

Db2 12 for z/OS

*Installation and Migration Guide*



**Notes**

Before using this information and the product it supports, be sure to read the general information under "Notices" at the end of this information.

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This edition applies to Db2<sup>®</sup> 12 for z/OS<sup>®</sup> (product number 5650-DB2), Db2 12 for z/OS Value Unit Edition (product number 5770-AF3), and to any subsequent releases until otherwise indicated in new editions. Make sure you are using the correct edition for the level of the product.

Specific changes are indicated by a vertical bar to the left of a change. A vertical bar to the left of a figure caption indicates that the figure has changed. Editorial changes that have no technical significance are not noted.

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## About this information

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This information describes installation and migration of Db2 for z/OS (Db2) in a data sharing and non-data-sharing environment.

Throughout this information, "Db2" means "Db2 12 for z/OS". References to other Db2 products use complete names or specific abbreviations.

**Important:** To find the most up to date content for Db2 12 for z/OS, always use [IBM® Documentation](#) or download the latest PDF file from [PDF format manuals for Db2 12 for z/OS \(Db2 for z/OS in IBM Documentation\)](#).

The availability of new function depends on the type of enhancement, the activated function level, and the application compatibility levels of applications. In the initial Db2 12 release, most new capabilities are enabled only after the activation of function level 500 or higher.

### Virtual storage enhancements

Virtual storage enhancements become available at the activation of the function level that introduces them or higher. Activation of function level 100 introduces all virtual storage enhancements in the initial Db2 12 release. That is, activation of function level 500 introduces no virtual storage enhancements.

### Subsystem parameters

New subsystem parameter settings are in effect only when the function level that introduced them or a higher function level is activated. Many subsystem parameter changes in the initial Db2 12 release take effect in function level 500. For more information about subsystem parameter changes in Db2 12, see [Subsystem parameter changes in Db2 12 \(Db2 for z/OS What's New?\)](#).

### Optimization enhancements

Optimization enhancements become available after the activation of the function level that introduces them or higher, and full prepare of the SQL statements. When a full prepare occurs depends on the statement type:

- For static SQL statements, after bind or rebind of the package
- For non-stabilized dynamic SQL statements, immediately, unless the statement is in the dynamic statement cache
- For stabilized dynamic SQL statements, after invalidation, free, or changed application compatibility level

Activation of function level 100 introduces all optimization enhancements in the initial Db2 12 release. That is, function level 500 introduces no optimization enhancements.

### SQL capabilities

New SQL capabilities become available after the activation of the function level that introduces them or higher, for applications that run at the equivalent application compatibility level or higher. New SQL capabilities in the initial Db2 12 release become available in function level 500 for applications that run at the equivalent application compatibility level or higher. You can continue to run SQL statements compatibly with lower function levels, or previous Db2 releases, including Db2 11 and DB2® 10. For details, see [Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

## Who should read this information

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This information is primarily intended for those people who are responsible for installing Db2 or setting up Db2 for distributed communications. This information is intended for those people who plan to install Db2 from the enterprise server using the installation CLIST.

This information assumes that you are familiar with:

- The basic concepts and facilities of Db2 in the z/OS environment
- The z/OS Time Sharing Option (TSO) and the z/OS Interactive System Productivity Facility (ISPF)

- The basic concepts of Structured Query Language (SQL)
- The basic concepts of Customer Information Control System (CICS®)
- The basic concepts of Information Management System (IMS)
- How to define and allocate z/OS data sets by using z/OS job control language (JCL)
- How to use IBM System Modification Program/Extended (SMP/E) to install IBM licensed programs

To set up Db2 for distributed communications, knowledge of Virtual Telecommunications Access Method (VTAM®) or Transmission Control Protocol/Internet Protocol (TCP/IP) is also needed.

## Db2 Utilities Suite for z/OS

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**Important:** Db2 Utilities Suite for z/OS is available as an optional product. You must separately order and purchase a license to such utilities, and discussion of those utility functions in this publication is not intended to otherwise imply that you have a license to them.

Db2 12 utilities can use the DFSORT program regardless of whether you purchased a license for DFSORT on your system. For more information about DFSORT, see <https://www.ibm.com/support/pages/dfsor>.

Db2 utilities can use IBM Db2 Sort for z/OS as an alternative to DFSORT for utility SORT and MERGE functions. Use of Db2 Sort for z/OS requires the purchase of a Db2 Sort for z/OS license. For more information about Db2 Sort for z/OS, see [Db2 Sort for z/OS documentation](#).

### Related concepts

[Db2 utilities packaging \(Db2 Utilities\)](#)

## Terminology and citations

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When referring to a Db2 product other than Db2 for z/OS, this information uses the product's full name to avoid ambiguity.

The following terms are used as indicated:

### Db2

Represents either the Db2 licensed program or a particular Db2 subsystem.

IBM rebranded DB2 to Db2, and Db2 for z/OS is the new name of the offering that was previously known as "DB2 for z/OS". For more information, see [Revised naming for IBM Db2 family products on IBM z/OS platform](#). As a result, you might sometimes still see references to the original names, such as "DB2 for z/OS" and "DB2", in different IBM web pages and documents. If the PID, Entitlement Entity, version, modification, and release information match, assume that they refer to the same product.

### IBM OMEGAMON® for Db2 Performance Expert on z/OS

Refers to any of the following products:

- IBM OMEGAMON for Db2 Performance Expert on z/OS
- IBM Db2 Performance Monitor on z/OS
- IBM Db2 Performance Expert for Multiplatforms and Workgroups
- IBM Db2 Buffer Pool Analyzer for z/OS

### C, C++, and C language

Represent the C or C++ programming language.

### CICS

Represents CICS Transaction Server for z/OS.

### IMS

Represents the IMS Database Manager or IMS Transaction Manager.

### MVS™

Represents the MVS element of the z/OS operating system, which is equivalent to the Base Control Program (BCP) component of the z/OS operating system.

## RACF®

Represents the functions that are provided by the RACF component of the z/OS Security Server.

## Accessibility features for Db2 for z/OS

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Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use information technology products successfully.

### Accessibility features

The following list includes the major accessibility features in z/OS products, including Db2 for z/OS. These features support:

- Keyboard-only operation.
- Interfaces that are commonly used by screen readers and screen magnifiers.
- Customization of display attributes such as color, contrast, and font size

**Tip:** IBM Documentation (which includes information for Db2 for z/OS) and its related publications are accessibility-enabled for the IBM Home Page Reader. You can operate all features using the keyboard instead of the mouse.

### Keyboard navigation

For information about navigating the Db2 for z/OS ISPF panels using TSO/E or ISPF, refer to the *z/OS TSO/E Primer*, the *z/OS TSO/E User's Guide*, and the *z/OS ISPF User's Guide*. These guides describe how to navigate each interface, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

### Related accessibility information

#### IBM and accessibility

See the *IBM Accessibility Center* at <http://www.ibm.com/able> for more information about the commitment that IBM has to accessibility.

## How to send your comments about Db2 for z/OS documentation

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Your feedback helps IBM to provide quality documentation.

Send any comments about Db2 for z/OS and related product documentation by email to [db2zinfo@us.ibm.com](mailto:db2zinfo@us.ibm.com).

To help us respond to your comment, include the following information in your email:

- The product name and version
- The address (URL) of the page, for comments about online documentation
- The book name and publication date, for comments about PDF manuals
- The topic or section title
- The specific text that you are commenting about and your comment

#### Related concepts

About Db2 12 for z/OS product documentation (Db2 for z/OS in IBM Documentation)

#### Related reference

PDF format manuals for Db2 12 for z/OS (Db2 for z/OS in IBM Documentation)

## How to read syntax diagrams

Certain conventions apply to the syntax diagrams that are used in IBM documentation.

Apply the following rules when reading the syntax diagrams that are used in Db2 for z/OS documentation:

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

The ►►— symbol indicates the beginning of a statement.

The —► symbol indicates that the statement syntax is continued on the next line.

The ►— symbol indicates that a statement is continued from the previous line.

The —►◄ symbol indicates the end of a statement.

- Required items appear on the horizontal line (the main path).

►► *required\_item* ◄◄

- Optional items appear below the main path.

►► *required\_item* ———— ◄◄  
                    └── *optional\_item* ───┘

If an optional item appears above the main path, that item has no effect on the execution of the statement and is used only for readability.

►► *required\_item* ———— ◄◄  
                    ┌── *optional\_item* ───┘

- If you can choose from two or more items, they appear vertically, in a stack.

If you *must* choose one of the items, one item of the stack appears on the main path.

►► *required\_item* ———— ◄◄  
                    └── *required\_choice1* ───┘  
                    └── *required\_choice2* ───┘

If choosing one of the items is optional, the entire stack appears below the main path.

►► *required\_item* ———— ◄◄  
                    ┌── *optional\_choice1* ───┘  
                    ┌── *optional\_choice2* ───┘

If one of the items is the default, it appears above the main path and the remaining choices are shown below.

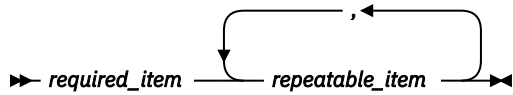
►► *required\_item* ———— ◄◄  
                    ┌── *default\_choice* ───┘  
                    ┌── *optional\_choice* ───┘  
                    ┌── *optional\_choice* ───┘

- An arrow returning to the left, above the main line, indicates an item that can be repeated.

►► *required\_item* ———— ◄◄  
                    ┌── *repeatable\_item* ───┘  
                    └──┘

If the repeat arrow contains a comma, you must separate repeated items with a comma.



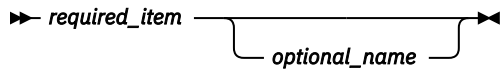


A repeat arrow above a stack indicates that you can repeat the items in the stack.

- Sometimes a diagram must be split into fragments. The syntax fragment is shown separately from the main syntax diagram, but the contents of the fragment should be read as if they are on the main path of the diagram.



**fragment-name**



- For some references in syntax diagrams, you must follow any rules described in the description for that diagram, and also rules that are described in other syntax diagrams. For example:
  - For *expression*, you must also follow the rules described in [Expressions \(Db2 SQL\)](#).
  - For references to *fullselect*, you must also follow the rules described in [fullselect \(Db2 SQL\)](#).
  - For references to *search-condition*, you must also follow the rules described in [Search conditions \(Db2 SQL\)](#).
- With the exception of XPath keywords, keywords appear in uppercase (for example, FROM). Keywords must be spelled exactly as shown.
- XPath keywords are defined as lowercase names, and must be spelled exactly as shown.
- Variables appear in all lowercase letters (for example, *column-name*). They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or other such symbols are shown, you must enter them as part of the syntax.

### **Related concepts**

[Commands in Db2 \(Db2 Commands\)](#)

[Db2 online utilities \(Db2 Utilities\)](#)

[Db2 stand-alone utilities \(Db2 Utilities\)](#)



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# Chapter 1. Installing or migrating to Db2 12

The essential steps are similar for both installing Db2 12 and migrating to Db2 12. When you migrate to Db2 12, you must also activate function levels 500 and 501 before many new capabilities can be used.

## Installation and migration tools

Db2 12 provides the following tools that help you complete the process of installing or migrating to Db2 12:

### Job control language (JCL) jobs

Each installation and migration JCL job helps you perform an installation or migration task.

### Installation and migration command list (CLIST)

The installation and migration CLIST helps tailor the installation and migration JCL jobs. It contains the necessary code for tailoring the jobs to suit your needs.

**Tip:** You can capture most settings of an existing Db2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44](#) and [“DSNTXAZP tool” on page 49](#).

### Interactive Systems Productivity Facility (ISPF) panels

You can use a series of ISPF panels to pass parameter values to the CLIST. The CLIST uses these values to tailor the installation and migration jobs. This process is described in [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43](#).

### Sample applications

The sample applications help you determine whether you installed or migrated Db2 correctly. Db2 provides a set of sample programs and procedures that help you determine if Db2 is operating correctly. For more information, see [Chapter 9, “Verifying successful Db2 12 installation or migration with sample applications,” on page 727](#).

All references to SYS1.PARMLIB also imply the logical PARMLIB data set that is used for Db2.

## Generating Db2 initialization code

Db2 executable parameters are prepared in a quick and simple procedure referred to as an *assembly*, which uses the supplied object code.

## Ability to defer decisions about Db2 characteristics

Db2 allows you to specify many subsystem characteristics during Db2 operation. You can modify initialization parameters, authorize users, define databases and tables, and tune Db2 while Db2 is running. Therefore, you can defer many decisions until after you finish installing or migrating Db2.

## Ability to update installation and migration options

During the process of installing or migrating, Db2 uses ISPF panels to prompt you for many options. Db2 allows you to update most of these options without requiring you to reinstall or remigrate. You can accept the default values for certain options and, after acquiring experience with Db2, tailor them to suit your needs.

### Related tasks

[“Installing, migrating, and enabling Db2 data sharing” on page 601](#)

Whether you need to install, migrate, or enable data sharing depends on the type of system that you start with and the type of system that you want to create.

[Installing the RACF access control module \(RACF Access Control Module Guide\)](#)

**Related reference**

[z/OS Parallel Sysplex Configuration Overview \(IBM Redbooks\)](#)

**Related information**

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# Chapter 2. Preparing your system to install or migrate to Db2 12

The key to a successful installation or migration of Db2 is planning. Prepare your environment and system before you begin installing or migrating.

## Before you begin

Familiarize yourself with the various changes that Db2 12 introduces, as described in [Changes to plan for in Db2 12 \(Db2 for z/OS What's New?\)](#).

In particular, plan to resolve any incompatible changes that might impact your migration to Db2 12. For a summary of such changes, see [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#) and [Function that Db2 12 no longer supports \(Db2 for z/OS What's New?\)](#).

Plan the amount of direct-access storage and virtual storage that you need. Planning and coordinating with other Db2 subsystems is essential if you plan to install the distributed data facility (DDF). Review the values that are needed for the parameters on the installation and migration panels. By planning in advance, your task of filling in the parameters becomes easier.

For information about specific planning for Db2 data sharing, see [“Planning for Db2 data sharing” on page 601](#).

## Related tasks

[Generating tailored Db2 12 installation, migration, or function level activation jobs](#)

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

[Controlling distributed data connections and database access threads \(DBATs\) \(Db2 Administration Guide\)](#)

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## Hardware and software requirements for Db2 for z/OS

Before you can install or migrate Db2 12, you must fulfill the hardware and software requirements.

Before installing or migrating to Db2 12 for z/OS, ensure that your system meets the following requirements:

<b>Hardware:</b>	IBM System z114 or IBM System z196 64-bit z/Architecture® or later
<b>Operating system:</b>	z/OS 2.1 or later

For information about system requirements for Db2 12 for z/OS, see the [Program Directories for Db2 12](#).

## Related reference

[Summary of operational requisite changes for Db2 function levels \(Db2 for z/OS What's New?\)](#)

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## Required maintenance for Db2 12 installation or migration

In addition to ensuring that you have required hardware and software products installed, you must ensure that required service changes for Db2 12 have been applied.

## FIXCATs for migrating to Db2 12

To help you identify the required service, z/OS provides enhanced HOLDDATA. Enhanced HOLDDATA categories (FIXCATs) provide a simplified, automated method of identifying and applying missing PTFs

that are required for installation or migration or to support specific product functions. For installation and migration to Db2 12, use the following FIXCATs:

<b>Fix category (FIXCAT)</b>	<b>Keyword</b>
IBM.Migrate-Fallback.DB2.V12	DB2MIGV12/K
IBM.Coexistence.DB2.SYSPLEXDataSharing	DB2COEXIST/K

You can use this automated process instead of manually reviewing Preventive Service Planning (PSP) buckets, identifying service that is already installed, and applying missing PTFs.

For more information about enhanced HOLDDATA and available FIXCATs, see the following pages:

- [Db2 for z/OS Keywords for searching APAR text](#)
- [IBM Fix Category Values and Descriptions](#)
- [Enhanced HOLDDATA for z/OS](#)

### **Related concepts**

[Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#)

### **Related information**

[Getting an RSU](#)

[IBM z/OS Consolidated Service Test and the RSU](#)

## **Required authorization for installation or migration**

You are not required to use the SYSADM or installation SYSADM authority to install or migrate a Db2 subsystem. Instead, you can use the installation SYSOPR authority to perform all installation or migration tasks while preventing unintended access to user data.

In Db2 11 and earlier releases, you needed the SYSADM authority to perform Db2 installation or migration tasks. In addition, you were required to have the installation SYSADM authority to run the DSNTIJTC job and the CATMAINT utility. However, the SYSADM and installation SYSADM authorities provide unrestricted access to all user objects in the subsystem, which in some cases was unintended and introduced unnecessary security risks.

Using the installation SYSOPR authority can help reduce those risks. The installation SYSOPR authority provides all the privileges that are required for installing or migrating Db2. For example, with installation SYSOPR, you can access catalog and directory objects, create, drop, or alter system objects, execute the -ACTIVATE command, specify the owner for the BIND and REBIND commands, and run the CATMAINT utility. However, you are not allowed any access to non-system objects or user data in the subsystem.

The overall process of installing or migrating Db2 with the installation SYSOPR authority is the same as that with the SYSADM authority. You can use the installation SYSOPR authority to perform all installation or migration tasks if you meet the following additional requirements:

- The primary or secondary authorization ID that performs installation or migration tasks must have the installation SYSOPR authority.
- The current SQLID that processes data definition statements must be set to SYSINSTL which owns all the system objects created by the installation SYSOPR authority.
- The OWNER option for the BIND and REBIND commands must be set to an ID that is authorized to bind and execute SQL statements in a package. To obtain the required authorization for migration to Db2 12, consider granting system DBADM authority with DATAACCESS to an ID that is authorized to bind and execute SQL statements. Revoke DBADM authority with DATAACCESS from that ID after migration is complete.

For installing Db2 12, specify an installation system administrator ID.

- The DSNTIAIN plan must be used with the DSNTIAD program to process all dynamic data definition statements for Db2 installation or migration. The DSNTIAIN plan is specifically provided for dynamically executing SQL statements when the primary or secondary authorization ID is granted the installation

SYSOPR authority and the current SQLID is set to SYSINSTL. The DSNTIAIN plan is bound by job DSNTIJTM when it is configured by the CLIST for installation or migration.

- An explicit qualifier must not be specified for the CREATE TABLE or CREATE INDEX statement. The qualifier can be implicitly specified through a leading SET CURRENT SCHEMA statement so that SYSINSTL can own the table or index.

You can configure installation or migration jobs to use the installation SYSOPR authority by running the CLIST and specifying SYSINSTL for the ROUTINES CREATOR, SEC DEF CREATOR, and INSTALL SQL ID fields on panel DSNTIPG. When INSTALL SQL ID is set to SYSINSTL, the authorization ID with the installation SYSOPR authority can create, alter, or drop the following objects:

- Auxiliary table
- Created global temporary table
- Database
- Function
- Index
- Procedure
- Procedure and function in schema, SYSTOOLS and SYSFUN
- Storage group
- Table
- Table space
- Trigger

You must explicitly specify the owner of a procedure or function package. If a stored procedure is created with the SECURITY DEFINER clause, you must define SYSINSTL in RACF. When the current SQLID is set to SYSINSTL, the authorization ID with the installation SYSOPR authority can grant certain privileges on some system objects and resources, as follows:

- All database, table space, and table privileges on objects in database DSNDDB04 and system databases DSNRGFDB, DSNRLST, DSNOPTDB, DSNMDCDB, DSNADMDB, DSNATPDB, DSN5JSDB, DSNMQDB, SYSIBMTA, SYSIBMTS, and DSNXSR
- The USE privilege on buffer pools and storage groups
- All privileges on plans that begin with 'DSN'
- All privileges on packages where the collection-ID and package-name begin with 'DSN'
- The EXECUTE privilege on system-defined routines.

In addition, the same authorization ID can create, alter, and drop the following objects without any additional privileges:

- Alias
- Distinct type
- Distinct type in schema, SYSTOOLS and SYSFUN
- Sequence
- Variable.

With additional privileges, the authorization ID can create and alter the following objects:

- A function that has any of the following characteristics: it uses a table as a parameter, it is sourced on another function, or it is defined with LANGUAGE JAVA and the EXTERNAL NAME clause specifies the name of a JAR file.
- An index that uses an expression.
- A procedure that is defined with LANGUAGE is JAVA and the EXTERNAL NAME clause specifies the name of a JAR file.
- A trigger when additional privileges are granted for executing SQL in the trigger definition.

- A view when the SELECT privilege on the base table or view is granted.

### **Related reference**

[DSNTIPG: Installation preferences panel](#)

The entries on the DSNTIPG panel specify the authorization IDs for installation and IVP jobs.

[DSNTIPP1: Protection panel 2](#)

Use the DSNTIPP1 panel to specify security options, including the authorization IDs that are required for system administrators and system operators, and the authorization IDs or roles that are required for security administrators. You can also specify the authorization IDs that are to be used to install, configure, and validate Db2-supplied routines.

## **Storage requirements for Db2 for z/OS**

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When you install or migrate Db2, consider the size of your site and how it will be set up to determine your storage needs.

You can use the installation CLIST to calculate your estimated storage needs. For details, see [“Calculating storage requirements with the installation CLIST”](#) on page 6.

The parameters that you specify when you run the installation CLIST affect the sizes of some data sets and the required amount of virtual storage. All data sets are linear data sets, with the exception of the bootstrap data set, which is a key-sequenced data set.

You can use Data Facility Storage Management Subsystem (DFSMS) to manage Db2 data sets. It provides automatic backup and recovery features, which might require disk storage beyond what is estimated below. Starting in DB2 10, data sets for the Db2 catalog and directory are managed by Db2 and must be SMS-managed. The SMS environment that you used for DB2 10 can be used for Db2 12. You are not required to convert existing Db2 catalog and directory data sets to the SMS environment before migrating to Db2 12. These data sets will be converted the next time the related table space is reorganized.

### **Related concepts**

[Storage estimates for data sharing environments](#)

As part of planning for a data sharing environment, you should estimate the storage requirements for coupling facility structures and for Db2 resources.

[DFSMSHsm Storage Administration Reference](#)

[Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#)

### **Related reference**

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## **Calculating storage requirements with the installation CLIST**

By providing information about the sizes of your Db2 environment, you can use the installation CLIST to calculate certain storage requirements for your Db2 subsystem.

### **Before you begin**

For information about increased EDM storage requirements in Db2 12, see [Increased EDM storage usage for DBDs \(in Storage release incompatibilities\)](#).

### **About this task**

The CLIST contains the algorithms that Db2 uses to calculate storage based on the parameters that you supply during installation or migration.



## Procedure

1. Run the installation CLIST, as described in Chapter 4, “[Generating tailored Db2 12 installation, migration, or function level activation jobs,](#)” on page 43.
2. In the INSTALL TYPE field on panel DSNTIPA1, specify INSTALL.  
If you specify MIGRATE for the INSTALL TYPE field, Db2 12 uses values from Db2 11 instead of running the CLIST calculations.
3. On panel DSNTIPD, specify field values that describe the size of your Db2 environment.  
Specify integer values, not fractions. You can use K (as in 32 K) for multiples of 1024 bytes and M (as in 16 M) for multiples of 1,048,576 bytes in most fields. do not exceed the maximum value that is accepted by the field.

The CLIST uses the values that you specify to calculate storage requirements. You can see the calculation results on the fields of the CLIST calculations panel: DSNTIPC.

4. On panel DSNTIPC, specify whether to accept the calculated values.

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

## What to do next

If you want to examine the algorithms that Db2 uses for the CLIST calculations, that Db2 uses, print or edit the installation CLIST and REXX EXEC. The DSNTCALC EXEC contains most of the data set calculations.

### Related concepts

[Storage release incompatibilities in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related reference

[DSNTIPD: Sizes panel 1](#)

The entries on the DSNTIPD panel establish the size of the Db2 catalog, directory, and log data sets. Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

## Db2 subsystem storage requirements

You must configure storage sizes for your Db2 subsystem.

You can use the installation CLIST to calculate storage requirements for your Db2 installation. For details, see “[Calculating storage requirements with the installation CLIST](#)” on page 6.

If you do not accept the default values, you can calculate the storage that you need for the Db2 data sets by using the information in [Active log data sets storage requirements](#). For other data sets, you can use the formulas in the CLIST. After calculating the required storage for each data set, you can calculate the total requirements.

Although the Db2 libraries require a fixed amount of space, disk requirements for active logs and the Db2 catalog increase with the size of a site. You need additional space for archive logs, image copies, user databases, and other working data sets.

### Related concepts

[Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#)

## Related reference

[DSNTIPD: Sizes panel 1](#)

The entries on the DSNTIPD panel establish the size of the Db2 catalog, directory, and log data sets. Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

## Db2 catalog storage requirements

Estimated storage requirements for the Db2 catalog include space for the entire set of Db2 catalog data sets and their indexes.

Data sets for the Db2 catalog and directory are managed by Db2 and must be SMS-managed. The SMS environment that you use for Db2 catalog and directory data sets must be established before you begin installation or migration to Db2 12. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing Db2 catalog and directory data sets to the SMS environment before migrating to Db2 12. These data sets will be converted the next time that the related table space is reorganized.

## Related tasks

[Changing catalog and directory size and location \(Db2 Performance\)](#)

## Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Db2 directory storage requirements

The amount of directory space required for the Db2 directory depends mainly on the number of user databases, application plans and packages, and tables in the Db2 subsystem.

Data sets for the Db2 catalog and directory are managed by Db2 and must be SMS-managed. The SMS environment that you use for Db2 catalog and directory data sets must be established before you begin installation or migration to Db2 12. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing Db2 catalog and directory data sets to the SMS environment before migrating to Db2 12. These data sets will be converted the next time the related table space is reorganized.

A typical site requires about 808 cylinders for the Db2 directory.

## Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Active log data sets storage requirements

Active log data sets record significant events and data changes. Active log data sets are periodically offloaded to archive log data sets. Storage requirements for active log data sets depend on the frequency of data updates and of offloads to archive log data sets.

Before function level 500 or higher is activated, the maximum data set size is 4 GB. If you use 3390 volumes, in the DEFINE CLUSTER command, define the data set with a primary quantity that is big enough to hold the entire active log, and a secondary quantity of 0. Ensure that the allocation for each active log data set does not exceed the following values:

For 3390-9 volumes:

- 87375 tracks, if allocated in units of tracks
- 5825 cylinders, if allocated in units of cylinders

For 3390-A volumes:

- 5817 cylinders. 3390-A volumes are extended address volumes (EAV), for which the space allocation unit can be 21 cylinders, instead of one cylinder. For more information, see [DEFINE CLUSTER command \(DFSMS Access Method Services for Catalogs\)](#).

After function level 500 or higher is activated, the maximum data set size is 768 GB. In most cases, the best data set size is considerably less than 768 GB. When you define a data set that is greater than 4 GB, you need to specify Extended Format (EF) in the SMS data class definition.

You must also ensure that each archive log data set is at least as large as your active log data sets. In Db2 12, subsystem parameter ALCUNIT is removed, and the allocation unit for the PRIQTY and SECQTY subsystem parameters is always cylinders, so you might need to adjust those values. Set subsystem parameters PRIQTY and SECQTY so that the archive log can extend to contain the active log. If the active log data set size is greater than 4 GB, you need to specify Extended Addressability in the SMS data class definition for the archive log data sets. Doing this allows a maximum number of 123 extents for each volume, instead of 16 extents for a data set type of BASIC or LARGE. If your SMS data class attribute Override Space is set to YES, the data class space settings can override the Db2 subsystem parameter settings. In that case, you need to ensure the space quantities that you specify for the data class allow the archive logs to contain the active logs.

If the archive logs are written to tape, a large data set might require two tapes instead of one. For real tape, space might also be wasted on the tapes. Therefore, you must adjust your data set sizes that are based on the size of your real or virtual tapes. Most tape products use compaction. You can also use DFSMS to compress the archive log data sets.

When Db2 fills up one active log data set, it must offload the log data to an archive log data set. At the same time, Db2 begins writing to the next active log data set. When Db2 reaches the last active log data set, it starts again with the first active log data set. However, if the applications catch up to the offload process, the applications are suspended until the offload process can finish writing the next active log data set. Such application suspensions often happen because of the following situations:

- Large batch jobs that insert, update, or delete data.
- Frequent inserts.
- Logging of large LOBs.
- The offload operation is too slow.

To prevent such application suspensions, you can use any of the following approaches:

- Enable fast offload operations. For example, you might place the archive log data sets on a disk device that has fast channels. (You might move the data sets to tape later.)
- Allocate a large amount of active log space to support sustained bursts of insert, update, delete activity. After function level 500 or higher is activated in Db2 12, Db2 supports as many as 93 active log data sets with a maximum size of 768 GB each. This limit provides up to 71,424 GB of active log space. You must double the space calculation for dual logging. In many cases, fewer than the maximum number of data sets can be used. Two data sets might be sufficient. However, the more log space that you allocate, the larger a burst of insert, update, and delete operations can be without causing performance problems.

During startup, Db2 allocates the BSDS data set, all of the active log data sets, and, when dual logging is used, all secondary log data sets. When in a data sharing group, Db2 also allocates peer BSDS data sets and active log data sets as necessary during execution. To avoid exhausting the space in the MVS task I/O table (TIOT) for the Db2 system services address space (*ssnmMSTR*), which can cause Db2 to fail, perform the following actions:

1. Set the MVS TIOT size to 64K in the ALLOCxx PARMLIB member.
2. Specify NON\_VSAM\_XTIOT=YES in the DEVSUPxx PARMLIB member to enable Db2 to use the MVS extended task I/O table (XTIOT) when allocating offload data sets.
3. Specify a dynamic volume count (DVC) of 0 for any SMS data set class that is used to allocate a Db2 BSDS, active log, or secondary log data set.
4. Reallocate any existing BSDS, active log, or secondary log data sets that were allocated with a DVC greater than 0.

Also, as a rule, reading active log data sets is faster than reading archive log data sets, even if the archive log data sets are stored on disk. (A possible exception to this rule is if you use DFSMS compression for the archive logs.) If your recovery performance depends on the speed of reading the logs, then recovery performance can benefit from having as many active log data sets as possible.

Consider the amount of log data that is written and archived each day. For example, assume you want the ability to restore the database to a point in time 48 hours ago and apply the log records from the past 48 hours with good performance. In that case, you must retain 48 hours of log data on disk. If your applications generate 100 GB of log data per day, you need 200 GB of log space on disk, to apply two days of log records from disk. All 200 GB can be saved in active log data sets if you allocate enough space. If you do not allocate enough space, then the rest of the log data must be read from archive log data sets.

How you plan to manage database recovery and how you manage your archive log data sets are closely related. If your archive log data sets are on tape (no matter whether they are virtual or real tapes), two recover jobs cannot allocate the same tape at the same time. Contention is worse if multiple data sets are stored on a single tape. For that reason, it is often best if the archive logs are stored on real disk devices instead of tape.

However, you can use the following alternative approaches to reduce the cost of storing the archive logs:

- Use inexpensive nearline drives for the archive logs.
- Store the archive log data sets on tape, and recall the archive log data sets from tape to disk before you submit recovery jobs.
- Tolerate slow recovery.

However, remember as you plan for managing Db2 logs, that it is too late to change your approach when you must recover your Db2 database.

## Checkpoint frequency

The CHECKPOINT TYPE field on panel DSNTIPL1 specifies whether the frequency of system checkpoints is controlled by number of consecutive log records, number of minutes, or both. The RECORDS/CHECKPOINT field and MINUTES/CHECKPOINT field on panel DSNTIPL1 determine the number of log records between checkpoints or the number of minutes per checkpoint. When you choose a value for the checkpoint frequency, you must consider the trade-offs between the costs of frequent subsystem checkpoints and the time that is needed to restart a Db2 subsystem after a termination without a quiesce. If the checkpoint value is more than 1,000,000 log records, the time that is needed to restart Db2 after a termination without a quiesce can grow to over 15 minutes. Typical values for the checkpoint frequency are in the range of 500,000–1,000,000 log records or 2–5 minutes.

## Change data capture

When tables are defined with the DATA CAPTURE CHANGES option, the entire before-image of an updated row is captured on the log. This additional information can represent an increase in log data that is compared to tables that are not defined with the DATA CAPTURE CHANGES option, depending on whether the table contains fixed-length or variable-length rows.

### Related concepts

[Logging environment for data sharing \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Improving log capacity \(Db2 Performance\)](#)

### Related reference

[DSNTIPL1: Checkpoint parameters](#)

The entries on the DSNTIPL1 panel define characteristics for log checkpoints.

## Bootstrap data sets storage requirements

Each bootstrap data set (BSDS) requires 15 MB. During installation, Db2 automatically allocates two copies of the BSDS. During migration, Db2 12 adopts the BSDS characteristics that you specified for your previous version.

That is, if you specified two copies of the BSDSs for your previous version, you will have two copies for Db2 12. Keeping two copies of the BSDS is strongly recommended. The total space requirement is about 30 MB for both BSDSs. The BSDSs require about 45 cylinders of 3390 storage.

### Related concepts

[Management of the bootstrap data set \(Db2 Administration Guide\)](#)

## Work file database storage requirements

The work file database is used as storage for processing SQL statements that require working storage.

Work file storage is used for sorting, RID pool overflow to work files, and for temporary tables and common table expressions.

Work file usage varies, depending on the number of operations that require work files, and the number of concurrent users that require work files. You can monitor work file usage by gathering Db2 statistics traces. Use the high water mark value for work file usage from the traces as a guideline for determining the amount of space to allocate for work files.

If you are installing Db2, see [“Storage requirements for installation” on page 13](#).

## Storage requirements for migration

You might need more storage for the work file database if you have a large amount of data to sort and a large amount of concurrent sort activity. If you are sorting compressed data, allow for the same amount of storage that you would need if the data were not compressed. The maximum amount of storage that you need is enough to satisfy the requirements of the largest combination of concurrent activities that use the work file database. The amount of storage that is required for a sort depends on the following variables:

- Data size
- Sort key size

**Important:** For migration to Db2 12, you might need to increase your 32KB work file allocations for work file data sets and work file buffer pools. If you did not define 32KB work files in previous Db2 releases, you might need to define 32KB work files in Db2 12. To implement improvements in sort processing and performance, Db2 12 uses more 32KB work files than previous Db2 releases. For sorting a very large number of records, Db2 12 might require 32KB work files, even though previous releases did not use them.

When Db2 12 uses 32KB work files for sorting a very large number of records, and there is an insufficient amount of 32KB work file space, Db2 12 cannot use work files of a smaller size. The operation that requires the sort fails with an error that indicates that there is not enough work file space.

You can estimate the total amount of work file space that is needed to perform the sort as follows:

- Let *MIN* be the operation of selecting the lowest value from a set of values.
- Let *FLOOR* be the operation of discarding the decimal portion of a real number.
- Let *CEILING* be the operation of rounding a real number up to the next-highest integer.
- Let *Data* be the total data length in bytes.
- Let *Key* be the total length of the sort key.
- Let *Row-overhead* be the 6-byte record header plus the 2-byte record page map entry.
- Let *Prefix* be the 16-byte header.

- Let *Rows* be the total number of rows that are being sorted.
- Let *Segsize* be the segment size.

Then calculate as follows:

```

Records per page = MIN(MAXROWS, FLOOR (4056 / (Data + Key + Row-overhead)))
Total pages = CEILING (Rows / Records per page)
Total segments = CEILING (Total pages / Segsize)
Total pages used = Total segments * Segsize

```

The number of records per page cannot exceed 255 (the value of MAXROWS).

This result tells you how much storage is needed in the work file database after sort processing. However, if a merge phase was required during sort processing, an additional intermediate copy of the records might exist at any given time. For most subsystems, you can assume that about half of the records that are involved in a sort have two copies. Therefore, a multiplier value of 1.5 is safe. If you want to be conservative, choose 2 for your multiplier value. Therefore, the amount of storage that is used in the work file database during sort processing can vary in the range 1–2 times the storage that is needed after sort processing. The actual storage that is used might also increase if you have little available buffer pool storage.

When a large object (LOB) column is part of a result table, and the result table must be placed in a work file for sorting, the actual LOB column data is not placed in the work file. Therefore, LOB columns do not require large increases in the amount of work file space that Db2 requires. For work file calculations, you can assume 51 bytes of storage per LOB column for the work file.

However, if a large object (LOB) column is defined with the *INLINE* attribute and the result table must be placed in a work file, the inline LOB data will be placed in the work file. Therefore, work file calculations need to account for the length of the inline LOB.

To determine the number of tracks that are needed, convert the number of pages into bytes, and divide the result by the number of bytes per unit. Let *r* be the number of 4096-byte records per track, and let *safety\_factor* be a number from 1.5 to 2.0. For 3390 devices, *r* is 12.

```

Tracks = CEILING (Total pages used / r) * safety_factor

```

**Example 1:** Consider a table (TABLE1) that contains 45,327 rows, for which you want to create a *nonunique padded index* on COL1 CHAR(3) NOT NULL, COL2 CHAR(4), COL3 VARCHAR(20), and COL4 SMALLINT. Determine the amount of temporary storage that Db2 needs to create this index as follows:

- $Data = 3 + (4 + 1) + (20 + 1) + (2 + 1) + 4 = 36$
- $Key = 36$  (*Data* plus RID is key for CREATE INDEX)
- $Rows = 45,327$
- $Record\ overhead = 8$
- $Records\ per\ page = MIN(MAXROWS, FLOOR (4056 / (36 + 36 + 12))) = 48$
- $Total\ pages = CEILING (45,327 / 50) = 907$
- $Segments = CEILING (907 / 24) = 38$
- $Total\ pages\ used = CEILING (38 * 24) = 912$
- $Tracks = CEILING (912 / 12) * 1.5 = 114$

Example 1 is a data page calculation for storing index keys in the work file database. For this example, 114 tracks of a 3390 storage device are needed. The 2-byte length field of a VARCHAR column is not a part of *Data* for CREATE INDEX. The RID field is a part of *Data*, and the *Key* includes the entire *Data* portion, including the RID.

**Example 2:** Consider TABLE1 again and the following SQL query:

**GUIP**

```
SELECT COL1, COL2, COL3, COL4
FROM TABLE1
ORDER BY COL2, COL3, COL1;
```

**GUIP**

This query, which includes an ORDER BY clause, requires a sort. Determine the amount of temporary storage that is required for this table as follows:

- $Data = 3 + (4 + 1) + (20 + 2 + 1) + (2 + 1) = 34$
- $Key = (4 + 1) + (20 + 1) + 3 = 29$
- $Rows = 45,327$
- $Record\ overhead = 8$
- $Segsize = 24$
- $Records\ per\ page = \text{MIN}(\text{MAXROWS}, \text{FLOOR}(4056 / (34 + 29 + 12))) = 54$
- $Total\ pages\ (final\ result) = \text{CEILING}(45,327 / 57) = 796$
- $Segments\ (final\ result) = \text{CEILING}(796 / 24) = 34$
- $Total\ pages\ used = \text{CEILING}(34 * 24) = 816$
- $Tracks = \text{CEILING}(816 / 12) * 1.5 = 102$
- $Total\ pages\ (during\ processing) = \text{CEILING}(1.5 * 796) = 1194$
- $Segments\ (during\ processing) = \text{CEILING}(1.5 * 34) = 51$
- $Total\ pages\ used\ (during\ processing) = \text{CEILING}(51 * 24) = 1224$
- $Tracks\ (during\ processing) = \text{CEILING}(1224 / 12) * 1.5 = 153$

For this example, which is a table calculation, 102 tracks of a 3390 storage device are needed. The 2-byte length field of a VARCHAR column is a part of *Data*, and the *Key* does not include the entire *Data* portion.

You can use the sort summary trace record, IFCID 96, to simplify some of the calculations. This record shows the number of records that are sorted, the sort record size (*Data + Key*), and an indication of whether a merge phase was required for an individual sort request.

Also note that if the overall record length (*Data + Key + Prefix*) exceeds 100 bytes, Db2 attempts to create the work file in a table space with a 32 KB page size. If the overall record length is 100 bytes or less, Db2 uses a table space with a 4 KB page size.

## Storage requirements for installation

If you are installing Db2, use the following calculations to determine either PRIQTY (primary space allocation) or DSSIZE and MAXPARTITION values for creating work file table spaces. During installation, you must create at least one 4 KB work file table space and one 32 KB work file table space.

### For 4 KB work file table spaces:

- Let *total space* be the total amount of space in megabytes (from the TEMP 4K SPACE field on panel DSNTIP9).
- Let *table spaces* be the number of table spaces (from the TEMP 4K TBL SPACES field on panel DSNTIP9).
- Let CEILING be the operation of rounding a real number up to the next-highest integer.
- Let *GB per table space* be the amount of space per work file table space in gigabytes.

Calculate the following:

```
GB per table space = CEILING (total space / table spaces / 1024)
```

```
If GB per table space < 1 GB, then PRIQTY = CEILING (total space / table spaces
```

```
If GB per table space ≤ 16 384 GB, then DSSIZE = 4 GB
```

and MAXPARTITIONS = GB per table space / 4  
Otherwise, DSSIZE = 4 GB and MAXPARTITIONS = 4096

### For 32 KB work file table spaces:

- Let *total space* be the total amount of space in megabytes (from the TEMP 32K SPACE field on panel DSNTIP9).
- Let *table spaces* be the number of table spaces (from the TEMP 32K TBL SPACES field on panel DSNTIP9).
- Let CEILING be the operation of rounding a real number up to the next-highest integer.
- Let *GB per table space* be the amount of space per work file table space in gigabytes.

Calculate the following:

$GB\ per\ table\ space = CEILING (total\ space / table\ spaces / 1024)$

If *GB per table space* < 1 GB, then  $PRIQTY = CEILING (total\ space / table\ spaces)$

If *GB per table space* ≤ 16 384 GB, then DSSIZE = 4 GB

and MAXPARTITIONS = *GB per table space* / 4

If *GB per table space* ≤ 131 072 GB, then DSSIZE = 32 GB

and MAXPARTITIONS = *GB per table space* / 32

Otherwise, DSSIZE = 32 GB and MAXPARTITIONS = 4096

### Related concepts

[Diagnostic traces for attachment facilities \(Db2 Administration Guide\)](#)

### Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Default database storage requirements

The size of the default database depends on column lengths, page sizes, and index column lengths.

The estimated size of your data, multiplied by 2, usually provides an adequate planning estimate for the default database size.

## Dump data set size storage requirements

When planning for your Db2 subsystem storage, you must reserve enough space for the dump data sets. The storage requirements depend on factors such as the number of dump data sets you have defined and whether you invoke authorized Language Environment® functions.

**Recommendation:** Use the following guidelines to estimate storage requirements for the dump data sets:

- Have at least two dump data sets.
- Have approximately 1000 cylinders for all dump data sets.

If you invoke authorized Language Environment functions, a different style of dump might be generated, which requires approximately 520 cylinders.

- Have 3.25 MB of space for Db2 volatile summary storage data.

Summary data in dumps is usually enough to diagnose most problems. In addition to summary data, Db2 also requests a SDUMP from the operating system to provide these additional storage areas if enough space is available in the dump data set:

- Db2 system services address space
- Db2 database services address space
- Db2 distributed data facility (DDF) address space
- Allied address space of the failing allied task
- IRLM address space for data sharing environments



Db2 passes the following parameters to the SDUMP service aid through the SDATA keyword: SQA, ALLPSA, LSQA, SUMDUMP, and CSA (subpools 231 and 241).

After Db2 SVC dump processing is complete, z/OS issues message IEA911E to indicate whether enough space was available in the dump data set to contain the requested storage areas. If this message indicates that a partial dump was taken, but the 3.25 MB of summary storage is available in the dump, this dump is probably enough for problem diagnosis. Otherwise, IBM Software Support might request that you re-create the problem if storage areas that are required for problem determination are not included in the dump.

## System databases storage requirements

The Db2 installation process automatically creates system databases for the resource limit facility, DDL registration, and EXPLAIN tables that are created under the SYSIBM schema. The storage requirements for these databases depend on the amount of user data that they each contain.

## Archive log data sets storage requirements

If you decide to store the archive log data sets on disk, you need to reserve enough space on the device. The active log data set and the BSDS are both written to the same location. Therefore, you must reserve enough storage for the active log and the BSDS.

**Recommendation:** You should store archive logs on disk, especially if Db2 will be running in data sharing mode.

The amount of space for the archive primary and secondary archive log space are calculated as follows:

The primary space (PRIQTY subsystem parameter) is set to the size of the active log data set. The secondary space (SECQTY subsystem parameter) is set to a quarter the size of the active log data set.

### Related concepts

#### Active log data sets storage requirements

Active log data sets record significant events and data changes. Active log data sets are periodically offloaded to archive log data sets. Storage requirements for active log data sets depend on the frequency of data updates and of offloads to archive log data sets.

#### Bootstrap data sets storage requirements

Each bootstrap data set (BSDS) requires 15 MB. During installation, Db2 automatically allocates two copies of the BSDS. During migration, Db2 12 adopts the BSDS characteristics that you specified for your previous version.

### Related reference

#### DSNTIPC1: CLIST calculations panel 2

The DSNTIPC1 panel displays CLIST messages that indicate a variety of calculations. This panel is displayed only when you run the CLIST in INSTALL mode.

## Profile tables storage requirements

You need to reserve disk space for profile tables.

The amount of required disk space is approximately 100 to 200 MB.

### Related reference

#### Profile tables (Db2 Performance)

## Virtual storage requirements for Db2 address spaces

Db2 uses several types of private address spaces, and each type requires storage.

### Tip:

You might notice that the sample jobs sometimes use a region size of 0 KB. This region size is meant to simplify the installation process in those particular cases. In the following recommendations, the region

sizes are based on average use under normal circumstances on typical systems. Your requirements might be quite different.

#### **Database services address space (*ssnmDBM1*)**

The *database services address space* is responsible for accessing relational databases that are controlled by Db2 for z/OS and provides most database-related services. The input and output to database resources is performed on behalf of SQL application programs in this address space. It is the largest Db2 address space. It uses storage above the 2 GB bar. The default start up procedure is DSN1DBM1. First, plan for a minimum of 90 MB in this address space, with 2 MB below the 16 MB line.

Most modules reside in the 31-bit extended private area. Storage usage below the 16-MB line is typically less than 2 MB.

#### **System services address space (*ssnmMSTR*)**

The *system services address space* starts and stops Db2, and controls local access to Db2 for z/OS, and performs various system-related functions. It needs less space than the database services address space (*ssnmDBM1*). Specify 0 KB for the system services address space. The default start up procedure is DSN1MSTR.

#### **Distributed data facility (DDF) services address space (*ssnmDIST*)**

The *distributed data facility address space* supports network communications with other remote systems and execution of database access requests on behalf of remote users. Use the default region size of 0 KB. This address space is started as part of DDF initialization. The start-up procedure is DSN1DIST.

#### **Internal resource lock manager (IRLM) address space (*irlmproc*)**

Db2 uses the *IRLM address space* to control access to database resources and locking. When row locking is used, the number of locks that Db2 acquires might increase, which might in turn increase the amount of storage that IRLM requires. The number of locks that are acquired is dependent on your application.

You can estimate the IRLM control block structure at 540 bytes per lock. IRLM no longer supports placing locks in ECSA. All IRLM locks are now placed in the IRLM private address space.

**Tip:** In the IRLM address space startup procedure, set the region size to 0 (RGN=0), and set an estimated value for the amount of above-the-bar storage that the IRLM address space can request (MLMT=*integer*).

The PC and MAXCSA parameters are no longer used, but you must maintain them for compatibility reasons. You must specify the parameters and values, but their values are not used. The MAXCSA value must be in the range 0–9999. The amount of available storage for IRLM private control blocks, including locks, is determined by the operating system and site-specific IPL parameters. IRLM reserves approximately 10% of the available private storage to be used for must-complete lock requests.

Use the MODIFY *irlmproc*,STATUS,STOR command to view and monitor the amount of private storage that IRLM has available.

You can dynamically adjust the amount of below-the-bar private storage by using the MODIFY *irlmproc* SET,PVT command. This command changes only the monitoring threshold of private storage for IRLM.

You can dynamically adjust the limit for above-the-bar private storage by using the MODIFY *irlmproc* SET,MLT command. This command updates only the MEMLIMIT that z/OS uses to control the amount of above-the-bar storage that can be requested by an address space. A new value remains in effect until the next time IRLM is stopped and restarted or until the MODIFY command is issued successfully again.

Neither of these MODIFY commands change the physical amount of storage that the operating system assigns to the address space.

Enabling data sharing further increases the storage that IRLM requires.

### Allied agent address spaces

In Db2, an *allied agent address space* is any user address space that attaches to Db2. This address space can include Resource Recovery Services attachment facility (RRSAF), TSO attachment facility, IMS attachment facility, CICS attachment facility, and batch address spaces.

The size of the Db2 attachment facility code in the allied agent address space depends on which attachment facilities you use. TSO requires about 372 KB for the DSN command. CAF, IMS, and RRSAF each require about 36 KB for the Db2 attachment facility code. For all attachment facilities, except CICS Transaction Server and RRSAF, the Db2 attachment facility code must run below the 16 MB line of virtual storage. Applications can run above the 16 MB line.

### Db2 stored procedures address spaces (WLM-named)

*WLM-established stored procedures address spaces* are WLM-established address spaces that can provide multiple isolated environments for stored procedures.

Each WLM-established stored procedures address space is associated with a Workload Manager environment.

Db2 for z/OS stored procedures support both main programs and subprograms; this support requires additional storage for each task control block (TCB). However, because you can run fewer programs in an address space, you can use less storage below the 16 MB line in each address space.

The amount of space that is required by a WLM-established stored procedures address space depends on the applications. Stored procedures that internally store a large amount of in-process work require more space than those that do not store much in-process work. Also, Java™ stored procedures require more space than others, such as COBOL stored procedures.

The overall amount of required space depends on the number of WLM-established stored procedures address spaces that are running, and the amount of space that is required for each.

### Administrative task scheduler address space

Each Db2 subsystem has a coordinated *administrative task scheduler address space* that it can start by using a z/OS started task procedure.

Therefore, if there are many Db2 subsystems running on a single z/OS system, there is a separate administrative task scheduler with a separate name for each one.

Two instances of the same administrative task scheduler cannot run simultaneously. To avoid starting up a duplicate administrative task scheduler, at startup the administrative task scheduler checks all of the address spaces control block first to ensure that there is no address space other than itself with the same name. If another address space with the same name is already up and running, the administrative task scheduler that is starting up immediately shuts down with a console error message. The administrative task scheduler can check only the address spaces that are in the same system, not in the entire Sysplex.

The administrative task scheduler address space stays up, even when Db2 comes down.

Db2 also uses extended common service area (ECSA), 64-bit common storage, and the z/OS Shared Memory Facility. For more information, see [“Shared memory storage requirements” on page 20](#) and [“Common service area storage requirements” on page 17](#).

### Related concepts

[Db2 address spaces in the z/OS environment \(Introduction to Db2 for z/OS\)](#)

## Common service area storage requirements

Some of the Db2 load modules and control blocks are in common storage. Most of the space is in the extended common service area (ECSA) and 64-bit common storage.

With few exceptions, the CSA-resident load modules are link-edited with the residency attribute of RMODE(ANY). Most of the modules reside in ECSA (above the 16 MB line of virtual storage), as do most of the global control blocks. The IRLM lock control blocks (RHB and RLB) use 64-bit private storage.

Monitor your use of CSA and ECSA, and increase those values if necessary. By monitoring CSA below the 16-MB line, you can determine whether you need to increase the size of the ECSA.

When you IPL z/OS, you can override the CSA size with this syntax:

```
CSA=(a,b)
```

where:

- *a* is the number of kilobytes of CSA storage below the 16 MB line
- *b* is the number of kilobytes of ECSA storage above the 16 MB line

The CSA value is rounded down to the next 1 MB boundary, while the ECSA value is rounded up to the next 1 MB boundary.

To define the size of the 64-bit common area, you can use the HVCOMMON parameter of the IEASYSxx member in the parmlib concatenation.

Db2 12 requires 64-bit common storage. Db2 requires that at least 6 GB of 64-bit common storage is defined for each Db2 subsystem that runs on a z/OS image. Additionally, the 64-bit common storage must be large enough to accommodate the size of the log buffers that is specified by the OUTBUFF subsystem parameter plus 15%.

**Restriction:** Ensure that you have defined a high enough value for HVCOMMON to satisfy requirements for all Db2 subsystems plus all other use on the LPAR. The default value is 66 GB. The 6 GB of 64-bit common storage that is requested for each member must be contiguous.

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

### Related reference

[Common Service Area \(CSA/Extended CSA\) \(MVS Initialization and Tuning Guide\)](#)

## Calculating the storage requirement for the common service area

You need to calculate the approximate storage requirement for the common service area (CSA). Under normal conditions, your virtual storage requirements in the CSA (below the 16-MB line) are unlikely to increase.

### About this task

In a data sharing environment, if an IRLM performs member recovery or structure rebuilding, additional virtual storage is required. Any other increase in the amount of virtual storage that is needed occurs within the extended private area of the Db2 database address space and the extended private area of the distributed data address space.

### Procedure

To calculate the approximate residual requirement for CSA (below the 16-MB line):

1. Start with up to 40 KB for each Db2 subsystem.
2. Add 24 KB for each started IRLM.

## Calculating the storage requirement for the extended common service area

You must calculate the approximate storage requirement for the extended common service area (ECSA).

### Before you begin

Determine the values of the following subsystem parameters for use in the calculations:

- “MAX USERS field (CTHREAD subsystem parameter)” on [page 160](#)
- “MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)” on [page 160](#)
- “MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)” on [page 161](#)

## Procedure

- To estimate storage that is needed for ECSA (above the 16-MB line) for each local Db2 subsystem, use the following calculations:
  - a) Start with 5 MB of ECSA for the base.
  - b) Add 4 KB for each user. You can use  $(MAXDBAT-value + CTHREAD-value) \times 4$  KB.
  - c) Add 5 MB for each IRLM subsystem.

Each IRLM subsystem uses 4 - 5 MB of ECSA when no workload is active and the default trace settings are used. As the workload increases, the ECSA use in IRLM for locking might also increase, depending on the type of requests processed by IRLM.

For example, if a workload processes a large number of queries or notifies through IFI calls, the ECSA increases depending on the number of locks held, number of threads, number of members in the data sharing group, and so forth. When multiple IFI requests run concurrently, the ability of IRLM to reuse and or release the ECSA storage is reduced. In such scenarios, the ECSA usage by IRLM might go up to 10 MB.
  - d) If optional tracing is used for IRLM with the TRACE parameter, add memory for the IRLM optional trace buffers:
    - If TRACE=YES is used, add 1.3 MB.
    - If TRACE=*n* is used, where *n* is the number of optional trace buffers, add  $512 \times n$  KB.
  - e) Add at least 8 MB, and as much as 50 MB, for the instrumentation facility interface (IFI), for IFI buffers as requested by monitoring programs and the standard trace classes for accounting (1, 2, 3, 7, and 8) and statistics (1, 3, 4, 5 and 6).

If Db2 encounters a shortage of ECSA storage for IFI processing, Db2 can continue processing threads, but trace records might be lost until the ECSA shortage is resolved.

Traces that are likely to increase the storage requirement above the 8 MB minimum include: IFCID 003 or IFCID 148 with more than 10 active buffer pools (or group buffer pools), IFCID 124 (SQL statement text), IFCID 199 (Buffer pool stats), and others.
- If you use the distributed data functions of Db2 (DDF), you might find that you need more virtual storage. You can estimate how much your storage needs are likely to increase in the ECSA above the 16-MB line by adding the following amounts:
  - a) Add 2.5 MB for the code that relates to distributed processing
  - b) Add 1 KB for each SNA network connection. In z/OS 2.2 or later, TCP/IP connections use zero ECSA storage.

However, if you are uncertain of how many concurrent SNA connections you might have, or if you operate with z/OS 2.1 or earlier, use the CONDBAT subsystem parameter value.
  - c) Add 2 KB for each thread that uses distributed processing. You can use  $MAXDBAT-value \times 2$  KB.
  - d) Add 1 KB for each requesting system that is listed as a TCP/IP address or SNA LU name in the communication database of the Db2 subsystem. You do not need to count the number of connections between Db2 and the requesting systems.

## What to do next

Specify this sum or a value that is larger than this sum as the second value of the CSA parameter of the IEASYSxx z/OS logical PARMLIB member. The logical PARMLIB is usually referred to as SYS1.PARMLIB. Specifying values that are too high is preferable to specifying values that are too low; making your values too low can result in a need to IPL z/OS. For example, if the ECSA size is too small, z/OS places the Db2 global load modules and control blocks for Db2 in CSA below the 16-MB line instead of above it. This can cause problems with coexisting z/OS subsystems.

Distributed threads are represented by z/OS SSRB control blocks that reside in the extended system queue area (ESQA) when they are paused. The amount of storage that is used might vary depending on

the z/OS release that is used. Estimate 4 KB of ESQA for every active distributed thread. You can use  $MAXDBAT\text{-value} \times 4\text{ KB}$ .

## Shared memory storage requirements

*Shared memory* is a type of virtual storage that allows multiple address spaces to easily address storage that is common to Db2 address spaces. This memory resides above the 2 GB bar. Db2 also uses 64-bit common storage, which is shared by the entire LPAR, for control structures that need to be accessed while running processes in and out of the system services address space (*ssnmMSTR*), database services address space (*ssnmDBM1*), and *ssnmDIST* address space.

The shared memory object is created at Db2 startup, and the following Db2 address spaces for the subsystem (*ssnmDIST*, *ssnmDBM1*, *ssnmMSTR*, and Utilities) are registered with z/OS to be able to access the shared memory object.

To define the size of the shared memory and the 64-bit common area, use the HVSHARE and HVCOMMON parameters of the IEASYSxx member in the parmlib concatenation.

**Restriction:** Ensure that you have defined a high enough value for HVSHARE to satisfy all component requests for shared memory within the z/OS image. The default value is 510 TB. Db2 12 requires 1 TB of contiguous 64-bit shared private storage for each subsystem. This storage is virtual, and it is controlled by the z/OS HVSHARE parameter in IEASYSxx. This storage is not backed at allocation, only as it is used.

### PSPI

IFCID 0225 has statistics that you can use to determine the amount of currently defined storage and how much of it is currently allocated.

### PSPI

#### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

#### Related information

[IEASYSxx \(symbol definitions and IEASYSxx members\) \(MVS Initialization and Tuning Reference\)](#)

## Virtual storage requirements for storage pools and working storage

During the ISPF tailoring session, you specify values that the DSNTINST CLIST uses to calculate main storage size.

**Recommendation:** Determine these values based on your estimated application workload before you install or migrate Db2.

These values provide an estimate of the private area that is needed by the database services address space (*ssnmDBM1*), the largest of the Db2 address spaces. If the estimated virtual storage for the address space is not available, you can re-evaluate the sizes that you requested.

The calculations in this topic are planning estimates. The noted values do not provide the exact limits, but they indicate a reasonable range of values.

The sum of the following values must fit the region size that Db2 supports:

- VSAM data set control block storage size
- Working storage size

The CLIST adds a fixed code size to the sum of these values to determine the main storage size.

After you specify the values listed above, the CLIST determines the EDM pool size and the size that is needed for the data set control blocks. The CLIST adds the working storage size and the fixed code size to update the region size that is used in the Db2 startup procedures. The CLIST also displays this information on CLIST calculations panel 1: DSNTIPC.

Use the formulas in this topic to estimate your storage needs. For your reference, the default values are included where appropriate.

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

### Related tasks

[Calculating virtual storage requirements for a dictionary \(Db2 Performance\)](#)

### Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Calculating buffer pool size

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All Db2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

### About this task

**Virtual buffer pools:** For best results, use at least 100 KB of buffer pool space for each concurrent user. A value of 300 KB or more is recommended for improved performance. Very simple SQL statements that access small amounts of data can require less than this amount. Complex SQL statements that access large amounts of data can require more than this amount. Dynamic SQL statements might require a dynamic bind, which requires additional buffers for catalog tables and indexes. If an SQL statement requires directory access, additional buffers are also required for directory page sets. UPDATE, DELETE, and INSERT statements require more buffers to keep updated pages in a buffer pool.

To efficiently support prefetch, allow 400 KB for each object that is concurrently accessed. For example, if you have a SELECT statement with a single table space scan, allow 400 KB for that statement. For another example, suppose you have a SELECT statement with a three-table sort merge join that uses an index for each table, and a parallel degree of 4. To obtain a rough estimate, calculate the total number of objects that are accessed and multiply the number of objects by 400 KB and then by the degree of parallelism. In this example, the equation would be (3 tables + 3 indexes + 1 work file for the sort) x 400 KB x 4. The result is 11200 KB that is recommended for this statement. Typically, these objects should be defined in separate buffer pools to provide better performance control. For example, you should have at least three separate buffer pools: one for indexes, one for tables, and one for work files.

During installation, you can set the buffer pool sizes on the installation panels. Later, you can use the ALTER BUFFERPOOL command to alter the sizes and other attributes of as many as 50 buffer pools for 4-KB page sets, 10 buffer pools for 8-KB page sets, 10 buffer pools for 16-KB page sets, and 10 buffer pools for 32-KB table spaces. The ALTER BUFFERPOOL command can make the changes dynamically while Db2 is running.

**Important:** Do not allocate more storage for buffer pools than available real storage for buffer pools. If you attempt to use more than the available real storage, performance will suffer.

Db2 limits the total amount of storage that is allocated for virtual buffer pools to approximately twice the amount of real storage. If you specify more than this amount for virtual buffer pools, Db2 allocates buffer pools during startup until twice the amount of real storage is used. Db2 then allocates the remaining buffer pools as follows:

Page size	Number of pages
4 KB	2000
8 KB	1000
16 KB	500

Page size	Number of pages
32 KB	250

After these storage limits have been reached, you cannot increase the amount of virtual buffer pool storage unless you increase the amount of real storage that is available to the z/OS image.

## Procedure

Use the following table.

*Table 1. Virtual buffer pool size calculation*

Virtual buffer pool calculation			Default
Buffers for BP0	_____ x 4 KB = _____	20,000 x 4 KB	= 80,000 KB
Buffers for BP1	+ _____ x 4 KB = _____	+ 0 x 4 KB	= 0 KB
Buffers for BP2	+ _____ x 4 KB = _____	+ 0 x 4 KB	= 0 KB
.	.	.	.
Buffers for BP49	+ _____ x 4 KB = _____	+ 0 x 4 KB	= 0 KB
Buffers for BP8K0	+ _____ x 8 KB = _____	+ 1000 x 8 KB	= 8000 KB
Buffers for BP8K1	+ _____ x 8 KB = _____	+ 0 x 8 KB	= 0 KB
.	.	.	.
Buffers for BP16K0	+ _____ x 16 KB = _____	+ 500 x 16 KB	= 8000 KB
Buffers for BP16K1	+ _____ x 16 KB = _____	+ 0 x 16 KB	= 0 KB
.	.	.	.
Buffers for BP32K	+ _____ x 32 KB = _____	+ 250 x 32 KB	= 8000 KB
.	.	.	.
Buffers for BP32K9	+ _____ x 32 KB = _____	+ 0 x 32 KB	= 0 KB
	= _____		= 104,000KB

### Related concepts

[Introduction to Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

[Changing the size of the group buffer pool \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Deciding how many buffer pools to use \(Db2 Performance\)](#)

[Choosing buffer pool sizes \(Db2 Performance\)](#)

### Related reference

[DSNTIP1: Buffer pool sizes panel 1](#)

The DSNTIP1 panel is the first of two panels on which you can specify the size of your virtual buffer pools.

[DSNTIP2: Buffer pool sizes panel 2](#)



The DSNTIP2 panel is the second of the two panels that enables you to specify the size of your virtual buffer pools.

## Calculating sort pool size

The Db2 sort process uses two kinds of storage: local storage and buffer pool storage. Sort pool storage and buffer pools have storage above the 2 GB bar.

### Related reference

[MAX DATA CACHING field \(MXDTCACH subsystem parameter\)](#)

The MXDTCACH subsystem parameter specifies the maximum amount of memory, in MB, that is to be allocated for data caching for each thread.

## Calculating sort pool storage in local storage

The sort process creates fixed-length storage pools in local storage for internal sort structures and work areas. Local storage is created above the 2 GB bar at allocation time.

## About this task

The Db2 sort work area (in-memory) has the following storage boundaries for **each** concurrent sort operation:

Minimum sort storage = 240 KB

Maximum sort storage = 128,000 KB

Db2 initially allocates storage for each sort and gradually adds more storage until the maximum sort work area limit is reached or the maximum number of nodes (32,000) are populated at the bottom of the sort tree, whichever occurs first. With 32,000 nodes at the bottom of the sort tree, the average run size for each sorted string is 64,000 records.

The default size of the sort pool is 10,000 KB, but you can override this default value by entering a sort pool size on installation panel DSNTIPC.

## Procedure

Use the following formula:

$$32000 * (16 + \text{sort key length} + \text{sort data length})$$

### Related tasks

[Improving the performance of sort processing \(Db2 Performance\)](#)

### Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Adjusting buffer pool storage that is used for sort work files

Sort processing uses pages in the Db2 buffer pool for its initial input, for work files that contain intermediate results, and for the final output.

## About this task

The buffer pools are not always dedicated to sort work files. The amount of sort activity determines how much the buffer pools are used. For heavy sort activity, sort records that have been written to the work files are temporarily written to the disk until buffer pool space becomes available.

Db2 considers the buffers that it uses for work files as sequentially accessed pages.

## Procedure

Use the VPSEQT parameter of the ALTER BUFFERPOOL command. If a buffer pool is used only for sort work files, you might set VPSEQT to 99%. If the buffer pool is used for sparse indexes or declared global temporary tables, set VPSEQT to 90%. If you do not have enough allocated storage to complete sort processing, you must allocate more disk space for the work file database.

### Related concepts

[Work file database storage requirements](#)

The work file database is used as storage for processing SQL statements that require working storage.

## Calculating RID pool size

The *RID pool* is an area of local storage that is reserved for record identifier (RID) sort processing, including RID list sort processing.

### About this task

The RID pool is created at startup, but no space is allocated until RID storage is needed. When RID storage is needed, it is allocated above the 2 GB bar in 32 KB blocks, which are known as RID blocks.

Consider the following when you calculate RID pool size:

- If the total RID pool size is less than 2 GB, regardless of the current RID pool usage, each agent that requests a new RID map and RID list is granted two 32 KB RID blocks: one RID map and one RID list.
- If a thread needs another RID list block to be added to the existing RID map and RID list, the next 32KB block is granted only if the RID pool usage is below the maximum RID pool size. It is possible for the RID pool size to be larger than the setting of the MAXRBLK subsystem parameter because every new agent is granted at least one RID map and one RID list, if the total RID pool size is less than 2 GB.
- Startup RID storage = 0 (but acquired in 32 KB blocks as needed)

The default size of the RID pool is 1000000 KB, but you can override this default value by entering a RID pool size on installation panel DSNTIPC.

## Procedure

Use the following formula:

```
number of concurrent RID processing activities * average number of RIDs *  
2 * 8 (bytes per RID)
```

### Related tasks

[Managing RID pool size \(Db2 Performance\)](#)

### Related reference

[RID POOL SIZE field \(MAXRBLK subsystem parameter\)](#)

The MAXRBLK subsystem parameter specifies the amount of storage in kilobytes that is needed for the RID pool.

## Calculating EDM pool sizes

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

### About this task

In Db2 12, the EDM pools are the dynamic statement cache pool, the skeleton pool for packages, and the database descriptor (DBD) pool. All of these pools are located above the 2-GB bar.

When you cache prepared statements, they are stored in the dynamic statement cache along with static SQL statements. The number of prepared statements that are stored in the cache depends on the characteristics of the dynamic SQL statements that your application executes. One type of application typically benefits from caching prepared statements, whereas the other type usually does not. The first type of application uses dynamic SQL statements that are embedded in an application and used repeatedly. Applications and queries with this type of SQL statements benefit most from caching prepared statements because the statement can be used from the cache. However, applications that contain SQL statements that are infrequently used pay the cost of being added to the cache. For example, queries from QMF are likely to be prepared and executed only once. Caching prepared statements does not benefit applications that extensively use this kind of SQL statement.

The size of the dynamic statement cache pool is affected by the number of concurrent threads, the maximum number of DBATs, the number of plans, and the amount of estimated space for plans. If you use dynamic SQL, you need more working storage and less EDM pool space than if you use static SQL.

The skeleton pool for packages is used to store skeleton copies of packages (SKPT). The size of this pool is determined by the maximum number of unique plans in the EDM pool, the average statement size, and the average number of executed statements.

The EDM pool space for database descriptors is determined based on an estimated number of concurrently open databases and the average size of the database descriptor.

For Db2 12 installation, the CLIST provides initial EDM pool size settings on the CLIST calculations panel 1: DSNTIPC. These calculations are based on your site size. You might need to adjust these settings according to the specific needs of your site.

For migration to Db2 12, the CLIST reuses the values from your Db2 11 settings. However, you might need to adjust these values in Db2 12 if your workloads have grown.

## Procedure

- If you are migrating to Db2 12, start with the EDM pool sizes that you used in Db2 11, and adjust the sizes as necessary.
- If you are installing Db2 12, the installation CLIST provides initial EDM pool size settings on the CLIST calculations panel 1: DSNTIPC. The calculations are based on your site size. You might need to adjust the settings according to the specific needs of your site.

## Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Calculating data set control block storage

Calculate the data set control block storage requirements by determining the total number of open data sets (DSMAX).

## Procedure

To determine the main storage requirements for your data set control blocks:

- Let *concdb* be the number of concurrent databases, which is specified on installation panel DSNTIPE.
- Let *tables* be the number of tables in each database, which is specified on installation panel DSNTIPD.
- Let *indexes* be the number of indexes in each table. The installation CLIST sets this variable to 2.
- Let *pctpts* be the percentage of partitioned table spaces.
- Let *avgpart* be the average number of partitions in each partitioned table space.
- Let *partts* be the average number of partitioned table spaces per database.
- Let *nonparti* be the number of non-partitioning indexes per partitioned table space.

1. Calculate the total number of open tables with the following formula:

```
opntab = concdb * tables
```

2. Calculate the number of open data sets for partitioned table spaces with the following formula:

```
opnptsds = opntab * (pctpts / 100) * avgpartconcdb *  
(((tables * indexes) + tblspaces) +  
(2 * partts * avgpart) - (2 * partts))
```

3. Calculate the number of open data sets with the following formula:

```
concdb * (((tables * indexes) + tblspaces) +  
(2 * partts * avgpart) - (2 * partts))
```

You can modify DSMAX by editing job DSNTIJUZ. The maximum number of concurrently open data sets that is allowed by Db2 is 200000.

4. To calculate the main storage that is required for your data set control blocks, use the following formula:

```
DSMAX * 5 KB
```

### Example

The default, as calculated by the DSNTINST CLIST, is

```
20000 * 5 KB = 100000 KB
```

This method of calculation ignores partitioned table spaces and partitioning index spaces. It also assumes that all data sets in the database are open if the database is in use. You could enter a smaller value for the number of concurrent databases if only a few of the data sets in a database are typically opened. The larger the value of DSMAX, the longer data sets stay open.

### Recommendations:

- Move the scheduler work area (SWA) above the 16 MB line of z/OS virtual storage by using JES initialization statements, JES exit routines, or the SMF exit routine (IEFUJV). This way, you can save approximately 1 KB for each open data set in virtual storage below the 16 MB line and avoid potential storage errors. To determine the amount of storage that is needed below the 16-MB line, use 0.016 KB for the multiplication factor if the SWA is above the line or 1.2 KB for the multiplication factor if the SWA is below the line. The preceding calculations and the calculations in the CLIST presume that the SWA is above the line.
- If you do not move the SWA above the 16 MB line, you should not use a DSMAX value greater than 5000.

### Related concepts

[How Db2 determines the initial value of DSMAX \(Db2 Performance\)](#)

## Calculating working storage requirements

Working storage is private virtual storage in the Db2 database services address space, which is primarily above the 2 GB bar. Working storage is used to hold temporary data that is needed for the processing of an SQL request.

### About this task

If you use static SQL, you have larger plan sizes, typically varying from 15 KB to 1 MB. Typical sites would use about 300 KB for each thread of working storage for dynamic SQL users, and 100 KB per thread for static SQL users. A *thread* is a structure that describes an application connection to Db2. The CLIST does not include information about open compressed table spaces. Compression dictionaries are stored above the 2-GB bar. Therefore, if you use compressed table spaces, you need additional storage.

## Procedure

To estimate the amount of working storage:

1. Start with 600 KB.
2. Determine the amount of space in KB that is needed for active users.
  - Start with 11,920 bytes for each concurrent Db2 user. This value is specified by the CTHREAD subsystem parameter.
  - Add 11,920 bytes for each remote Db2 user. This value is specified by the MAXDBAT subsystem parameter.
  - Divide the total by 1,024 to convert to KB.
3. Determine the amount of space in KB that is needed for inbound DDF connections.
  - Start with 298 bytes per connection.
  - Divide the number of bytes by 1,024 to convert to KB.
  - Subtract the result from the maximum number of concurrent inbound DDF connections. This value is specified by the CONDBAT subsystem parameter.
  - Multiply the result by 4.
4. Estimate the working storage by adding the results from steps 1, 2, and 3:

```
600+(((CTHREAD+MAXDBAT)*11920)/1024)+((CONDBAT-(MAXDBAT*298)/1024)*4)
```

## Example

The default, as calculated by the DSNTINST CLIST, is:

```
600+(((200+200)*11920)/1024)+((10000-(200*298)/1024)*4)=45024
```

## Related concepts

[How Db2 allocates threads \(Db2 Performance\)](#)

## Related tasks

[Compressing your data \(Db2 Performance\)](#)

## Related reference

[MAX USERS field \(CTHREAD subsystem parameter\)](#)

The CTHREAD subsystem parameter controls the maximum number of allied threads that are to be allocated concurrently. *Allied threads* are threads that are started at the local subsystem.

[MAX REMOTE CONNECTED field \(CONDBAT subsystem parameter\)](#)

The CONDBAT subsystem parameter sets the maximum number of concurrent inbound DDF connections that are to be allowed.

[MAX REMOTE ACTIVE field \(MAXDBAT subsystem parameter\)](#)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

## Calculating virtual storage below the 16-MB line

This calculation produces an estimate of virtual storage constraints below the 16-MB line in the Db2 database services address space.

## About this task

Most of the needed virtual storage is in extended private storage and storage above the 2 GB bar, including the buffer pool, the EDM pool, and almost all of the code and working storage. This is the difference between the total storage and the estimated region size. The estimated region size does not include extended private storage or storage above the 2 GB bar. It includes only the data set control block storage size and some of the code.

## Procedure

Use the following formula:

$$600 \text{ KB} + (((\text{MAX USERS} + \text{MAX REMOTE ACTIVE}) * 298) / 1024) + (\text{DSMAX} * 0.016)$$

## Example

The default, as calculated by the DSNTINST CLIST, is

$$600 \text{ KB} + (((200 + 200) * 298) / 1024) + (20000 * 0.016 \text{ KB}) = 1036 \text{ KB}$$

If the scheduler work area (SWA) is above the 16-MB line, multiply the number of data sets by 0.016 KB; if the SWA is below the 16-MB line, multiply the number of data sets by 1.2 KB.

The CLIST calculations panel, DSNTIPC, displays storage sizes that are calculated by the DSNTINST CLIST.

## Related reference

[DSNTIPC: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

## Calculating real storage requirements

Db2 can use real storage to reduce I/O and processor times and to improve response time and throughput. The amount of real storage that Db2 needs varies greatly.

### About this task

Some users find that their organizations need several times the estimates listed below, whereas others need less. The amount of storage is an important parameter in Db2 performance. Performance monitoring programs give you a more accurate estimate of your storage requirements than the formulas in this topic because these programs can take specific environmental characteristics into account.

For the Db2 buffer pools, the EDM pool, log buffers, and working storage, the amount of real storage must be the same as the amount of virtual storage. Paging activity in the buffers is an indication of a problem. If you do not have enough real storage, you might need to reduce your buffer pool size, which allows fewer concurrent users. You also need space to contain locks, the working set of code in all address spaces, log buffers, and common storage space. In Db2 12, log buffers are permanently page-fixed. Therefore, the entire size of the output buffer needs to be used to estimate real storage. Because some of the figures that are used in virtual storage calculations are maximums, whereas the real storage figures typically use activity for the peak, changes are needed in the calculations. The virtual storage figures concentrate on the most constrained address space, but real storage work must include them all. For more information about each category, see the information specified in the first two tables below.

Some storage for castout engines or DASD read and write of a compressed index might be fixed through a PAGEFIX operation. More castout engines or more compressed indexes can cause more storage to be permanently fixed. MVS Real Storage Manager (RSM) controls where the PAGEFIX occurs in real storage, and it can occur below the 16 MB line. If you have concerns about this behavior, consult with IBM Support for MVS RSM.

## Procedure

To estimate real storage requirements:

1. Multiply the virtual size of each storage area by the factor that is indicated in the following table to estimate the real size for that area.

Table 2. Real storage size calculation

Category	Default	Virtual size	× Factor	= Real size
Buffer pools	104,200 KB	-----	1.0	-----
Sort pool	10,000 KB	-----	0.5	-----
RID pool	400,000	-----	0.5	-----
EDM pool	33,600 KB	-----	1.0	-----
Data set size	17,928 KB	-----	0.6	-----
Code size + 1100 (4 address spaces)	40,000 KB	40,000 KB	0.5	20,000 KB
Working storage + (DSCF + DDF)	55,800 KB	-----	1.0	-----
Log buffers	4000 KB	-----	1.0	-----
Lock space	5000 KB	-----	0.4	-----
Common storage	2160 KB	-----	0.4	-----
Total real storage size =				-----

2. Plan to add real storage for additional users.

The following table uses rough estimates to approximate the amount of additional real storage that is needed by several kinds of users. If you have more concurrent users, plan to add real storage.

Table 3. Additional real storage for more users

Type of user	Additional real storage
Transaction	150 KB
Query	400 KB
Batch	700 KB

**Recommendation:** If you are assessing the storage needs of a running subsystem, look at the IBM OMEGAMON for Db2 Performance Expert on z/OS report for IFCID 0225. This report calculates the virtual storage per user.

3. Plan to add 28 KB of real storage for each open index partition.

**Example**

The following table shows the default real storage size calculations.

Table 4. Default real storage size calculation

Category	Default virtual size	× Factor	= Real size
Buffer pools	104,000 KB	1.0	104,000 KB
Sort pool	10,000 KB	0.5	5000 KB
RID pool	400,000	0.5	200,000
EDM pool	33,600 KB	1.0	33,600 KB
Data set size	17,928 KB	0.6	10,756.8 KB
Code size + 1100 (4 address spaces)	40,000 KB	0.5	20,000 KB

Table 4. Default real storage size calculation (continued)

Category	Default virtual size	× Factor	= Real size
Working storage + (DSCF + DDF)	55,800 KB	1.0	55,800 KB
Log buffers	4000 KB	1.0	4000 KB
Lock space	5000 KB	0.4	2000 KB
Common storage	2160 KB	0.4	864 KB
			-----
		Total real storage size =	436,021 KB

### Related tasks

#### Calculating buffer pool size

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All Db2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

#### Calculating EDM pool sizes

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

#### Calculating working storage requirements

Working storage is private virtual storage in the Db2 database services address space, which is primarily above the 2 GB bar. Working storage is used to hold temporary data that is needed for the processing of an SQL request.

## Planning for performance of Db2

When you install or migrate Db2, consider your performance goals for your subsystem or data sharing member. Use z/OS Workload Manager (WLM) to define these goals.

Also, consider the following guidance:

- Monitoring and managing performance are more difficult with few plans.
- Never-ending threads and plans reuse accumulate thread storage and working storage.
- Each distributed COMMIT statement needs package accounting.
- Consider reusing threads.
- Finding unused packages and cleaning up mistakes are difficult unless ownership is known.
- Performance monitoring may require analyzing everything in a CICS region instead of just one plan.
- Plan is a required short name.
- Package name is optional, long, multipart, and not always easy to find.
- Consider differentiating by plan within a CICS region and having at least 5 to 20 plans within a region. You can work faster and make changes on a more granular basis.
- Eligible processes can be offloaded to IBM z Integrated Information Processor (zIIP) specialty engines to reduce the load on general purpose processors.

### Related concepts

z/OS performance options for Db2 (Db2 Performance)

### Related tasks

Controlling resource usage (Db2 Performance)

Configuring IBM z Integrated Information Processor (zIIP) specialty engines for Db2 (Db2 Performance)



## Planning for release coexistence in Db2 12

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In *release coexistence*, applications can continue to access Db2 data while you migrate data sharing members or distributed subsystems. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

Db2 12 supports release coexistence with Db2 11 in data sharing and distributed environments, as long as function level 500 or higher has not been activated on any Db2 12 member or subsystem.

**Important:** Do not issue the `ACTIVATE` command or run job `DSNTIJAF` for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the `ACTIVATE` command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.

For more information about release coexistence in Db2 data sharing, see [“Release coexistence in Db2 data sharing”](#) on page 693.

### Related tasks

[Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12](#)

By taking appropriate actions in Db2 11 well before migration to Db2 12, you can minimize the risk of disruptive automatic binds of application plans and packages during and after migration to Db2 12.



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## Chapter 3. Making the Db2 product code available

IBM distributes the product code for Db2 for z/OS in various ways. However you obtain the product code, you use System Modification Program Extended (SMP/E) to create Db2 distribution libraries, Db2 target libraries, and SMP/E control data sets, and to control of subsequent software maintenance.

For more information about SMP/E, see [Db2 Program Directory](#).

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDNSLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

### z/OSMF portable software instances

A *z/OSMF portable software instance* can be used to simplify distribution of a software instance across a network, and can be deployed by the z/OSMF Software Management task. It is a set of portable archive files that are created by the SMP/E GIMZIP service routine for each of the data sets defined to the software instance. It includes SMPCSI data sets with all associated SMP/E managed target and distribution libraries, and a descriptor file to describe in detail the entire originating software instance. For more information about installing portable software instances, see [ServerPac Installation using z/OSMF](#) and [Overview of z/OSMF](#).

#### Related tasks

[Generating tailored Db2 12 installation, migration, or function level activation jobs](#)

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

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## Editing the SMP/E jobs

Before running any of the SMP/E jobs, you must edit them. Some of the items that you might want to edit include link list options and naming conventions for the Db2 library data sets.

## Creating JOB statements

The SMP/E jobs do not include JOB statements. Although JOB statements are often built automatically, creating your own JOB statements that are correct for your site is usually easier than editing the provided JOB statements.

### Procedure

To create JOB statements:

1. If you are using ISPF to edit and submit the SMP/E jobs, edit a member that contains the JOB statement. Delete all text except the JOB statement. Then use the ISPF COPY command to copy the member into each job before submitting it.
2. If you are using TSO to submit the SMP/E jobs, edit a JOB statement and submit that JOB statement with each job.

For example, data set JCL.CNTL(J) might contain the following code:

```
//DB2INST JOB ACCT,NAME,  
// MSGCLASS=A,MSGLEVEL=(1,1),  
// TIME=(10),USER=SYSADM,PASSWORD=xxxxxxxx  
/*JOBPARM . . . .  
/*ROUTE PRINT . . . .
```

When you are ready to submit a job, use a command like the following command:

```
SUBMIT (JCL(J) JCL(DSNxxxxxx))
```

In this command, `xxxxx` represents the last five characters of the SMP/E job name. This command submits the JOB statement along with the job.

## Choosing link list options

Before you run the SMP/E jobs to load the Db2 libraries, you can choose your link list options.

### Procedure

Consider and choose your link list options based on the following information about the load module libraries:

#### ***prefix*.SDSNLINK**

Contains Db2 modules that are referred to as *early (ERLY) code*, which must reside in an APF-authorized library. You must place early code modules in the link list because they are loaded at subsystem initialization during IPL. In the link list, you can have only one level of the early code. That early code can be shared by multiple subsystems and releases of Db2. So, you must choose the level of early code that is appropriate for all subsystems that use the link list. If your system is at the prerequisite maintenance level, your Db2 11 early code is compatible with Db2 12. The Db2 12 early code is compatible with Db2 11. If you plan to run Db2 10 subsystems on the same LPAR as Db2 12, choose Db2 11 ERLY code.

If you are migrating, maintenance to early code or an installation of new early code requires that you activate the early code, which can be done in a couple of ways:

- Activate the early code by doing an IPL of z/OS.
- Another option to activate maintenance to early code is to issue the `REFRESH Db2, EARLY` command. If you use this command, the subsystem that is having its early code refreshed must be stopped when the command is issued.

To initialize a new Db2 subsystem, you can issue the z/OS `SETSSI` command, which executes the early code initialization routine and update the subsystem vector table (SSVT).

Schedule an IPL of z/OS before or during a migration to Db2 12. This IPL is necessary because changes that migration job `DSNTIJMV` makes in `SYS1.PARMLIB` are not recognized by z/OS until the next IPL. Alternatively, you can use the `SETSSI`, `SETPROG APF`, and `SETPROG LNKLST` commands to define the subsystem to z/OS until the next IPL. Changes that `DSNTIJMV` makes to the `SYS1.PARMLIB` might affect the following libraries:

- New subsystem definitions in `IEFSSNxx`
- New APF libraries in `IEAAPFxx`
- New load module libraries in `LNKLSTxx`

#### ***prefix*.SDSNLOAD**

- Is a main load module repository.
- Can be shared by multiple subsystems at the same release level.
- Allows only Db2 to modify code.
- Holds default exit routines.
- Is APF-authorized.
- Must be a PDSE.

#### ***prefix*.SDSNLOD2**

A PDSE data set that contains DLLs for products and features such as IBM Data Server Driver for JDBC and SQLJ, Db2 for z/OS ODBC, XML Toolkit for z/OS, and the `HDFS_READ` function.

Db2 does not require that SDSNLOD2 is APF-authorized. However, if this data set is in a STEPLIB data set concatenation of an address space that does need APF authorization, SDSNLOD2 must also be APF-authorized.

### ***prefix*.SDSNEXIT**

- Holds the subsystem parameter module, DSNHDECP, and user-written exit routines.
- Is modified by user.
- Is APF-authorized.

### **Link list recommendation for IRLM**

Adding the IRLM load module DXRRL183 to the link list is highly recommended so that IBM Support can help you diagnose and resolve potential problems. IRLM can operate without this load module. However, if the DXRRL183 load module is not in the link list, users cannot run CT TRACE commands to externally start and stop IRLM component traces, which are critical for diagnosing problems. To add DXRRL183 to the link list if it is not already there, you need to copy the module into a link-listed library. After you apply maintenance to IRLM that affects DXRRL183, remember to copy the updated module to the link list.

### **Integrated Cryptographic Services Facility link list requirement**

If you plan to use encryption with your Db2 subsystem, you must include in the link list the Integrated Cryptographic Services Facility library that contains the SCSFMOD0 load module. The SQL statement SET ENCRYPTION PASSWORD and the following built-in functions require this support:

- ENCRYPT
- DECRYPT\_BIT
- DECRYPT\_DB
- DECRYPT\_CHAR
- GETHINT
- HASH\_MD5
- HASH\_SHA1
- HASH\_SHA256

### **Supporting one Db2 subsystem**

You can choose among several methods of maintaining a single Db2 subsystem. The following steps describe what is probably the easier method for most sites:

- a. Change the SMP/E procedure DSNALLOC to assign all load modules to *prefix*.SDSNLOAD. You can do so by changing the data set name for DDDEF (SDSNLINK) from *prefix*.SDSNLINK to *prefix*.SDSNLOAD.
- b. Remove the allocation for *prefix*.SDSNLINK from the allocation job DSNALLOC.
- c. Include *prefix*.SDSNLOAD (instead of *prefix*.SDSNLINK) in the LNKSTxx member of SYS1.PARMLIB.

### **Supporting multiple Db2 subsystems**

Supporting multiple subsystems can mean several things. You can have two or more Db2 subsystems at the same release and service level (for example, two Db2 12 subsystems). Create separate libraries for DSNHDECP and user-written exit routines of each Db2 subsystem.

You can also have two or more Db2 subsystems at the same release level, but at different service levels. For example, you can have a Db2 12 production subsystem and a Db2 12 test subsystem at different service levels. Alternately, you can have two Db2 subsystems at different release levels. For example, you can have a Db2 12 subsystem and a Db2 11 subsystem.

In either of these cases, you can use an INCLUDE statement in JCL or a started task to identify the necessary load modules.

The Db2 subsystem must use the appropriate release level of *prefix*.SDSNLOAD, but the application attachment code (for example, CICS, CAF, or TSO attachment facilities) can use code that is either one release earlier or one later from *prefix*.SDSNLOAD. To use application attachment code from the earlier or later release, place the attachment code in a different STEPLIB data set from the STEPLIB data set that Db2 executes.

### Related tasks

[Preparing for Db2 12 migration in Db2 data sharing](#)

When planning the migration of data sharing members to Db2 12 it is best to take certain actions to reduce or avoid unnecessary operation complexity.

[Migration step 17: Refresh the z/OS definition of Db2](#)

As part of the migration to Db2 12, you must refresh how Db2 is defined to z/OS.

### Related reference

[-REFRESH DB2,EARLY command \(Db2\) \(Db2 Commands\)](#)

[z/OS SETSSI Command \(MVS System Commands\)](#)

[z/OS SETPROG Command \(MVS System Commands\)](#)

## Accessing the correct Db2 program library

If you do not place *prefix*.SDSNLOAD in the LNKSTxx member of SYS1.PARMLIB, you must provide JOBLIB or STEPLIB statements for it in certain types of programs and procedures.

### Before you begin

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDSNLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

### About this task

The installation and migration jobs that are provided with Db2 12 already contain the necessary JOBLIB or STEPLIB statements. In addition, the startup procedures that Db2 provides include STEPLIB statements for their respective program libraries, *prefix*.SDSNLOAD, and *prefix*.SDSNEXIT.

### Procedure

Provide STEPLIB or JOBLIB statements for the following types of programs and procedures if you do not place *prefix*.SDSNLOAD in the LNKSTxx member of SYS1.PARMLIB.

- **TSO or batch jobs** that access Db2 services require JOBLIB or STEPLIB statements for *prefix*.SDSNLOAD. These jobs include TSO logon procedures and batch jobs that access the DSN command and subcommands, the Db2 precompiler, and Db2 utilities.
- **IMS control, message, and batch processing jobs** also require JOBLIB or STEPLIB statements for *prefix*.SDSNLOAD. You must specify the Db2 load library in the startup procedure for each IMS region (IMS control, message processing program (MPP), batch message processing (BMP), and Fast Path region) that can communicate with Db2. You can do this in two ways:
  - If all the data sets that the JOBLIB or STEPLIB statement refers to for an IMS region are APF-authorized, add the DD statement for *prefix*.SDSNLOAD to the JOBLIB or STEPLIB statement. If you are using the DYNAM option of COBOL, the IMS RESLIB DD statement must precede the reference to *prefix*.SDSNLOAD in the JOBLIB or STEPLIB statement.
  - If any of the data sets that the JOBLIB or STEPLIB statement refers to for the IMS region are not APF-authorized, add the DFSESL DD statement for *prefix*.SDSNLOAD. All libraries that are specified on the DFSESL DD statement must be APF-authorized. The DFSESL DD statement is not required by

the Db2 DL/I batch support. IMS requires that an IMS RESLIB DD statement also be referred to by the DFSESL DD statement, as in the following example:

```
//DFSESL    DD      DSN=ims_reslib,DISP=SHR
//          DD      DSN=prefix.SDSNLOAD,DISP=SHR
```

- **CICS procedures**, including the CICS initialization JCL, also need to include Db2 libraries.

### Related tasks

[CICS startup JCL requirements for connection to Db2](#)

## Performance implications of installation libraries

The performance of your system might be degraded by including modules in the libraries that are included in the link list and you might want to consider the strategies below. These general suggestions might not match the specific needs of your site.

Regardless of which attachment facilities you use, the modules in *prefix.SDSNLINK* must always be in the link list. Adding many modules to the libraries that are included in the link list can reduce system performance. However, adding only a few modules to the libraries requires additional STEPLIB or JOBLIB statements. Because these STEPLIB or JOBLIB statements must be searched before the link list is searched, this approach can also reduce system performance. The approach that produces the best performance for your site depends on the environment in which you use Db2.

If you run multiple Db2 subsystems on the same LPAR, but the Db2 subsystems are at different releases or service levels, the copy of *prefix.SDSNLINK* in the link list must have the PTFs to support compatibility of those releases or service levels. If you also include a copy of *prefix.SDSNLOAD* in the link list for use by Db2 programs, *prefix.SDSNLOAD* must also have the PTFs to support compatibility of those releases or service levels.

If you are using Db2 with IMS, take one of the following actions:

- Include *prefix.SDSNLINK*, but not *prefix.SDSNLOAD*, in the link list. Place the needed STEPLIB or JOBLIB statements in the IMS procedures. This is the simpler solution because the IMS RESLIB and *prefix.SDSNLOAD* have the DSNHLI alias.
- If you want to include *prefix.SDSNLOAD* as well as *prefix.SDSNLINK* in the link list, you need to ensure that the library concatenation for *prefix.SDSNLOAD* and the IMS RESLIB are correct for your site.

If you are using Db2 with CICS, put *prefix.SDSNLINK* in the link list, but do not put *prefix.SDSNLOAD* in the link list. Place the needed STEPLIB or JOBLIB statements in the CICS procedures.

If you use the TSO attachment facility, RRS attachment facility, or call attachment facility, you might need to handle placement of load modules somewhat differently, as follows:

- If you use the DSN command and its subcommands infrequently, place only *prefix.SDSNLINK* in the link list. Provide the necessary STEPLIB or JOBLIB statements in your JCL if you are using batch, or in your TSO logon procedures.
- If you use the DSN command and its subcommands frequently, move the TSO attachment facility load modules (DSNECP00, DSNECP10, DSNESM00, and DSNELI.) to a library that is defined in the link list.
- If you use the call attachment facility (CAF) frequently, move the CAF load modules (DSNACAB, DSNACAF, and DSNALI) to a library that is defined in the link list.
- If you use the RRS attachment facility (RRSAF) frequently, move the RRSAF load modules (DSNARRS and DSNRLI) to a library that is defined in the link list.
- If you use the CAF, RRSAF, and the DSN command and its subcommands frequently, you might improve performance by moving the eligible load modules to a library that is defined in the link pack area (LPA).
  - The TSO load modules that you can place in the LPA are DSNECP00, DSNECP10, DSNESM00, and DSNELI. If you include these modules in the LPA, you also need to include the appropriate aliases for DSNECP00 (DSN) and DSNELI (DSNHLI).
  - The CAF load modules that you can place in the LPA are DSNACAF and DSNALI. If you include these modules in the LPA, you also need to include the appropriate aliases for DSNALI (DSNHLI2 and

DSNWL12). Do not include DSNACAB in the LPA because it is a data-area-only, non-executable load module.

- The RRSAF load modules that you can place in the LPA are DSNARRS and DSNRLI. If you include these modules in the LPA, you also need to include the appropriate aliases for DSNRLI (DSNHLIR and DSNWLIR).

**Tip:** Placing the DSNULI load module in the LPA is not recommended. You should link-edit DSNULI with your applications.



**Attention:** If modules are moved or copied from one library to another, you must make changes to SMP/E control data to reflect the movement. If you do not make these changes, future service or changes to the modules will not be processed correctly.

## Naming conventions for Db2 library names

You need to modify the Db2 library data set names in the SMP/E jobs.

These data sets are listed in [“What you produce: Db2 distribution and target libraries” on page 40](#). Their names are composed of three parts:

- A user-defined prefix
- A fixed base name: for example, SDSNLOAD
- An optional user-defined suffix

The Db2 12 default prefix (*prefix*) is used in this information; the default suffix is null. You need to edit each of the Db2 SMP/E jobs and follow the directions in the header notes of each job to specify the names of the SMP/E data sets. If you want to add a suffix, edit the SMP/E procedures and allocation jobs. The prefix cannot exceed 18 characters. The suffix cannot exceed 17 characters, minus the length of the prefix. In addition, any data set names that exceed eight characters must be in groups of no more than eight characters, separated by periods. The qualified data set name cannot exceed 44 characters.

You can also change the base name of these libraries or load them into another data set. If you do this, however, you might need to do additional editing of the installation or migration jobs.

The DSNTINST CLIST, which you use later to tailor the installation and migration jobs, uses the following default data set names:

```
prefix.SDSNCLST  
prefix.SDSNEXIT  
prefix.SDSNLINK  
prefix.SDSNLOAD  
prefix.SDSNMACS  
prefix.SDSNDBRM  
prefix.SDXRRESL  
prefix.SDSNSAMP  
prefix.DBRMLIB.DATA  
prefix.RUNLIB.LOAD  
prefix.SRCLIB.DATA  
prefix.SDSNIVPD  
prefix.SDSNC.H
```

For best results, use the supplied naming convention, and be sure to document any changes that you make to the library names in the SMP/E jobs. You must specify these library names again during the ISPF tailoring session.

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDSNLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.



## Related concepts

What you produce: Db2 distribution and target libraries

During SMP/E processing, Db2 is loaded into the distribution and target libraries. Db2 uses the distribution libraries to maintain Db2 and contain the master copy of all elements for your Db2 subsystem.

## Specifying SMP/E data set options

You have several options regarding how you establish and use SMP/E data sets.

### About this task

You must decide whether you want Db2 and IMS to share SMP/E data sets. You must also decide whether you need an additional set of SMP/E data sets. An additional set of SMP/E data sets is required if you support more than one release of Db2.

### Related information

[SMP/E for z/OS: User's Guide](#)

## Sharing SMP/E data sets with IMS

Db2 and z/OS cannot share SMP/E data sets because some module names and macro names are common to both products. Under certain conditions, however, Db2 can share SMP/E data sets with IMS.

### About this task

If you do not share SMP/E data sets with IMS, skip this step.

The allocation job DSNALLOC defines a new set of SMP/E data sets that Db2 and IMS are to share.

## Procedure

You must modify your allocation job for either of the following situations:

- **Situation 1:** You decide to have separate SMP/E data sets for Db2 and IMS. In certain situations, Db2 and IMS cannot share SMP/E data sets. You must have separate SMP/E data sets if you want to have two IRLMs.

Even if you are not required to have separate SMP/E data sets, you might want to keep them separate. If Db2 and IMS share the SMP/E data sets, you need to accept or reapply Db2 corrective service to these data sets to allow IMS SYSGENs.

To establish separate SMP/E data sets for Db2 and IMS, change the data set prefix that your allocation job uses to a value other than the prefix that you use for your current IMS SMP/E data sets. The allocation jobs use the prefix "IMS". Changing this prefix prevents the allocation job from replacing your current SMP/E data sets and still allows it to create new SMP/E data sets.

- **Situation 2:** You decide to share SMP/E data sets between Db2 and IMS, but you want to use the SMP/E data sets that already exist for IMS. To do this, remove the data set allocation and initialization statements from your allocation job. When you run the job, no SMP/E data sets are created, and Db2 then shares the existing SMP/E data sets with IMS.

## SMP/E data sets for two releases

A single set of SMP/E zone structures can record only one release of Db2. Maintaining separate zone structures for both Db2 12 and your previous release is strongly recommended until you are sure that you will not need to fall back.

The SMP/E jobs that are provided with Db2 assume that you will allocate a new set of SMP/E data sets for the new release. When you run your allocation job (DSNALLOC), it creates a set of SMP/E data sets. If you choose to reuse your Db2 11 zone structure, you can run job DSNTIJUD to delete SMP/E data for Db2 11. However, after you run this job, you cannot fall back to your previous release.

You can create an additional set of SMP/E data sets either by copying them from a prior release of Db2 or by allocating a new set. Allocating a new set is faster because no data must be deleted.

**Recommendation:** Copy a prior set so that you can then perform service regression checking.

## Specifying a new SMP/E prefix for IRLM

The SMP/E prefix in the SMP/E jobs is the same for the new IRLM as for the old IRLM. Consequently, if you do not change the SMP/E prefix, the jobs overwrite your old IRLM.

### Procedure

Edit the SMP/E jobs accordingly.

## What you produce: Db2 distribution and target libraries

During SMP/E processing, Db2 is loaded into the distribution and target libraries. Db2 uses the distribution libraries to maintain Db2 and contain the master copy of all elements for your Db2 subsystem.

The target libraries contain the various Db2 components. Db2 target libraries are updated when you apply corrective service.

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDNSLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

The following table describes all the Db2 distribution libraries. The distribution libraries contain the master copy of all elements for your Db2 system.

Table 5. Db2 distribution libraries

Distribution libraries	Description
<i>prefix</i> .ADSNBASE	This library contains all jobs that are required to complete SMP/E installation.
<i>prefix</i> .ADSNENU or ADSNDKF	This library contains the Db2 English or Kanji task panels, respectively.
<i>prefix</i> .ADSNLOAD	This library contains an individual object module for every Db2 load module. It contains the IRLM load modules if you choose to install IRLM into the same distribution libraries as Db2. This library must be a PDSE data set.
<i>prefix</i> .ADSNLOD2	This library contains a PDSE data set, which contains DLLs for products and features like IBM Data Server Driver for JDBC and SQLJ, Db2 for z/OS ODBC, XML Toolkit for z/OS, the HDFS_READ function, and others.
<i>prefix</i> .ADSNHFS	This library contains the data that is to be copied into z/OS UNIX System Services.
<i>prefix</i> .ADSNIVPD	This library contains the IVP input data and expected output for sample applications.
<i>prefix</i> .ADSNMACS	This library contains the Db2 macros, sample programs, sample data, initialization data, TSO CLISTS, ISPF panels, and ISPF messages.
<i>prefix</i> .ADXRLOAD	This library contains an individual object module for every IRLM load module.
<i>prefix</i> .ADXRSAMP	This library contains the installation procedures for installing IRLM Version 2.

The following table describes all Db2 target libraries.

Table 6. Db2 target libraries

Target libraries	Description
<i>prefix</i> .SDSNBASE	This library contains all jobs that are required to complete SMP/E installation.
<i>prefix</i> .SDSNC.H	This library contains the header files. The command-line interface (CLI) requires header files. C language application programs can use header files.
<i>prefix</i> .SDSNCLST	This TSO CLIST library contains code that simplifies the process of installing and migrating, aids program preparation and the use of Db2 utilities, and allows the use of Db2 Interactive (Db2I).
<i>prefix</i> .SDSNDBRM	This library contains the system DBRMs for Db2 12.
<i>prefix</i> .SDSNEXIT	This program library is empty when first created. The installation jobs put the DSNZPxxx subsystem parameters load module, application defaults load module ( <i>dsnhdecpl</i> ), and user exit modules into this library.
<i>prefix</i> .SDSNIVPD	This library contains the IVP input data and the expected output for sample applications.
<i>prefix</i> .SDSNLINK	This library contains early code of Db2 12.
<i>prefix</i> .SDSNLOAD	This library contains Db2 12 load modules. This library must be a PDSE data set.
<i>prefix</i> .SDSNLOD2	This library contains the PDSE data set, which contains DLLs for products and features like IBM Data Server Driver for JDBC and SQLJ, Db2 for z/OS ODBC, XML Toolkit for z/OS, the HDFS_READ function, and others.
<i>prefix</i> .SDSNMACS	This macro library contains macros that are needed for the CICS and IMS attachment facilities, the initialization parameter macros, and some data-mapping macros that are needed for some applications.
<i>prefix</i> .SDSNPFPE or <i>prefix</i> .SDSNPFPK	<i>prefix</i> .SDSNPFPE contains the English task and help panels, and <i>prefix</i> .SDSNPFPK contains the Kanji task and help panels.
<i>prefix</i> .SDSNSAMP	This initialization library contains the sample applications and data, the jobs for installing and migrating, the default installation and migration parameters, and catalog initialization data for Db2. The JCLIN for each FMID is stored in this library.
<i>prefix</i> .SDSNSPFM	This Db2 ISPF message library contains messages that are issued during installation or migrate processing.
<i>prefix</i> .SDSNSPFP	This library is the Db2 ISPF library for installation task and help routing panels.
<i>prefix</i> .SDSNSPFS	This library is the Db2 ISPF skeleton library that is used to produce EDITJCL.
<i>prefix</i> .SDSNSPFT	This library is the Db2 ISPF command table library.
<i>prefix</i> .SDXRRESL	This library contains the IRLM load modules. This library might be empty if you chose to install IRLM elsewhere.
<i>prefix</i> .SDXRSAMP	The IRLM samples library might be empty if you chose to install IRLM elsewhere.

For a description of each SMP/E job that Db2 provides, see the following table. These jobs allocate the Db2 libraries and load them with the data from the installation tapes or cartridges.

Table 7. List of SMP/E jobs

<b>Job name</b>	<b>Description</b>
DSNTIJAA	This job creates the Db2 target and distribution zones, and defines the SMP/E control data sets in these zones and in the SMP/E global zone.
DSNACEP1	This job invokes SMP/E to accept all the required and additional FMIDs into the Db2 distribution libraries (DLIBs).
DSNALLOC	This is the SMP/E allocation job. It creates the Db2 target and distribution libraries and defines the libraries in the SMP/E target and distribution zones for Db2 for the required and optional FMIDs.
DSNISMKD	This sample job invokes the supplied DSNMKDIR EXEC to allocate HFS paths for JDBC and SQLJ.
DSNL SMKD	This sample job invokes the supplied DSNLMKDR EXEC to allocate HFS paths for MQLListener.
DSNWSMKD	This sample job invokes the supplied DSNWMKDR EXEC to allocate HFS paths for Web Services Object Runtime (WORF).
DSNAPPL1	This job invokes SMP/E to apply all the FMIDs to the Db2 target libraries for the required and additional FMIDs.
DSNRECV1	This job invokes SMP/E to receive all the required FMIDs (from both tapes or cartridges) from the base tape into the SMP/E control data sets.
DSNRECV2	This job invokes SMP/E to receive all the required FMIDs (from both tapes or cartridges) for IRLM into the SMP/E control data sets.
DSNRECV3	This job invokes SMP/E to receive all the additional FMIDs (from both tapes or cartridges) for ODBC, JDBC, and SQLJ into the SMP/E control data sets.
DSNRECV4	This job invokes SMP/E to receive FMIDs (from both tape or cartridge) for the Kanji DB2I panels into the SMP/E control data sets.
DSNTIJUD	This job invokes SMP/E to delete all Db2 11 entries from the SMP/E libraries.
DSNDDEF1	This job creates DDDEF entries for the SMP/E target and distribution libraries.

### **Related concepts**

[Naming conventions for Db2 library names](#)

You need to modify the Db2 library data set names in the SMP/E jobs.

## Chapter 4. Generating tailored Db2 12 installation, migration, or function level activation jobs

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

### Before you begin

You must use SMP/E to load the required Db2 12 libraries, as described in [Chapter 3, “Making the Db2 product code available,” on page 33](#). At minimum, generating Db2 installation, migration, or function level activation jobs requires the following Db2 load libraries:

- *prefix*.SDSNCLST
- *prefix*.SDSNSPFM
- *prefix*.SDSNSPFP
- *prefix*.SDSNSAMP
- *prefix*.SDSNIVPD (only if generating z/OSMF artifacts)

### About this task

**Tip:** You can capture most settings of an existing Db2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44](#) and [“DSNTXAZP tool” on page 49](#).

**Important:** If you use the installation CLIST, do not change any members in your *prefix*.SDSNSAMP library. If you do, the installation CLIST can fail or produce unpredictable results when tailoring the installation or migration jobs.

### Procedure

Run the Db2 installation CLIST in interactive mode. For more information, see [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode” on page 52](#).

### Results

The values that you specified describe the operating characteristics of the Db2 subsystem and configure the subsystem parameter module and application defaults load module:

#### Subsystem parameter module

The *subsystem parameter module* is generated by job DSNTIJUZ each time that you install, migrate, or update Db2. Six macros expand to form this data-only subsystem parameter load module. The load module contains the Db2 execution-time parameters that you selected using the ISPF panels. These six macros are DSN6ARVP, DSN6FAC, DSN6LOGP, DSN6SPRM, DSN6SYSP, and DSN6GRP. By default, this load module has the name that you specify in the PARAMETER MODULE field in panel DSNTIPO3. For more information, see [“PARAMETER MODULE field” on page 187](#).

#### Application defaults load module

The *application defaults load module*, sometimes called the “*DSNHDECP*”, is generated by job DSNTIJUA. This module contains the application programming defaults. By default, this load module has the name that you specify in the APPL DEFAULTS field of installation panel DSNTIPO3. For more information, see [“APPL DEFAULTS field” on page 187](#).

## What to do next

If you are installing Db2, you might need to tailor several items in the installation jobs, such as data set names or library names, to meet the requirements of your site. For more information see [“Tailoring the installation jobs”](#) on page 369.

After a successful installation or migration, you can also update values that you specified later to improve your operations. For more information, see [“Updating subsystem parameter and application default values”](#) on page 373.

### Related concepts

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

### Related reference

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## Updating the CLIST defaults input member: job DSNTIJXZ

Before you run the CLIST to migrate to Db2 12, update an existing Db2 12 subsystem, or install Db2 12 using the settings of an existing Db2 12 subsystem, update your defaults input member.

### Before you begin

Ensure that you have configured Resource Recovery Services (RRS).

### About this task

The DSNTIDxx defaults input member contains, the subsystem parameter settings, buffer pool settings, and other settings from an existing subsystem. It is used as input during your migration, update, or installation.

You can use job DSNTIJXZ to create an updated defaults input member, DSNTIDxx, which contains most of the settings from your current subsystem. Running this job reduces the effort of manually comparing settings in your current DSNTIJUZ job with the values that are defined in the defaults input member.

Before running this job, you might need to bind or refresh the package and plan for the DSNTXAZP program. The necessary bind commands are in installation job DSNTIJSG.

### Procedure

To update the CLIST defaults input member:

1. Obtain the correct version of the DSNTIJXZ job.
  - If you are preparing to migrate to Db2 12, use the Db2 11 DSNTIJXZ job on Db2 11 to create an updated migration input member for the Db2 12 installation CLIST.
  - If you are preparing to update an existing Db2 12 subsystem or install Db2 12 using the settings of an existing Db2 12 subsystem, use the Db2 12 DSNTIJXZ job to create an updated input member.
2. Configure and run job DSNTIJXZ.
  - If you are preparing to migrate to Db2 12, specify as input your existing Db2 11 DSNTIDxx member. This member is the one that was created when you installed or migrated to Db2 11. If you do not have this member, specify as input the Db2 11 DSNTIDXA member, or the DSNTIDXB member if you use SAP.

For Db2 data sharing, verify that job DSNTIJXZ runs on the data sharing member that you are preparing to migrate and that the input to job DSNTIJXZ is the DSNTIDxx member for that data sharing member.

- If you are preparing to update an existing Db2 12 subsystem or install Db2 12 using the settings of an existing Db2 12 subsystem, specify as input your existing Db2 12 DSNTIDxx member. This member is the one that was created when you installed or migrated to Db2 12. If you do not have this member, specify as input the Db2 12 DSNTIDXA member, or the DSNTIDXB member if you use SAP.

Job DSNTIJXZ uses the DSNTXAZP tool to create a copy of the specified DSNTIDxx member and update it with the current subsystem parameter settings, buffer pool settings, and other installation settings. For more information, see “DSNTXAZP tool” on page 49.

**Important:** The DSNTXAZP tool does not update the DSNTIDxx CLIST input member with current settings for the following parameters or panel fields. Update the values as you complete the CLIST, or modify the values directly in the DSNTIDxx member:

*Table 8. Settings not updated by the DSNTXAZP tool in Db2 12*

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPA2</u>	The following fields: CATALOG ALIAS (VCATALOG) DEFINE CATALOG (VCATSTAT)
<u>DSNTIPA3</u>	All fields: PERMANENT UNIT NAME (VOLSDEVT) TEMPORARY UNIT NAME (TVOLSDEVT) CLIST ALLOCATION: VOL/SER (VOLSDAT1) CLIST ALLOCATION: DATA CLASS (DATACLS1) CLIST ALLOCATION: MGMT CLASS (MGMTCLS1) CLIST ALLOCATION: STOR CLASS (STORCLS1) NON-VSAM DATA: VOL/SER (VOLSDAT2) NON-VSAM DATA: DATA CLASS (DATACLS2) NON-VSAM DATA: MGMT CLASS (MGMTCLS2) NON-VSAM DATA: STOR CLASS (STORCLS2) VSAM CATALOG, ...: VOL/SER (VOLSDAT3) VSAM CATALOG, ...: DATA CLASS (DATACLS3) VSAM CATALOG, ...: MGMT CLASS (MGMTCLS3) VSAM CATALOG, ...: STOR CLASS (STORCLS3)
<u>DSNTIPA4</u>	BSDS AND ACTIVE LOG ICF CATALOG ALIAS (VBSDSLOG) LOG COPY 1, BSDS 2: VOL/SER (VOLSDAT6) LOG COPY 1, BSDS 2: DATA CLASS (DATACLS6) LOG COPY 1, BSDS 2: MGMT CLASS (MGMTCLS6) LOG COPY 1, BSDS 2: STOR CLASS (STORCLS6) LOG COPY 2, BSDS 1: VOL/SER (VOLSDAT7) LOG COPY 2, BSDS 1: DATA CLASS (DATACLS7) LOG COPY 2, BSDS 1: MGMT CLASS (MGMTCLS7) LOG COPY 2, BSDS 1: STOR CLASS (STORCLS7)

Table 8. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPK</u>	The following fields: WORK FILE DB (WKDBNAME) SUBGRP ATTACH (SGRPATNM)
<u>DSNTIPG1</u>	All fields: INSTALL IC PREFIX (IN SICPRE) INSTALL DS PREFIX (INSDSPRE) IC DATA SET UNIT NAME (ICDSDEV) IC TEMPLATE EXPRESSION (ICDSTPLT) IC TEMPLATE DATA CLASS (ICDSDC) IC TEMPLATE MGMT CLASS (ICDSMC) IC TEMPLATE STOR CLASS (ICDSSC)
<u>DSNTIPH</u>	The following fields: COPY 1 NAME (BSDSNAM1) COPY 2 NAME (BSDSNAM2) Archive logs: COPY 1 PREFIX (ARCHPRE1) Archive logs: COPY 2 PREFIX (ARCHPRE2)
<u>DSNTIPT</u>	All fields: TEMP CLIST LIBRARY (NEWCL) SAMPLE LIBRARY (NEWSAMP) CLIST LIBRARY (OUTCL) APPLICATION DBRM (DBRMLIB) APPLICATION LOAD (RUNLIB) DECLARATION LIBRARY (SRCLIB) LINK LIST LIBRARY (DSNLINK) LOAD LIBRARY (DSNLOAD) JDBC AND SQLJ DLLS (DSNL0D2) MACRO LIBRARY (DSNMACS) LOAD DISTRIBUTION (DSNALOAD) EXIT LIBRARY (DSNEXIT) DBRM LIBRARY (DSNDBRM) IRLM LOAD LIBRARY (DSNIRLM) IVP DATA LIBRARY (DSNIVPD) INCLUDE LIBRARY (DSNCHDRS)



Table 8. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPU</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>IBM LE RUNTIME LIBRARY (LERUN)</li> <li>IBM LE RUNTIME LIBRARY 2 (LERUN2)</li> <li>IBM LE LINK EDIT LIB (LELKED)</li> <li>IBM LE PRELINK MSG LIB (LEPLMSG)</li> <li>HIGH LEVEL ASSEMBLER LIB (IASMLIB)</li> <li>C/CPP COMPILER MODULE (CPROG)</li> <li>C/CPP COMPILER LIBRARY (CCOMP)</li> <li>C/CPP HEADER LIBRARY (CHDRS)</li> <li>C/370 COMPILER MESSAGES (CMMSG)</li> <li>C LE PRELINKER PHASE (CPRLK)</li> <li>CPP LE PRELINKER PHASE (CPPPRLK)</li> <li>CPP CLASS LIB HEADERS (CPPHDRS)</li> <li>CPP AUTO CALL LIBRARY (CPPAUTCL)</li> <li>CPP CLASS LIBRARY (CPPCLASS)</li> <li>CPP PROCEDURE LIBRARY (CPPPROC)</li> </ul>
<u>DSNTIPU1</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>COBOL COMPILER LIBRARY (ICOBCOMP)</li> <li>COBOL LE PRELINKER PHASE (ICOBPRLK)</li> <li>FORTRAN COMPILER LIBRARY (FORTCOMP)</li> <li>FORTRAN LINK EDIT LIB (FORTLINK)</li> <li>PL/I COMPILER LIBRARY (PLICOMP)</li> <li>PL/I LE PRELINKER PHASE (PLIPRLK)</li> </ul>
<u>DSNTIPW</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>SYSTEM MACLIB (MACLIB)</li> <li>SYSTEM PROCEDURES (PROCLIB)</li> <li>SORT LIBRARY (SORTLIB)</li> <li>IMS RESLIB (RESLIB)</li> <li>ISPF ISPLINK MODULE (ISPLOAD)</li> <li>GDDM MACLIB (GDDMMACS)</li> <li>GDDM LOAD MODULES (GDDMLOAD)</li> <li>CICS LOAD LIBRARY (CICSMOD)</li> <li>CICS MACRO LIBRARY (CICSMAC)</li> <li>CICS COBOL LIBRARY (CICSCOB)</li> <li>CICS PL/I LIBRARY (CICSPLI)</li> <li>CICS EXCI LIBRARY (CICSEXCI)</li> </ul>

Table 8. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

CLIST Panel	Field Name (DSNTIDxx entry)
<u>DSNTIPD</u>	All fields: DATABASES (NUMDATAB) TABLES (NUMTABLE) COLUMNS (NUMCOLUM) VIEWS (NUMVIEWS) TABLE SPACES (NUMTABSP) PLANS (NUMPLANS) PLAN STATEMENTS (NUMSTMTS) PACKAGES (NUMPKGS) PACKAGE STATEMENTS (NUMPKSTS) PACKAGE LISTS (NUMPLPL) EXECUTED STMTS (NUMSTMTE)
<u>DSNTIP9</u>	All fields: 4K SORT PRIMARY SPACE (S4KSPAC) 4K SORT WORK TS'S (S4KNOTS) 4K SORT WORK SEG SIZE (S4KSGSZ) 32K SORT PRIMARY SPACE (S32KSPAC) 32K SORT WORK TS'S (S32KNOTS) 32K SORT WORK SEG SIZE (S32KSGSZ) 4K TEMP PRIMARY SPACE (T4KSPAC ) 4K TEMP WORK TS'S (T4KNOTS) 4K TEMP WORK SEG SIZE (T4KSGSZ) 32K TEMP PRIMARY SPACE (T32KSPAC) 32K TEMP WORK TS'S (T32KNOTS) 32K TEMP WORK SEG SIZE (T32KSGSZ)
<u>DSNTIPM</u>	The following fields: SUBSYSTEM NAME (MVSNAME) DB2 VTAM PASSWORD (DDPASS)
<u>DSNTIPX</u>	The following fields: WLMENV (WLMENV)

3. When you run the CLIST, specify the DSNTIDxx member that is created by this job during instillation or migration:

- For migration, specify the DSNTIDxx member that is created by this job in the DATA SET(MEMBER) NAME field on panel DSNTIPA1.
- During installation, or for updates, specify the DSNTIDxx member that is created by this job in the INPUT MEMBER NAME field on panel DSNTIPA1.

### Related reference

#### DSNTXAZP tool

The DSNTXAZP tool updates a CLIST defaults input member (DSNTIDxx) with information about the current subsystem parameter settings, buffer pool settings, and other installation settings that are defined in a specified Db2 subsystem.

#### DATA SET(MEMBER) NAME field

The value of the DATA SET(MEMBER) NAME field indicates the name of the input data set to use for migrating from Db2 11. If you are installing, updating, or provisioning Db2 subsystems, the DATA

SET(MEMBER) NAME field must remain blank.If you are installing or updating, the field must remain blank.

#### INPUT MEMBER NAME field

The INPUT MEMBER NAME field specifies the member name of the input data set. This data set contains the default Db2 12 parameter values that are used for installation and migration, as in *prefix.SDSNSAMP.suffix*.

#### Directory of subsystem parameters, panel fields, and application default values

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## DSNTXAZP tool

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The DSNTXAZP tool updates a CLIST defaults input member (DSNTIDxx) with information about the current subsystem parameter settings, buffer pool settings, and other installation settings that are defined in a specified Db2 subsystem.

The DSNTXAZP tool updates a CLIST defaults input member (DSNTIDxx) with the following configuration information:

- Authorization IDs used in installation jobs
- Authorization IDs used in IVP jobs
- Buffer pool settings
- DDF settings
- Log settings
- MVS parmlib settings
- Routine settings
- Subsystem parameter settings

Job DSNTIJXZ invokes the DSNTXAZP tool.

The DSNTXAZP tool requires Resource Recovery Services (RRS).

The DSNTXAZP tool does not update all entries in the DSNTIDxx member. For a list of entries that are not updated, see [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44.](#)

The batch program requires the following arguments:

```
//STEP01 EXEC PGM=DSNTXAZP,PARM='ssid action'
```

*ssid* is the subsystem ID.

*action* is one of the following values:

#### **UPDATE\_ALL**

Creates a new CLIST defaults input member and updates current subsystem parameter settings, buffer pool settings, and various other installation settings. Essentially, UPDATE\_ALL has the effect of executing all of the following actions at the same time:

- UPDATE\_AUTH\_INSTALL
- UPDATE\_AUTH\_IVP
- UPDATE\_BPOOL
- UPDATE\_DDF
- UPDATE\_LOG
- UPDATE\_MVS\_PARMLIB
- UPDATE\_ROUTINE
- UPDATE\_ZPARAM

## UPDATE\_AUTH\_INSTALL

Creates a new CLIST defaults member and updates it using the authorization IDs used in installation jobs only. The following DSNTIDxx entries (CLIST parameters) are updated: INSSQLID (INSTALL SQL ID), INSPKOWN (INSTALL PKG OWNER), INSGRLST (INSTALL GRANTEE(S))

## UPDATE\_AUTH\_IVP

Creates a new CLIST defaults member and updates it using the authorization IDs used in IVP jobs only. The following DSNTIDxx entries (CLIST parameters) are updated: IVPSQLID (IVP SQL ID), IVPKOWN (IVP PACKAGE OWNER), IVPGRLST (IVP GRANTEE(S))

## UPDATE\_BPOOL

Creates a new CLIST defaults input member and updates it with the current buffer pool settings only (no subsystem parameter changes).

## UPDATE\_DDF

Creates a new CLIST defaults member and updates it using the current DDF settings only. The following DSNTIDxx entries (CLIST parameters) are updated: DDLOC, DDLUNAM, GENLUNM, IPNAME, TCPRT, SECPRT, RESYNPRT

## UPDATE\_LOG

Creates a new CLIST defaults member and updates it using the current log settings only. The following DSNTIDxx entries (CLIST parameters) are updated: LOGSPRE1, LOGSPRE2,

## UPDATE\_MVS\_PARMLIB

This action creates a new CLIST defaults member and updates it using the current MVS parmlib settings only. The following DSNTIDxx entry (CLIST parameter) is updated: MVSSPREF.

## UPDATE\_ROUTINE

This action creates a new CLIST defaults member and updates it using the current routine settings only. The following DSNTIDxx entries (CLIST parameters) are updated:

- AUTHID, SECDEFID
- WLMENVG, WLMENVP, WLMENV1, WLMENVU, WLMENVX, WLMENVJ, WLMENVR, WLMENVV, WLMENVC, WLMENVM, WLMENVW
- RTxnnACL, RTxnnPKO, RTxnnWLM

## UPDATE\_ZPARAM

Creates a new CLIST defaults input member and updates it with the current subsystem parameter settings only (no buffer pool changes).

The following DD statements are required for processing:

### XAINPUT

Used as input to the DSNTXAZP program. It allocates the current CLIST defaults input member that will be used as the source for creating a new CLIST defaults input member. The version of the member should match the version of the selected Db2 subsystem.

### XAOUTPUT

Used as output by the DSNTXAZP program. It allocates the generated CLIST defaults input member with updated subsystem parameter and buffer pool settings. This should be a member of a PDS that is defined with RECFM=FB, LRECL=80.

### SYSPRINT

Used as output by the DSNTXAZP program for informational and error messages. It also contains a report on the parameters that were processed and modified. For additional details on the report, see the example below.

The following JCL is an example of running the tool:

```
//DSNTIXZ EXEC PGM=DSNTXAZP,PARM='DSN UPDATE_ALL'  
//XAINPUT DD DSN=prefix.SDSNSAMP(DSNTIDXA),DISP=SHR  
//XAOUTPUT DD DSN=prefix.SDSNSAMP(DSNTIDNU),DISP=SHR  
//SYSPRINT DD SYSOUT=*
```

The tool generates a CLIST input member with the current subsystem parameter settings, buffer pool settings, or both, and the following prolog:

```

* *****
*   CREATED MEMBER = MY.DATASET.NAME(DSNTIDNU)
*
*   CREATED ON = MAR 24, 2010 11:12:30
*
*   SOURCE MEMBER = MY.SOURCE.NAME(DSNTIDXA)
*
*   DESCRIPTIVE NAME = DB2 INSTALLATION DATA
*
*   FUNCTION = PROVIDE UPDATED VALUES FOR MIGRATING TO A NEW RELEASE
*             OF DB2 OR INSTALLING A NEW RELEASE OF DB2
*
*   PARAMETERS:
*     PARM NAME = NAME FOR ISPF PANEL VARIABLE
*     PARM TYPE = TYPE FOR VALIDITY CHECKING
*     DS SCP    = DATA SHARING SCOPE:  G = GROUP, M = MEMBER
*     MIN, MAX  = RANGE VALUES FOR VALIDITY CHECKING
*     CURRENT VALUE = VALUE USED AS INPUT FOR NAMED ISPF VARIABLE
*
* *****
* ***** *
* PARM  PARM DS  MIN      MAX      CURRENT *
* NAME  TYPE SCP VALUE    VALUE    VALUE  *
* ***** *

```

In addition to creating a new CLIST input member, the DSNTXAZP tool provides a report of all parameters. The report indicates whether each parameter was updated or if the original value from the input member was retained. It also shows the mapping between the subsystem parameter and the CLIST parameter. This is a sample report:

```
CLIST INPUT MEMBER GENERATION REPORT ** 2010-03-24 08:25:35
```

-----  
CLIST PARAMETER REPORT:

```

0001 PARAMETER NAME      = ABEXP
    ZPARAM/BUFFERPOOL PARAMETER = ABEXP
    PARAMETER TYPE       = CHAR
    DATA SHARING SCOPE  = M
    MINIMUM VALUE        = NO
    MAXIMUM VALUE        = YES
    CURRENT CLIST VALUE   = YES
    CURRENT INSTALLED VALUE = YES
    STATUS                = RETAINED

0002 PARAMETER NAME      = ABIND
    ZPARAM/BUFFERPOOL PARAMETER = ABIND
    PARAMETER TYPE       = CHAR
    DATA SHARING SCOPE  = M
    MINIMUM VALUE        = NONE
    MAXIMUM VALUE        = NONE
    CURRENT CLIST VALUE   = YES
    CURRENT INSTALLED VALUE = NO
    STATUS                = UPDATED

:
nnnn PARAMETER NAME      = DB2REL
    ZPARAM/BUFFERPOOL PARAMETER = N/A
    PARAMETER TYPE       = CHAR
    DATA SHARING SCOPE  = M
    MINIMUM VALUE        = NONE
    MAXIMUM VALUE        = NONE
    CURRENT CLIST VALUE   = 1010
    CURRENT INSTALLED VALUE = N/A
    STATUS                = RETAINED

:

```

CHANGE SUMMARY REPORT:

CLIST PARAMETER	ZPARAM/BUFFERPOOL PARAMETER	VALUE
ABEXP	-SAME-	YES
* ABIND	-SAME-	NO (YES)
:		
* BP0_VPSEQT	BP0 VPSEQT	50 (35)
* BP0_DWQT	BP0 DWQT	50 (35)

```

* BP0_VDWQT          BP0 VDWQT          10,0 (20)
:
:
BUFMAX00            BP0 VPSIZE          20000
:
:
DB2REL              -NONE-             1010
:
:
* NUMCONCR           CTHREAD            220 (200)
OVDSMAX             DSMAX              20000
:
:
-----
SOURCE MEMBER       : prefix.SDSNSAMP(DSNTIDXA)
CREATED MEMBER      : DB2.CLIST.MEMBER(DSNTIDX0)
PARAMETERS PROCESSED : n
PARAMETERS MODIFIED : m
-----

```

### Related tasks

[Updating the CLIST defaults input member: job DSNTIJXZ](#)

Before you run the CLIST to migrate to Db2 12, update an existing Db2 12 subsystem, or install Db2 12 using the settings of an existing Db2 12 subsystem, update your defaults input member.

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

### Related reference

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode

The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

### Before you begin

You must use SMP/E to load the required Db2 12 libraries, as described in [Chapter 3, “Making the Db2 product code available,” on page 33](#). At minimum, generating Db2 installation, migration, or function level activation jobs requires the following Db2 load libraries:

- *prefix*.SDSNCLST
- *prefix*.SDSNSPFM
- *prefix*.SDSNSPFP
- *prefix*.SDSNSAMP
- *prefix*.SDSNIVPD (only if generating z/OSMF artifacts)

### About this task

The values that you enter or accept on the ISPF panels describe the operating characteristics of your Db2 system. If you change the default values when you install Db2 or when you migrate to a newer release, the CLIST verifies that the values that you enter are within the allowable ranges.

The Db2 installation CLIST allocates several data sets for input and output. From your TSO user ID, you should be able to allocate these data sets to the permanent or temporary unit names that are provided on installation panel DSNTIPA2. These devices can be defined by an esoteric device group.

The values that you specify configure the subsystem parameter module and application defaults load module for the Db2 subsystem.

## Subsystem parameter module

The *subsystem parameter module* is generated by job DSNTIJUZ each time that you install, migrate, or update Db2. Six macros expand to form this data-only subsystem parameter load module. The load module contains the Db2 execution-time parameters that you selected using the ISPF panels. These six macros are DSN6ARVP, DSN6FAC, DSN6LOGP, DSN6SPRM, DSN6SYSP, and DSN6GRP. By default, this load module has the name that you specify in the PARAMETER MODULE field in panel DSNTIPO3. For more information, see [“PARAMETER MODULE field” on page 187](#).

## Application defaults load module

The *application defaults load module*, sometimes called the "DSNHDECP", is generated by job DSNTIJUA. This module contains the application programming defaults. By default, this load module has the name that you specify in the APPL DEFAULTS field of installation panel DSNTIPO3. For more information, see [“APPL DEFAULTS field” on page 187](#).

Running the Db2 installation CLIST also prepares the jobs that are required for installation, migration, or function level activation. The CLIST tailors each installation or migration job according to the values that you specify on the ISPF panels.

After a successful installation or migration, you can also update these values later to improve your operations. For more information, see [“Updating subsystem parameter and application default values” on page 373](#).

**Tip:** You can capture most settings of an existing Db2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44](#) and [“DSNTXAZP tool” on page 49](#).

**Important:** If you use the Db2 installation CLIST, do not change any members in your *prefix*.SDSNSAMP library. If you do, the Db2 installation CLIST can fail or produce unpredictable results when tailoring the installation or migration jobs.

## Procedure

To tailor Db2 12 installation and migration jobs, complete the following steps:

1. Make the Db2 ISPF libraries available to TSO by taking one of the following actions:

- To prepare for running only the Db2 installation CLIST, issue the following commands:

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSEXEC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' +
'ISP.SISPPENU') SHR REUSE
```

- To prepare for running the Db2 installation CLIST and the Db2 Interactive (DB2I) facility, issue the following commands. If you use Kanji DB2I panels, concatenate SDSNPFPK to ISPPLIB instead of SDSNPFPE.

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE
```

The PROFILE command provides complete error messages.

The ALLOCATE command uses the default names of the libraries that contain the ISPF panels. These ISPF library names might be different at your site. To concatenate or merge existing libraries with them, put the library names in the list of names in parentheses after DSN with the largest block size first. (If two or more libraries have the same block size, you can list either one first.)

2. If you are running the Db2 installation CLIST to migrate to Db2 12 update an existing Db2 12 subsystem, or install a new Db2 12 based on the settings of existing installation, configure and run job DSNTIJXZ to update the defaults input member. For details, see [“Updating the CLIST defaults input member: job DSNTIJXZ”](#) on page 44.
3. If your z/OS system has multiple procedure libraries, ensure that the installation jobs access the appropriate set of procedures by specifying the order in which procedure libraries are searched. You can use the following JCLLIB statement to specify the order in which procedure libraries are searched.

```
//ddname JCLLIB ORDER=(library[,library...])
```

The JCLLIB statement must follow the JOB statement and precede the first EXEC statement in the job. You can have Db2 insert this statement in your JCL for you by entering the statement on installation panel DSNTIPY. For more information on the JCLLIB statement, see [JCLLIB statement \(MVS JCL Reference\)](#).

4. Establish system affinity to ensure that the installation jobs run on the z/OS system where the appropriate Db2 subsystem is running. The following methods are examples of several z/OS installation-specific methods for establishing system affinity:

- For JES2 multi-access spool (MAS) systems, use the following JCL statement:

```
/*JOBPARM SYSAFF=cccc
```

Where *cccc* is the JES2 name. You can specify an asterisk (SYSAFF=\*) to indicate that the job should run on the system from which it was submitted.

- For JES3 systems, use the following JCL statement:

```
/*MAIN SYSTEM=(main-name)
```

The *main-name* is the JES3 name.

You can edit the jobs manually, or you can enter the preceding statements on installation panel DSNTIPY and have Db2 insert these statements for you. For more information, see [JES2 Control Statements \(MVS JCL Reference\)](#) and [JES3 Control Statements \(MVS JCL Reference\)](#).

5. Invoke the CLIST:

- a) Check that your TSO logon region size is sufficient.

Usually 2 MB is enough.

- b) Invoke ISPF.

- c) Select option 6 on the main ISPF panel.

- d) Run the Db2 installation CLIST by entering one of the following specifications:

- EXEC '*prefix*.SDSNCLST(DSNTINST)'

- If you want to receive the messages that trace the progress of the CLIST, use the following specification:

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CONTROL(LIST)'
```

- If you want to use the CLIST but skip the verification of output data sets, use the following specification:

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CHKOUTDS(NO)'
```

By default, the CLIST verifies the following information when installation panels DSNTIPT and DSNTIPA1 are displayed:

- The CLIST verifies that the TEMP CLIST LIBRARY and SAMPLE LIBRARY that you specify on DSNTIPT can be allocated and opened for output.
- If you specify a value for OUTPUT MEMBER NAME on DSNTIPA1, the CLIST verifies that the data set *prefix*.SDSNSAMP can be allocated and opened for output.



The CLIST reads a set of default values and displays them on the panels. The values can be the original default values that are supplied by IBM, values that you specified in a previous run of the CLIST, or values that were generated when you ran the DSNTXAZP tool.

6. Use the CLIST panels to verify or adjust the values in the panel fields.

For instructions for working with CLIST panels and descriptions of the panels and fields, see [“The Db2 installation CLIST panel session”](#) on page 56.

7. On the last panel that displays, CLIST calculations (DSNTIPC1 for installation or DSNTIPC for migration), press Enter to complete the CLIST processing.

A series of messages provide details about the CLIST processing:

- a. DSNT478I BEGINNING EDITED DATA SET OUTPUT

- b. If the CLIST detects a problem when it checks the parameter values that you entered, you receive an error or warning message indicating the name of the parameter and the type of problem.

- If you receive an error message, the CLIST cannot edit the installation or migration jobs properly.
- If you receive a warning message, check the conditions. A warning message can sometimes be issued even when the conditions are normal or acceptable.
- If you specify several large numbers in the panels, the CLIST might send a message indicating an overflow in CLIST arithmetic.

The CLIST displays the Main Panel again. You can proceed through the panels, rechecking or changing parameter values.

- c. If the CLIST does not find any errors, you receive messages on DSNTIPC1 that indicate the amount of required disk storage and virtual storage.

- d. You might also receive some other information messages. For example, if you specified an existing data set for the TEMP CLIST LIBRARY field or the SAMPLE LIBRARY field on panel DSNTIPT, the following message is displayed:

```
WARNING(S) ISSUED
```

## Results

The Db2 installation CLIST tailors each installation or migration job according to the panel values that you specified. For a list of the tailored jobs, see [“Installation and migration jobs that the CLIST tailors”](#) on page 367. These jobs and other output from the CLIST panel session are stored in several output data sets. For more information, see [“CLIST panel session output”](#) on page 365.

For each edited job, you receive the following message:

```
DSNT489I CLIST EDITING dsname(member), explanation
```

### Important:

If an error occurs when the Db2 installation CLIST edits your jobs, you receive the following message:

```
IKJ52506I TEXT NOT FOUND
```

Enter END NOSAVE to prevent modification of the original copies of your installation or migration jobs.

You can rerun the CLIST with the trace control parameter set to CONTROL(SYMLIST) to learn what caused the problem. In some cases, specifying CONTROL(LIST) as the trace control parameter may provide enough information for you to find the source of the problem.

After the CLIST finishes tailoring the jobs, it displays the Main Panel (DSNTIPA1) again. If you need to continue your tailoring at another time, conclude this session. Then, when you start a new session, use the value that you specified for OUTPUT MEMBER NAME during this session as the value for INPUT MEMBER NAME during the new session. Enter these values on the Main Panel.

## What to do next

If you are installing Db2, you might need to tailor several items in the installation jobs, such as data set names or library names, to meet the requirements of your site. For more information see [“Tailoring the installation jobs”](#) on page 369.

You can use the generated JCL jobs and input files to complete the following activities:

- [Chapter 6, “Migrating to Db2 12,”](#) on page 483
- [Chapter 5, “Installing Db2 12,”](#) on page 427
- [Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

### Related concepts

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

### Related reference

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## The Db2 installation CLIST panel session

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

For instructions for invoking the Db2 installation and migration CLIST, see [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode”](#) on page 52.

In general, you can change the default values to match the needs of your organization. However, some values cannot be changed, depending on the INSTALL TYPE value that you specify on panel DSNTIPA1, and whether you are installing the first or subsequent members of a data sharing group.

### Navigating in the CLIST panel session

All panel sequences begin with the Main Panel, DSNTIPA1.

```
DSNTIPA1 DB2 VERSION 12 INSTALL, UPDATE, MIGRATE AND PROVISION - MAIN PANEL
====>
Will the installation/migration be performed with z/OSMF?
  USE Z/OSMF WORKFLOW  ====> NO          Yes or No (Yes for Provision)

Check parameters and reenter to change:
  1 INSTALL TYPE          ====> INSTALL    Install, Migrate, Activate, Update
                                     or Provision
  2 DATA SHARING         ====> NO        Yes or No (blank for Activate, Update)
For migration only: Enter the data set and member name with the settings from
the previous Installation/Migration:
  3 DATA SET(MEMBER) NAME ====>
For DB2 SMP/E libraries (SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNCLST, etc.), enter:
  4 LIBRARY NAME PREFIX   ====> DSN1210
  5 LIBRARY NAME SUFFIX   ====>
For install data sets (NEW.SDSNSAMP, NEW.SDSNCLST, RUNLIB.LOAD, etc.), enter:
  6 DATA SET NAME PREFIX ====> DSN1210
  7 DATA SET NAME SUFFIX ====>
Enter to set or save panel values (by reading or writing the named members):
  8 INPUT MEMBER NAME     ====> DSNTIDXA  Default parameter values
  9 OUTPUT MEMBER NAME    ====>          Save new values entered on panels
PRESS: ENTER to continue  RETURN to exit  HELP for more information
```

Figure 1. Main panel: DSNTIPA1

You can use the following approaches to navigate in the CLIST panel session:

- To display the panel identifiers, enter the following command in any panel: `PANELID ON`.
- Enter your choices on a panel in the space that is marked by an arrow (`==>`). Begin your entry in the second position to the right of the arrow. The first position is protected and you cannot write in it.
- To validate entries in the current panel and display the next panel, press `Enter`.
- Panel fields that are marked with asterisks contain values that are primed on the basis of values from a previous panel. The following message is found on these panels:

```
DSNT444I SCROLLING BACKWARD MAY CHANGE FIELDS MARKED WITH ASTERISKS
```

If you scroll back to the panel that has the original value, the values on the succeeding panels are refreshed only if the original value is changed. If the values are changed, the following message is displayed:

```
DSNT443I VALUES MARKED WITH AN ASTERISK HAVE BEEN UPDATED
```

For example, panel `DSNTIPH` has fields that are marked with asterisks indicating values that are primed on the basis of the `CATALOG ALIAS` value on installation panel `DSNTIPA2`.

- To scroll back to the previous panels to review or change values press the `End` key (usually `PF3`).
- To save your changes at any point during the panel session, enter the following command in any installation panel: `SAVE` Then select option 1 in panel `DSNTIPSV`.

```
+-----+
|DSNTIPSV
| Save changes in progress:
|
| Select one.
|   S 1. Save and continue
|     2. Save and exit
|     3. Continue without saving
|
| PRESS: ENTER to continue
| RETURN to exit
+-----+
```

The changes are saved in the output member that is specified in the `OUTPUT MEMBER NAME` field on panel `DSNTIPA1`.

- To exit completely from the installation process, press the `Return` key (usually `PF4`).

The CLIST session completes when you press `Enter` from the last panel: `DSNTIPC1` for installation or `DSNTIPC` for migration. For the more information about completing the CLIST panel session, see step 7 in Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43.

## CLIST panel and field descriptions

The CLIST panel field descriptions following information:

### Acceptable values

This part of a panel field description indicates the range or list of allowable values for an installation panel field. The acceptable values apply to the installation panel field, but not necessarily to the subsystem parameter that is associated with that field. Differences might occur if a panel field is used to determine the value of the associated subsystem parameter and the values do not correspond exactly.

In most cases, if a maximum supported panel field value is large enough, you can specify the following multipliers:

- *valueK* for *value* multiplied by 1024
- *valueM* for *value* multiplied by 1,048,576
- *valueG* for values greater than 1024 MB
- *valueT* for values greater than 1024 GB

The maximum acceptable values might be too large for smaller systems; therefore, ensure that the values that you enter are valid for the size of your system.

### Default values

The default values that documentation shows are the original values that are supplied by IBM. If you previously ran the CLIST and saved the updated panel values in a DSNTIDxx input data set, the previously entered values appear as default values on the panels.

**Tip:** You can capture most settings of an existing Db2 subsystem by running the DSNTIJXZ job, which invokes the DSNTXAZP tool. Running this job reduces the effort to manually compare settings in the current DSNTIJUZ job with the values that are defined in the defaults input member. For details, see [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44](#) and [“DSNTXAZP tool” on page 49](#).

Panel values that are modified outside of the installation process are not saved in the DSNTIDxx data set and are not reflected on the panels.

### Update

This information identifies a corresponding field on the Update Selection Panel (DSNTIPB) or refers to information that provides instructions for updating the field value. For more information, see [“DSNTIPB: Update selection menu panel ” on page 377](#).

### *dsnhdec*p

These are the names of the parameters in the application defaults load module *dsnhdec*p. For more information, see [“Application defaults parameters” on page 660](#).

### DSNZPxxx

These are the names of the parameters in the data-only load module DSNZPxxx.

Some Db2 subsystem parameters do not appear on CLIST panels. For details, see [“Subsystem parameters that are not on installation panels” on page 380](#).

## DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

When processing is complete, this panel is displayed again. The values that you enter are saved in the ISPF profile for your authorization ID and are displayed each time that you run the CLIST.

To save your panel input, you must specify an output member name in the OUTPUT MEMBER NAME field.

The DSNTINST CLIST saves the panel input into your DSNTIDxx output member just before the CLIST issues this message:

```
DSNT4781 BEGINNING EDITED DATA SET OUTPUT
```

```

DSNTIPA1 DB2 VERSION 12 INSTALL, UPDATE, MIGRATE AND PROVISION - MAIN PANEL
====>
Will the installation/migration be performed with z/OSMF?
  USE Z/OSMF WORKFLOW  ===> NO          Yes or No (Yes for Provision)

Check parameters and reenter to change:
  1 INSTALL TYPE          ===> INSTALL    Install, Migrate, Activate, Update
                                     or Provision
  2 DATA SHARING         ===> NO        Yes or No (blank for Activate, Update)
For migration only: Enter the data set and member name with the settings from
the previous Installation/Migration:
  3 DATA SET(MEMBER) NAME ===>
For DB2 SMP/E libraries (SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNCLST, etc.), enter:
  4 LIBRARY NAME PREFIX   ===> DSN1210
  5 LIBRARY NAME SUFFIX   ===>
For install data sets (NEW.SDSNSAMP, NEW.SDSNCLST, RUNLIB.LOAD, etc.), enter:
  6 DATA SET NAME PREFIX ===> DSN1210
  7 DATA SET NAME SUFFIX ===>
Enter to set or save panel values (by reading or writing the named members):
  8 INPUT MEMBER NAME     ===> DSNTIDXA  Default parameter values
  9 OUTPUT MEMBER NAME    ===>          Save new values entered on panels
PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 2. Main panel: DSNTIPA1

## Recommended approach for new installers

If you are installing for the first time, try the following suggestions.

- In the INSTALL TYPE field, enter INSTALL.
- Set the PREFIX and SUFFIX fields to the values that you used when you allocated the Db2 libraries by using job DSNALLOC.
- In the INPUT MEMBER NAME field, use DSNTIDXA (the default) for the first run. If you are using SAP, specify DSNTIDXB, the SAP-specific CLIST input member, instead. For any later runs, the CLIST sets the default input name to the prior output name.
- Specify a value in the OUTPUT MEMBER NAME field to save your options. Specify values in the TEMP CLIST LIBRARY, CLIST LIBRARY, and SAMPLE LIBRARY fields on installation panel [DSNTIPT](#) when you want output data sets tailored.

**Important:** Do not run the installation jobs before tailoring them with the CLIST. If you want to update the parameters later, the CLIST sets the default input name to the prior output name.

## DSNTILA1: Main panel for generating z/OSMF workflows and provisioning Db2 subsystems

When you specify USE Z/OSMF WORKFLOW ===> YES, panel DSNTILA1 opens, and the CLIST runs with a modified set of installation panels that support the generation of z/OSMF workflows. For more information about the modified panels, see [“Installation panels for installing or migrating with z/OSMF”](#) on page 583.

You can also specify INSTALL TYPE ===> PROVISION to specify that you are running the CLIST to prepare artifacts for services that provision Db2 subsystems. For more information, see [“Creating artifacts for provisioning Db2 by running the installation CLIST”](#) on page 371.

The CLIST continues to run starting with the DSNTILA1 and the other modified panels unless and until you set USE Z/OSMF WORKFLOW ===> NO.

```

DSNTILA1 DB2 VERSION 12 INSTALL, UPDATE, MIGRATE AND PROVISION - MAIN PANEL
====>
Will the installation/migration be performed with z/OSMF?
  USE Z/OSMF WORKFLOW  ====> YES      Yes or No (Yes for Provision)

Check parameters and reenter to change:
  1 INSTALL TYPE          ====> INSTALL      Install, Migrate, Activate, Update,
                                         or Provision
  2 DATA SHARING         ====> NO          Yes or No (blank for Activate, Update)
                                         (No for Provision)

For migration only: Enter the data set and member name with the settings from
the previous Installation/Migration:
  3 DATA SET(MEMBER) NAME ====>
For DB2 SMP/E libraries (SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNCLST, etc.), enter:
  4 LIBRARY NAME PREFIX   ====> DSN1210
  5 LIBRARY NAME SUFFIX   ====>
For install data sets (NEW.SDSNSAMP, NEW.SDSNCLST, RUNLIB.LOAD, etc.), enter:
  6 DATA SET NAME PREFIX  ====> DSN1210
  7 DATA SET NAME SUFFIX  ====>
Enter to set or save panel values (by reading or writing the named members):
  8 INPUT MEMBER NAME     ====> DSNTIDXA    Default parameter values
  9 OUTPUT MEMBER NAME    ====>           Save new values entered on panels
PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 3. Main panel: DSNTILA1

### Related tasks

[Generating tailored Db2 12 installation, migration, or function level activation jobs](#)

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

[Automating Db2 installation or migration with z/OS Management Facility](#)

You can use z/OSMF to automate the process of installing or migrating to Db2 12 for z/OS.

[Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

### Related reference

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

## USE Z/OSMF WORKFLOW field

The USE Z/OSMF WORKFLOW field specifies whether to run the CLIST with panels that support the creating of z/OSMF workflows for migrating or installing Db2.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNHDECP:</b>	None

### NO

The CLIST uses a set of installation panels that support tailoring the CLIST in preparation for installing or migrating Db2, as described in Chapter 4, “[Generating tailored Db2 12 installation, migration, or function level activation jobs](#),” on page 43.

### YES

The CLIST uses a modified set of panels that support the generation z/OSMF workflow definition files and input variable files.

As soon as you set USE Z/OSMF WORKFLOW ====> YES, panel DSNTILA1 opens. The CLIST then runs starting with the DSNILA1 panel each time, until you set USE Z/OSMF WORKFLOW ====> NO. Then, the CLIST runs starting with panel DSNTIPA1 again.

### Related tasks

[Automating Db2 installation or migration with z/OS Management Facility](#)

You can use z/OSMF to automate the process of installing or migrating to Db2 12 for z/OS.

### Related reference

[Installation panels for installing or migrating with z/OSMF](#)

If you specify `USE Z/OSMF WORKFLOW ==> YES` on panel DSNTIPA1, panel DSNTILA1 opens, and the CLIST uses a modified set of installation panels.

## INSTALL TYPE field

The value of the INSTALL TYPE field specifies whether you are installing, updating, or migrating to Db2 12, activating a Db2 12 function level, or preparing artifacts for creating services to provision Db2 subsystems.

<b>Acceptable values:</b>	ACTIVATE, INSTALL, UPDATE, MIGRATE , PROVISION
<b>Default:</b>	INSTALL
<b>DSNHDECP:</b>	none

### INSTALL

Specifies that you are installing Db2 for the first time. This is the default value for the first run of the CLIST. After you complete the installation, function level 500 is activated.

### MIGRATE

Specifies that you are migrating from Db2 11 to Db2 12.

When you are migrating, the DATA SET(MEMBER) NAME field is required.

### ACTIVATE

Specifies that you are activating a Db2 function level. When this option is specified, Db2 prompts you to specify the new function level on the DSNTIP00 panel. In a data sharing environment, the function level activation process is completed only once for the data sharing group. The CLIST customizes a minimal job set for activation of the new function level.

**Important:** Use this option to activate a higher function level only after migration to Db2 12 is complete and Db2 is stable at a particular function level.

### UPDATE

Specifies that you are updating parameters for an existing Db2 subsystem.

### PROVISION

Specifies that you are preparing artifacts for creating services to provision Db2 subsystems. When you specify this value panel DSNTIPAP is displayed next in the CLIST panel session. For more information, see [“Creating artifacts for provisioning Db2 by running the installation CLIST”](#) on page 371.

If you are updating or migrating, you use the same set of panels that you use for installation. Each panel displays all fields; however, the fields that cannot be changed in update or migrate mode are protected. This way, you can see the values that are related to ones that you want to change.

You can also choose either INSTALL or UPDATE to recheck values you that chose before.

Certain fields cannot be changed during a migration. See panels DSNTIPH, DSNTIPD, DSNTIP7, and DSNTIPP for more information. Ensure that those fields are correct in the data set member that you provide.

### Related tasks

[Installing Db2 12](#)

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

[Updating subsystem parameter and application default values](#)

You can dynamically update the value of some subsystem parameters while Db2 is running. For other subsystem parameters, you must stop and restart Db2 to change the values.

### Related reference

[DSNTIPH: System resource data set names panel](#)

The entries on the DSNTIPH panel specify the names of bootstrap data sets, active logs, and archive logs. These entries also specify the number of copies (1 for single logging or 2 for dual logging) for the active and archive logs.

[DSNTIPD: Sizes panel 1](#)

The entries on the DSNTIPD panel establish the size of the Db2 catalog, directory, and log data sets. Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

[DSNTIP7: SQL OBJECT DEFAULTS PANEL 1](#)

The entries on the DSNTIP7 panel provide general default settings for creating table spaces.

[DSNTIPP: Protection panel](#)

The entries on the DSNTIPP panel are related to security matters.

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

## DATA SHARING field (DSHARE subsystem parameter)

The DSHARE subsystem parameter controls whether the data sharing function is to be used.

<b>Acceptable values:</b>	YES, NO, blank (for update)
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6GRP DSHARE

Choose NO if you are not using data sharing. If you choose YES, you will continue to panel DSNTIPK after completing panel DSNTIPA2.

### DSNTIPOA - DATA SHARING FUNCTION:

If you specify YES in the DATA SHARING field for installation, window DSNTIPOA is displayed:

```
DSNTIPOA
DATA SHARING FUNCTION:
Select one.
  1. Group
  2. Member
  3. Enable
PRESS:  ENTER to continue
        RETURN to exit
```

Figure 4. DSNTIPOA

Specify the data sharing function. A value is required.

#### 1. Group

Specify this value to install a new data sharing group. For more information, see [“Installing a new data sharing group”](#) on page 661.

#### 2. Member

Specify this value to add a new data sharing member. For more information, see [“Running the CLIST for adding a new member”](#) on page 675.



### 3. Enable

Specify this value to enable an existing Db2 subsystem to become the originating member of a data sharing group. For more information, see [“Running the CLIST for enabling data sharing” on page 663](#).

<b>Acceptable values:</b>	Group, Member, Enable
<b>Default:</b>	none
<b>DSNZPxxx:</b>	none

After entering a value, you proceed to panels DSNTIPA2 and DSNTIPK.

### DSNTIPOB - FIRST MEMBER OF GROUP TO MIGRATE?

If you specify YES in the DATA SHARING field for migration, window DSNTIPOB is displayed to ask if the current member is the first to migrate.

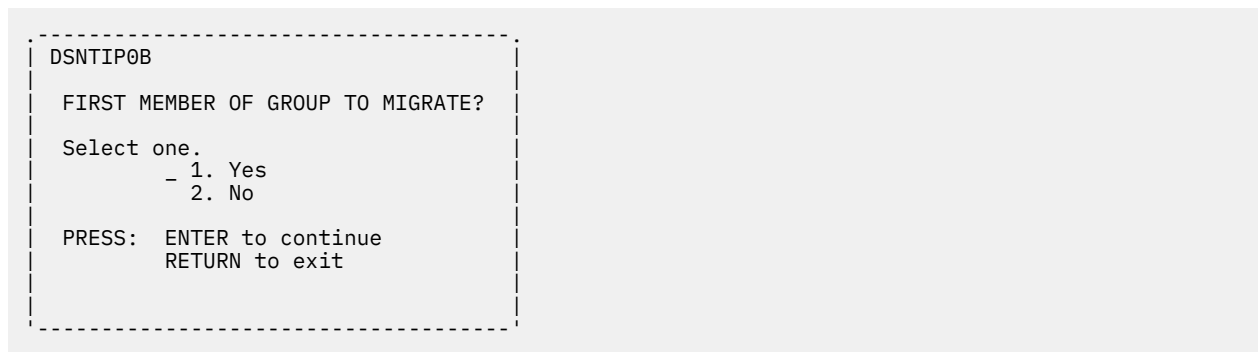


Figure 5. DSNTIPOB

Specify whether you are preparing to migration the first data sharing member or the subsequent members. A value is required.

#### 1. Yes

Specify this option to migrate the first member of a data sharing group. For more information, see [“Migrating the first member of a group to Db2 12” on page 706](#).

#### 2. No

Specify this option to migrate subsequent members of a data sharing group. For more information, see [“Generating tailored migration jobs for data sharing members” on page 708](#).

<b>Acceptable values:</b>	Yes, No
<b>Default:</b>	none
<b>DSNZPxxx:</b>	none

After entering a value, you proceed to panels DSNTIPA2 and DSNTIPK.

### Related tasks

#### [Adding a new data sharing member](#)

After you install a new data sharing group or enable an existing Db2 subsystem for data sharing, you can add new data sharing members. Always add a member as a new installation. After being added to the group, the new member uses the Db2 catalog of the originating member.

#### [Enabling Db2 data sharing](#)

The enabling process allows an existing Db2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

#### [Installing a new data sharing group](#)

Although you can install and immediately enable Db2 data sharing on a new Db2 12 member, you should do so only in low-risk situations. The recommended approach is to migrate to, or install, a Db2 12 member, use it for a while, and then enable data sharing.

## DATA SET(MEMBER) NAME field

The value of the DATA SET(MEMBER) NAME field indicates the name of the input data set to use for migrating from Db2 11. If you are installing, updating, or provisioning Db2 subsystems, the DATA SET(MEMBER) NAME field must remain blank. If you are installing or updating, the field must remain blank.

<b>Acceptable values:</b>	1–44 alphanumeric characters
<b>Default:</b>	NULL
<b>DSNZPxxx:</b>	none

The named member contains the output parameters that were produced when you last installed, updated, or migrated the prior release of Db2. Provide the fully qualified data set name as shown in the following example:

```
DSN1110.SDSNSAMP(DSNTIDXA)
```

If you no longer have this data set member, or if the one you have is incorrect, use the installation or update process from your previous release to re-create or correct the member. Enter the correct values on the panels, and save them under a new output member name. Discard the JCL that is created by this process; use the newly created member for migration.

Alternatively, you can run job DSNTIJXZ on your subsystem to create an updated data set member that contains the subsystem parameter and buffer pool settings from your previous release.

## Valid data set name

Valid data set names can be unqualified or qualified:

### Unqualified name

One to eight alphanumeric or national characters, a hyphen, or the character X'CO'. The first character must be alphabetic or national. Do not use hyphens in data set names for RACF-protected data sets. For example, ALPHA is an unqualified data set name.

### Qualified name

Multiple names joined by periods. Each name is coded like an unqualified name. Therefore, the name must contain a period within every eight characters. For example, ALPHA.PGM is a qualified data set name. The maximum length of a qualified data set name is:

- 44 characters if you use the TSO PROFILE setting NOPREFIX.
- 42 characters if you use the TSO PROFILE setting PREFIX.
- For an output tape data set, 17 characters, including periods. If the name is longer than 17 characters, only the right-most 17 characters are written to the tape header label.

## Related tasks

[Updating the CLIST defaults input member: job DSNTIJXZ](#)

Before you run the CLIST to migrate to Db2 12, update an existing Db2 12 subsystem, or install Db2 12 using the settings of an existing Db2 12 subsystem, update your defaults input member.

[Migrating an existing data sharing group to Db2 12](#)

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

## LIBRARY NAME PREFIX field

The LIBRARY NAME PREFIX field specifies the input prefix for the SDSNLOAD, SDSNMACS, SDSNSAMP, SDSNDBRM, and SDSNCLST libraries.

<b>Acceptable values:</b>	1–18 characters
<b>Default:</b>	DSN1210
<b>DSNZPxxx:</b>	none

The prefix must be the same as the name that you specified for the symbolic parameter TARGPRE in SMP/E job DSNALLOC.

This is the prefix of the Db2 SMP/E target libraries. If you specify DSNTIDXA or DSNTIDXB in the INPUT MEMBER NAME field, the prefix for the INCLUDE LIBRARY field, and the prefix and suffix for the LINK LIST LIBRARY field through the IVP DATA LIBRARY field on “[DSNTIPT: Db2 data set names panel](#)” on [page 111](#) are set. If all these data sets do not have the same prefix and suffix, you can change them on installation panel DSNTIPT.

### Related reference

INPUT MEMBER NAME field

The INPUT MEMBER NAME field specifies the member name of the input data set. This data set contains the default Db2 12 parameter values that are used for installation and migration, as in *prefix.SDSNSAMP.suffix*.

## LIBRARY NAME SUFFIX field

The LIBRARY NAME SUFFIX field specifies a suffix for the names of the libraries that are to be used by installation and sample jobs.

<b>Acceptable values:</b>	1–17 characters
<b>Default:</b>	NULL
<b>DSNZPxxx:</b>	none

The fully qualified data set name cannot exceed 44 characters. Names that exceed eight characters must be in groups of no more than eight characters, separated by periods.

Use a suffix only if you have added a common suffix to the following libraries when you created them in job DSNTIJAE:

- prefix.ADSNLOAD*
- prefix.SDSNLOAD*
- prefix.SDSNCLST*
- prefix.SDXRRESL*
- prefix.SDSNLINK*
- prefix.SDSNEXIT*
- prefix.SDSNSAMP*
- prefix.SDSNIVPD*
- prefix.SDSNMACS*
- prefix.ADSNMACS*
- prefix.SDSNDBRM*

If you did not add a common suffix to these libraries, enter their correct data set names on panel DSNTIPT.

To use the default Db2 data set names, specify DSN1010 in the LIBRARY NAME PREFIX field, and leave the LIBRARY NAME SUFFIX field blank.

## DATA SET NAME PREFIX field

The DATA SET NAME PREFIX field specifies the input prefix for the Db2 sample application libraries and for data sets that are to be created by the CLIST.

<b>Acceptable values:</b>	1–18 characters that form a valid z/OS data set name prefix
<b>Default:</b>	DSN1210
<b>DSNZPxxx:</b>	none

The prefix applies to the following data sets. The fully qualified data set name cannot exceed 44 characters. Names that exceed eight characters must be in groups of no more than eight characters that are separated by periods.

- *prefix*.NEW.SDSNTEMP
- *prefix*.NEW.SDSNSAMP
- *prefix*.NEW.SDSNCLST
- *prefix*.DBRMLIB.DATA
- *prefix*.RUNLIB.LOAD
- *prefix*.SRCLIB.DATA

If you specified YES in the USE Z/OSMF WORKFLOW field on panel DSNTIPA1, the installation CLIST creates two additional libraries to which the prefix applies:

- *prefix*.NEW.SDSNMFSA
- *prefix*.NEW.SDSNSAM2

These data sets are partitioned data sets. The first two are deleted if they exist, and they are created or re-created during the tailoring session. If you specify DSNTIDXA or DSNTIDXB in the INPUT MEMBER NAME field, the prefix for fields 1, 2, and 3, and the prefix and suffix for fields 4, 5, and 6 on installation panel “[DSNTIPT: Db2 data set names panel](#)” on page 111 are set. If all these data sets do not have the same prefix and suffix, you can change them on installation panel DSNTIPT.

## DATA SET NAME SUFFIX field

The DATA SET NAME SUFFIX field specifies the suffix for the Db2 sample application libraries and for data sets that are to be created by the CLIST.

<b>Acceptable values:</b>	1–17 characters that form a valid z/OS data set name prefix
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

The suffix applies to the following data sets. The fully qualified data set name cannot exceed 44 characters. Names that exceed eight characters must be in groups of no more than eight characters that are separated by periods.

- *prefix*.DBRMLIB.DATA
- *prefix*.RUNLIB.LOAD
- *prefix*.SRCLIB.DATA

If you do not use a common suffix to these libraries, enter their correct data set names on panel DSNTIPT.

To use the default Db2 data set names, specify DSN1110 in the DATA SET NAME PREFIX field, and leave the DATA SET NAME SUFFIX field blank.

## INPUT MEMBER NAME field

The INPUT MEMBER NAME field specifies the member name of the input data set. This data set contains the default Db2 12 parameter values that are used for installation and migration, as in *prefix.SDSNSAMP.suffix*.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSNTIDXA
<b>DSNZPxxx:</b>	none

### Installing Db2

If you are installing Db2 for the first time and not using SAP, use the supplied defaults input member, DSNTIDXA. If you are using SAP, you should specify DSNTIDXB, the SAP-specific input member. If you process the panels several times within a single run of the CLIST, all the previous values that are entered, except edited output data sets, remain the same.

To install Db2 using default parameter values from a previous installation, you must supply the member that contains the output from the previous run of the CLIST. That member was specified in the OUTPUT MEMBER NAME field during the previous run of the CLIST.

**Recommendation:** Before rerunning the CLIST, use job DSNTIJXZ to refresh the output member from the previous run of the CLIST.

### Migrating to Db2 12

If you are migrating, you must specify two member names for input values: one in the INPUT MEMBER NAME field, and one in the DATA SET(MEMBER) NAME field. The INPUT MEMBER NAME field must specify a member that contains the default parameter values for the new release (usually DSNTIDXA, or DSNTIDXB if you use SAP). This member is applied first to establish the CLIST parameters.

The member that is specified in the DATA SET(MEMBER) NAME field must be different from the one that is specified in the INPUT MEMBER NAME field. The DATA SET(MEMBER) NAME field must specify a member that contains the Db2 11 values at your site. You can create this member by running job DSNTIJXZ on your previous release. This member is applied last and it overrides the CLIST values that are established by the member that is specified in the INPUT MEMBER NAME field.

### Activating a function level

If you are activating a function level, the INPUT MEMBER field value needs to be the name of the OUTPUT MEMBER NAME that you specified when you installed or migrated to Db2 12, or when you most recently activated a Db2 12 function level.

### Updating an existing Db2 subsystem

Before running the CLIST in UPDATE mode, use job DSNTIJXZ to refresh the output member from the previous run of the CLIST. Specify the refreshed member in the INPUT MEMBER NAME field.

The following table lists the data set names that are generated with the *prefix* and *suffix* values from PREFIX and SUFFIX only when the INPUT MEMBER NAME is DSNTIDXA or DSNTIDXB.

Table 9. Resulting data set names when using prefix and suffix parameters

Default library name	CLIST edited library name
<i>prefix</i> .DBRMLIB.DATA	<i>prefix</i> .DBRMLIB.DATAsuffix
<i>prefix</i> .RUNLIB.LOAD	<i>prefix</i> .RUNLIB.LOAD.suffix
<i>prefix</i> .SRCLIB.DATA	<i>prefix</i> .SRCLIB.DATA.suffix

Table 9. Resulting data set names when using prefix and suffix parameters (continued)

Default library name	CLIST edited library name
<i>prefix</i> .SDSNDBRM	<i>prefix</i> .SDSNDBRM. <i>suffix</i>
<i>prefix</i> .SDSNLINK	<i>prefix</i> .SDSNLINK. <i>suffix</i>
<i>prefix</i> .SDSNLOAD	<i>prefix</i> .SDSNLOAD. <i>suffix</i>
<i>prefix</i> .SDSNMACS	<i>prefix</i> .SDSNMACS. <i>suffix</i>
<i>prefix</i> .ADSNLOAD	<i>prefix</i> .ADSNLOAD. <i>suffix</i>
<i>prefix</i> .ADSNMACS	<i>prefix</i> .SDSNMACS. <i>suffix</i>
<i>prefix</i> .SDSNSAMP	<i>prefix</i> .SDSNSAMP. <i>suffix</i>
<i>prefix</i> .SDSNCLST	<i>prefix</i> .SDSNCLST. <i>suffix</i>
<i>prefix</i> .SDSNIVPD	<i>prefix</i> .SDSNIVPD. <i>suffix</i>
<i>prefix</i> .SDSNC.H	<i>prefix</i> .SDSNC.H
<i>prefix</i> .SDXRRESL.	<i>prefix</i> .SDXRRESL. <i>suffix</i>

### Related tasks

#### Adding a new data sharing member

After you install a new data sharing group or enable an existing Db2 subsystem for data sharing, you can add new data sharing members. Always add a member as a new installation. After being added to the group, the new member uses the Db2 catalog of the originating member.

#### Migrating an existing data sharing group to Db2 12

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

### Related reference

#### DATA SET(MEMBER) NAME field

The value of the DATA SET(MEMBER) NAME field indicates the name of the input data set to use for migrating from Db2 11. If you are installing, updating, or provisioning Db2 subsystems, the DATA SET(MEMBER) NAME field must remain blank. If you are installing or updating, the field must remain blank.

## OUTPUT MEMBER NAME field

The OUTPUT MEMBER NAME field specifies the member name of the output data set in which to save the values that are entered on the installation panels.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	NULL
<b>DSNZPxxx:</b>	none

If you do not specify a name, the values are lost when you leave the installation CLIST, and you no longer have the values available for future updates. This member is stored in *prefix*.SDSNSAMP (not the one created by the DSNTINST CLIST). To avoid replacing any members of *prefix*.SDSNSAMP that were shipped with the product, specify DSNTIDxx as the value of OUTPUT MEMBER NAME, where xx is any alphanumeric value except SA, VB, XA, or XB.

Always give a new value in the OUTPUT MEMBER NAME field for a new panel session. You supply the name from your current session in the INPUT MEMBER NAME field for your next session. You should not use the same member name for output as for input.

**Recommendation:** Write down the output member name that you entered for reference during future sessions.



<b>Default:</b>	none
<b>DSNZPxxx:</b>	DSN6SYSP.OTC_LICENSE

This field accepts only one value, YES. You cannot pass this panel with any other value in that field. If you do not accept the terms of this license, press the Return key to exit the Db2 installation CLIST.

## DSNTIPAP: Provision DB2 - provisioning preferences and data set names

The fields on panel DSNTIPAP specify preferences for the provisioning of Db2, and the names of Db2 libraries that are used for provisioning Db2 subsystems only (not in installation or migration of Db2 12).

Panel DSNTIPAP is only displayed if INSTALL TYPE ==> PROVISION is specified on panel DSNTIPA1 or DSNTILA1. It is displayed immediately after panel DSNTILA1 and before panel DSNTIPA2.

```

DSNTIPAP          PROVISION DB2 - PROVISIONING PREFERENCES AND DATA SET NAMES
====>

s  1 DB2 COMMAND PREFIX  ==> -           First character of DB2 subsystem
    FIRST CHARACTER      command prefix
s  2 DATA SET OR        ==> NEW          For CLIST library to be allocated
    LIBRARY QUALIFIER

Data sets allocated by SMP/E and other methods:
s  3 ENGLISH TASK AND    ==> DSNCL10.SDSNPFPE
    PANELS LIBRARY
s  4 ISPF MESSAGE LIBRARY ==> DSNCL10.SDSNSPFM
s  5 ISPF INSTALL TASK   ==> DSNCL10.SDSNSPFF
    AND PANELS LIBRARY
s  6 ISPF SKELETON LIBRARY ==> DSNCL10.SDSNSPFS
s  7 ISPF CMD TABLE LIBR ==> DSNCL10.SDSNSPFT
For DB2 non-data sharing ONLY enter data below:
  8 SOFTWARE SERVICE     ==> DY           First two characters of software
    INSTANCE NAME PREFIX service instance name
For DB2 data sharing ONLY enter data below:
  9 SUBSYSTEM NAME PREFIX ==> D           First character of subsystem name
 10 CLUSTER INSTANCE NAME PREFIX ==> Z      First character of cluster name
 11 OUTPUT MEMBER NAME 2 ==>              Save additional member values
PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

### DB2 COMMAND PREFIX FIRST CHARACTER

Specifies the first character of the generated command prefix for the provisioned Db2 subsystem. Must not be blank.

<b>Acceptable values:</b>	One non-alphanumeric character; it must be a character, from the table in <a href="#">"COMMAND PREFIX field" on page 278</a> , except for the ampersand (&). <a href="#">"1" on page 70</a>
<b>Default:</b>	-
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	AGSSIDPX

#### Note:

1. The CLIST does not support use of the ampersand (&). However, to use & for a provisioned Db2 subsystem, you can edit dsntivn directly in zFS.

### DATA SET OR LIBRARY QUALIFIER

Specifies the intermediate qualifier for the data set or library for customized copies of Db2 target library members during provisioning.

It is NEW in the generated library name *prefix*.NEW.*ssin*.SDSNCLST for the CLIST LIBRARY field on panel DSNTIPT, where:

- *prefix* is the INSTALL DS PREFIX from panel DSNTIPG1 (INSTALLATION PREFERENCES PANEL 2)



- *ssin* is the provisioning software service instance name

Must not be blank.

<b>Acceptable values:</b>	Valid data set name qualifier.
<b>Default:</b>	NEW
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	AGNEWIDS

#### ENGLISH TASK AND PANELS LIBRARY

Specifies the English task and help panels library. Must not be blank.

<b>Acceptable values:</b>	Valid data set name.
<b>Default:</b>	<i>prefix.SDSNPFPE.suffix</i>
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	DSNPFPE

#### ISPF MESSAGE LIBRARY

Specifies the Db2 ISPF message library which contains messages that are issued during installation or migrate processing. Must not be blank.

<b>Acceptable values:</b>	Valid data set name.
<b>Default:</b>	<i>prefix.SDSNSPFM.suffix</i>
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	DSNSPFM

#### ISPF INSTALL TASK AND PANELS LIBRARY

Specifies the Db2 ISPF library for installation task and help routing panels. Must not be blank.

<b>Acceptable values:</b>	Valid data set name.
<b>Default:</b>	<i>prefix.SDSNSPFP.suffix</i>
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	DSNSPFP

#### ISPF SKELETON LIBRARY

Specifies the Db2 ISPF skeleton library that is used to produce EDITJCL. Must not be blank.

<b>Acceptable values:</b>	Valid data set name.
<b>Default:</b>	<i>prefix.SDSNSPFS.suffix</i>
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	DSNSPFS

### ISPF CMD TABLE LIBR

Specifies the Db2 ISPF command table library. Must not be blank.

<b>Acceptable values:</b>	Valid data set name.
<b>Default:</b>	<i>prefix.SDSNSPFT.suffix</i>
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	DSNSPFT

### SOFTWARE SERVICE INSTANCE NAME PREFIX field

Specifies the first two characters of the software service instance name. This field is required (must not be blank) and modifiable when provisioning a non-data-sharing Db2 system. Otherwise, this field is protected.

<b>Acceptable values:</b>	2 alphabetic characters (A-Z), the first character must not be 'I'.
<b>Default:</b>	DY
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF variable:</b>	none

### SUBSYSTEM NAME PREFIX field

Specifies the first character of the software service instance name. This field is always set to D and is always protected.

<b>Acceptable values:</b>	D
<b>Default:</b>	D
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF variable:</b>	none

### CLUSTER INSTANCE NAME PREFIX field

Specifies the first character of the cluster instance name. This field is required (must not be blank) and modifiable when provisioning a data sharing group.

Otherwise, this field is protected.

<b>Acceptable values:</b>	1 alphabetic character (A-Z)
<b>Default:</b>	Z
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF variable:</b>	none

### OUTPUT MEMBER NAME 2

Specifies the member name of the output data set in which to save the parameter values to be used by z/OSMF for provisioning the additional data sharing members.

This field is protected when provisioning a non-data sharing Db2 system. It is modifiable only when provisioning a data sharing group.

When you run the installation CLIST to provision a data sharing group, it generates the artifacts to provision the originating member and all additional members.

The parameter settings for provisioning the originating data sharing group member are saved in the data set output member specified in the OUTPUT MEMBER NAME on panel DSNTILA1/DSNTIPA1.

The parameter settings for provisioning the additional members of the data sharing group are saved in the data set output member specified here.

You can compare these two data set output members to quickly review the configuration differences between provisioning of the originating member and provisioning of additional members.

To save the settings for provisioning the additional members of the data sharing group, you must specify an output member name in the OUTPUT MEMBER NAME 2 field. Specify DSNTIDxx as the value of OUTPUT MEMBER NAME 2, where xx is any alphanumeric value except SA, VB, XA, XB or XC.

If you specify the same name here as in the OUTPUT MEMBER NAME of panel DSNTILA1/DSNTIPA1, the settings for provisioning the originating member of the data sharing group will be replaced by the settings for provisioning the additional members.

<b>Acceptable values:</b>	1 - 8 characters.
<b>Default:</b>	NULL
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF</b>	none

### Related tasks

[Creating artifacts for provisioning Db2 by running the installation CLIST](#)

You can run the installation CLIST to create artifacts for provisioning Db2 subsystems and data sharing groups.

[Creating services for provisioning Db2 for z/OS \(DBaaS\)](#)

You can use the sample Db2 software services template to create a service that rapidly provisions multiple Db2 for z/OS subsystems or data sharing groups, and deprovision them later.

### Related reference

DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

[INSTALL TYPE field](#)

The value of the INSTALL TYPE field specifies whether you are installing, updating, or migrating to Db2 12, activating a Db2 12 function level, or preparing artifacts for creating services to provision Db2 subsystems.

## DSNTIPA2: Db2 catalog and directory panel

The entries on the DSNTIPA2 panel define the name of the ICF catalog for Db2 VSAM data sets and indicate whether to create the specified catalog. The entries also define z/OS Storage Management Subsystem (SMS) classes that are to be used when defining data sets for the Db2 catalog and directory.

The values that you enter on this and each of the subsequent panels are saved in the data set member that you named in the OUTPUT MEMBER NAME field on the Main Panel, DSNTIPA1.

Db2 12 requires SMS, so ensure that the following conditions are met before you proceed:

- SMS is active on the system where this Db2 subsystem resides or is being installed or migrated. SMS must be configured to allocate all data sets for the Db2 catalog and directory in extended format and to use extended addressability.
- Your system storage administrator has provided the required SMS automatic class selection (ACS) routines for data sets and Db2 storage groups created during Db2 installation or migration.

- Your system storage administrator has provided any SMS data classes, management classes, and storage classes that you plan to specify on this panel and the DSNTIPA3 panel.

To help performance and recovery, reduce dependency on a single storage device by using more than one SMS scheme.

```

DSNTIPA2                INSTALL DB2 - CATALOG AND DIRECTORY
====>

Check parameters and reenter to change:
 1 CATALOG ALIAS          ==> DSNCAT      Alias of VSAM catalog for DB2 subsystem
                               data sets
 2 DEFINE CATALOG         ==> YES        YES or NO

                               ----- SMS -----
                               DATA CLASS  MGMT CLASS  STOR CLASS
                               -----
 3 DIRECTORY AND CATALOG ==>              ==>              ==>
  DATA
 4 DIRECTORY AND CATALOG ==>              ==>              ==>
  INDEXES
 5 COMPRESS DB2 DIR LOBS ==> NO          Compress LOB table spaces in the DB2
                               directory (NO or YES)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 8. Db2 catalog and directory panel: DSNTIPA2

### CATALOG ALIAS field (CATALOG subsystem parameter)

The value of the CATALOG ALIAS field specifies the high-level qualifier for VSAM data sets that are to be used by the Db2 catalog and directory.

The installation CLIST also uses the value in the CATALOG ALIAS field to customize the following statements in Db2 installation and migration jobs:

- The NAME parameter of the DEFINE ALIAS statement for the optional VSAM ICF user catalog for Db2 data sets (job DSNTIJCA)
- The CATALOG parameter of AMS DELETE and DEFINE statements for Db2 catalog (DSNDB06), Db2 directory (DSNDB01), active logs, and bootstrap data sets (jobs DSNTIJDE and DSNTIJIN)
- The VCAT parameter of various CREATE STOGROUP statements (jobs DSNTIJTM, DSNTIJSG, DSNTEJ1, DSNTEJ2A, and DSNTEJ3M)

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSNCAT
<b>Update:</b>	See <a href="#">Changing the high-level qualifier for Db2 data sets</a>
<b>DSNZPxxx:</b>	DSN6SPRM CATALOG

### VSAM data set cataloging options

The installation jobs classify the Db2 VSAM data sets, which include recovery log, subsystem, and user data sets. You must create the catalog that defines these data sets through the VSAM ICF.

**Recommendation:** Use an ICF user catalog to classify all Db2 objects because you can use aliases for user catalogs. Multi-level ICF catalog aliases are acceptable. However, when you use the CREATE STOGROUP statement, you might need to use an alias for the VCAT option, which must be a single-level one- to eight-character name. You can use a master catalog, but only if the name of the master catalog is a single-level name that is one to eight characters.

Ensure that your alias conforms to your local naming conventions. If you are migrating, you should use the same ICF catalog aliases for Db2 12 that you used for your previous version because Db2 12 uses many of the data sets from your previous version that are already classified.

Whether you are installing or migrating, Db2 does not require you to catalog all Db2 VSAM data sets in the same ICF catalog nor use the same prefix or catalog alias. However, data sets for the Db2 catalog (DSNDB06) and Db2 directory (DSNDB01) must have the high-level qualifier that you specify in the CATALOG ALIAS field. See the following table for guidelines for the high-level qualifier of data sets. The BSDS is VSAM KSDS. The archive logs are sequential. All other data sets are VSAM linear data sets.

*Table 10. Db2 data sets ICF catalog guidelines*

Db2 data sets	Guidelines
Db2 directory (DSNDB01) Db2 catalog (DSNDB06)	The first-level qualifier of these data sets must be the value that you specify in the CATALOG ALIAS field. These data sets must be SMS-managed with allocation for extended format and extended addressability.
Active logs Bootstrap data set Default database (DSNDB04) Work file database	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. You can also catalog the data sets in different ICF catalogs using different prefixes.
Archive logs	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. If the archive log data set is allocated on disk, the data set must be cataloged according to the values of the ARCPFX1 or ARCPFX2 subsystem parameters, which are set through the COPY 1 PREFIX and COPY 2 PREFIX fields on panel DSNTIPH. If the archive log data set is allocated on a tape device, cataloging the data set is optional.
User table spaces User index spaces	The first-level qualifier of these data sets does not need to match the value that you specify in the CATALOG ALIAS field. You can catalog different user spaces in different ICF catalogs, using different prefixes.

You must provide any catalog connections for log and bootstrap data sets that you catalog apart from the Db2 directory and catalog data sets.

**Recommendation:** Add an alias for the proper catalog.

Although you can catalog two Db2 subsystems in the same ICF catalog, they must not share the same ICF catalog alias because the alias is the only parameter that makes the data set names unique.

## Data set naming conventions

The value that you specify as the ICF catalog alias is also used as the high-level qualifier for Db2 directory and catalog VSAM data sets. The data sets for the Db2 directory and catalog databases and the default database are all VSAM linear data sets (LDSs). Their data set names have the following format:

```
ddddddd.DSNDBn.bbbbbbb.xxxxxxxx.y0001.Accc
```

With the following definitions:

**ddddddd**

The high-level qualifier, which is the value that you supply for the CATALOG ALIAS field.

**DSNDBn**

A constant identifying this as a Db2 data set. For *n*, use C for a cluster name or D for a data component name.

**bbbbbbb**

The database name. The system database names are:

**DSNDB01**

The Db2 directory database

**DSNDB04**

The default database

**DSNDB06**

The Db2 catalog database

**DSNDB07**

The default work file database

**xxxxxxx**

The individual table space or index space.

**y0001.Accc**

The data set. For table spaces and index spaces that can be reorganized with SHRLEVEL CHANGE or SHRLEVEL REFERENCE, *y* can be I or J, depending on whether REORG has been run. For other table spaces and index spaces, *y* is I. *ccc* is the partition number of a partitioned table space or index space, or the relative data set number of a simple or segmented table space or index space.

For example, if the catalog alias is DSNCAT, one of the Db2 directory data sets is named:

```
DSNCAT.DSNDBD.DSNDB01.DBD01.I0001.A001
```

Similarly, one of the Db2 catalog data sets is named:

```
DSNCAT.DSNDBD.DSNDB06.SYSTSVIEW.I0001.A001
```

## DEFINE CATALOG field

The value of the DEFINE CATALOG field determines whether Db2 is to create a new ICF catalog.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	see <a href="#">Changing the high-level qualifier for Db2 data sets</a>
<b>DSNZPxxx:</b>	none

**YES**

Builds a new ICF catalog by using the alias that is specified in the CATALOG ALIAS field.

**NO**

Signals that the catalog that is named in the CATALOG ALIAS field already exists; the CLIST does not create a new one.

If you specify YES, Db2 edits job DSNTIJCA which, when run, creates a user catalog and an alias for that catalog. Db2 creates the high-level qualifier of the catalog name by adding a number to the end of the alias that is defined in the CATALOG ALIAS field. If the alias has fewer than eight characters, Db2 appends a "1" to the end of the alias. For example, if you accept the default of DSNCAT for the CATALOG ALIAS field, the catalog that Db2 creates is named DSNCAT1.USER.CATALOG. If the alias has eight characters, Db2 changes the last character into a 1. If the last character is already a 1, Db2 changes the 1 to a 2.

## DIRECTORY AND CATALOG DATA field (CATDDACL, CATDMGCL, and CATDSTCL subsystem parameters)

The DIRECTORY AND CATALOG DATA field specifies the explicit Storage Management Subsystem (SMS) classes that are to be used for defining VSAM data sets for the Db2 catalog and directory. Your SMS storage administrator defines these SMS classes. To use ACS routines for defining these data sets, leave this field blank.

For migration, values that you enter in this field initially apply only for defining new Db2 catalog and directory data sets.

Table 11. Acceptable values and defaults for columns of DIRECTORY AND CATALOG DATA field

Column	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank
Update:	None	None	None
DSNZPxxx:	DSN6SPRM CATDDACL	DSN6SPRM CATDMGCL	DSN6SPRM CATDSTCL

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## DIRECTORY AND CATALOG INDEXES field (CATXDAACL, CATXMGCL, and CATXSTCL subsystem parameters)

The DIRECTORY AND CATALOG INDEXES field specifies the explicit Storage Management Subsystem (SMS) classes that are to be used for defining VSAM data sets for Db2 catalog and directory indexes. Your SMS storage administrator defines these SMS classes. To use ACS routines for defining these data sets, leave this field blank.

For migration, values that you enter in this field initially apply only for defining new data sets for Db2 catalog and directory indexes.

Table 12. Acceptable values and defaults for columns of DIRECTORY AND CATALOG INDEXES field

Column	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank
Update:	None	None	None
DSNZPxxx:	DSN6SPRM CATXDAACL	DSN6SPRM CATXMGCL	DSN6SPRM CATXSTCL

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## COMPRESS DB2 DIR LOBS field (COMPRESS\_DIRLOB subsystem parameter)

The value of the COMPRESS\_DIRLOB subsystem parameter specifies whether LOB table spaces in the Db2 directory are to be compressed.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Data sharing scope:</b>	Same setting recommended on all members
<b>Online changeable:</b>	Yes
<b>Update:</b>	option 1 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM COMPRESS_DIRLOB

### NO

LOB table spaces in the Db2 directory are not compressed. This is the default value.

### YES

LOB table spaces in the Db2 directory are compressed the next time they are reorganized.

In a data sharing environment, all members should use the same setting for the COMPRESS\_DIRLOB parameter. The result of a table space reorganization will be determined by the value of the COMPRESS\_DIRLOB parameter on the member that executes the REORG TABLESPACE utility.

**Important:** Compressing the LOB table spaces in the directory requires the following conditions to be met:

- Db2 12 must be at function level 500 or higher.
- The zEDC hardware and software must be available and configured in the z/OS system. For more information, see [Requirements for zEnterprise Data Compression](#).

In data sharing, system performance can degrade dramatically if a member accesses compressed LOB data and the zEDC hardware and software are not configured in z/OS.

- The LOB table space must be associated with a base table that is in a universal table space.
- The total length of the entire LOB must be larger than the defined data page size, otherwise the LOB is not compressed.

### Related concepts

[Compressing LOB data \(Db2 Performance\)](#)

### Related reference

[Overview and planning of zEnterprise Data Compression \(zEDC\)](#)

[Requirements for zEnterprise Data Compression](#)

## DSNTIPA3: Data parameters panel

The entries on the DSNTIPA3 panel define the storage management preferences for the storage groups and data sets that are created during installation and migration.

For information about updating parameters with changes that cannot be made by using the panels, see [“Updating subsystem parameter and application default values” on page 373](#).



```

DSNTIPA3          INSTALL DB2 - DATA PARAMETERS PANEL
====>

Check parameters and reenter to change:
 1 PERMANENT UNIT NAME  ==> 3390      Device type for MVS catalog and
                                       partitioned data sets
 2 TEMPORARY UNIT NAME  ==> SYSDA     Device type for temporary data sets
 3 DB2 zHyperLinks SCOPE ==> DISABLE  Scope of zHyperLinks I/O connection
                                       (DISABLE, ENABLE, DATABASE, ACTIVELOG)

                                       ----- SMS -----
                                       VOL/SER  DATA CLASS  MGMT CLASS  STOR CLASS
                                       -----
 4 CLIST ALLOCATION      ==>             ==>         ==>         ==>
 5 NON-VSAM DATA       ==>             ==>         ==>         ==>
 6 VSAM CATALOG, DEFAULT, AND WORK FILE DATABASE ==>             ==>         ==>         ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

## PERMANENT UNIT NAME field

The PERMANENT UNIT NAME field specifies the device type or unit name that is to be used for allocating data sets that are created during installation or migration.

<b>Acceptable values:</b>	blank, valid device type, unit name
<b>Default:</b>	3390
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The device type or unit name applies to the following data sets:

- ICF catalog
- *prefix*.DBRMLIB.DATA.*suffix*
- *prefix*.RUNLIB.LOAD.*suffix*
- *prefix*.SRCLIB.DATA.*suffix*
- The two data sets that the DSNTINST CLIST generates:
  - *prefix*.NEW.SDSNTEMP
  - *prefix*.NEW.SDSNSAMP

The value of PERMANENT UNIT NAME identifies a direct access unit name for partitioned data sets and the ICF catalog. If you want to use different device types for different data sets, edit the installation or migration jobs after you complete the tailoring session. A common device type is 3390.

The value of PERMANENT UNIT NAME is sometimes used during IVP processing to place output (from COPY TABLESPACE, for example) on the device type that is specified for the PERMANENT UNIT NAME field.

A change to PERMANENT UNIT NAME during migration does not affect the ICF catalog, Db2 catalog, directory, or logs. The new value is used for data sets that are created during migration.

## TEMPORARY UNIT NAME field

The value of the TEMPORARY UNIT NAME field specifies the device type or unit name that is to be used for allocating temporary data sets.

<b>Acceptable values:</b>	blank, or valid device type or unit name
<b>Default:</b>	SYSDA
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of TEMPORARY UNIT NAME is the direct access or disk unit name that is used for the precompiler, compiler, assembler, sort, linkage editor, and utility work files in the tailored jobs and CLISTS.

Be aware that this field was previously used to specify the VOLTDEVT subsystem parameter, which provides the device type that is used by Db2 utilities that dynamically allocate temporary data sets. You now specify the VOLTDEVT parameter in the TEMPORARY DS UNIT NAME field on “[DSNTIP61: Db2 utilities parameters panel 2](#)” on page 249.

## DB2 zHyperLinks SCOPE field (ZHYPERLINK subsystem parameter)

The ZHYPERLINK subsystem parameter specifies the default scope of the zHyperLink protocol for I/O requests.

<b>Acceptable values:</b>	DISABLE, ENABLE, DATABASE or ACTIVELOG
<b>Default:</b>	DISABLE
<b>Online changeable:</b>	Yes
<b>Update:</b>	option 2 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ZHYPERLINK

The following values can be used to specify the default value for the ZHYPERLINK parameter:

### DISABLE

Db2 does not use zHyperLink for any I/O requests.

### ENABLE

All eligible I/O requests that Db2 makes request the zHyperLink protocol.

### DATABASE

Db2 requests the zHyperLink protocol only for database synchronous read I/Os.

### ACTIVELOG

Db2 requests the zHyperLink protocol only for active log write I/Os.

**Note:** In order for the zHyperLink protocol to be enabled for I/O requests by the Db2 system, in addition to specifying a value of ENABLE, DATABASE, or ACTIVELOG for the ZHYPERLINK parameter, the SMS storage class of the Db2 data sets must be enabled for zHyperLink eligibility using the Integrated Storage Management Facility (ISMF).

### Related concepts

[Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

### Related tasks

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

### Related reference

[APPLCOMPAT bind option \(Db2 Commands\)](#)

## CLIST ALLOCATION field

The CLIST ALLOCATION field controls the storage management properties for the *prefix*.NEW.SDSNTEMP and *prefix*.NEW.SDSNSAMP data sets, which the CLIST creates during the tailoring session.

Table 13. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## NON-VSAM DATA field

The values of the NON-VSAM DATA field specify the storage management properties for non-VSAM data. Specifically, the NON-VSAM DATA field applies to the *prefix*.DBRMLIB.DATA, *prefix*.RUNLIB.LOAD, and *prefix*.SRCLIB.DATA data sets.

Table 14. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## VSAM CATALOG, DEFAULT AND WORK FILE DATABASE field

The values in the VSAM CATALOG, DEFAULT AND WORK FILE DATABASE field specify storage management properties. These properties apply to temporary data sets, the default storage group and sample storage group, and the VSAM catalog (if a new one is created).

Table 15. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

The CREATE STOGROUP statements for the default storage group and sample storage groups are tailored to include or exclude the VOLUMES, DATACLAS, MGMTCLAS, and STORCLAS parameters according to whether you specify arguments for them in this field.

- If a column is not blank, the corresponding parameter is included, with the value as its argument.
- If a column is blank, the corresponding parameter is excluded.
- If all columns are blank, the VOLUMES parameter is included, with the asterisk as its argument.

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

For migration, this field has no effect on the VSAM catalog or the default storage group because these objects are provided by the previous release of Db2.

## DSNTIPA4: BSDS and active log panel

The entries on the DSNTIPA4 panel define the name of the ICF catalog for the Db2 bootstrap data set (BSDS) and active log VSAM datasets. The entries also define optional z/OS Storage Management Subsystem (SMS) classes and disc volume serial names that are to be used when defining these data sets.

```

DSNTIPA4                INSTALL DB2 - BSDS AND ACTIVE LOG
====>

Check parameters and reenter to change:
 1 BSDS AND ACTIVE LOG   ==> DSNCAT   Alias of bootstrap and
   ICF CATALOG ALIAS     active log data sets

                                ----- SMS -----
                                VOL/SER  DATA CLASS  MGMT CLASS  STOR CLASS
                                -----
 2 LOG COPY 1, BSDS 2    ==>          ==>          ==>          ==>
 3 LOG COPY 2, BSDS 1    ==>          ==>          ==>          ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
  
```

### BSDS AND ACTIVE LOG ICF CATALOG ALIAS field

Indicates the dedicated ICF catalog alias for Db2 bootstrap data sets (BSDS) and active log VSAM data sets.

<b>Acceptable values:</b>	1–8 alphanumeric characters, beginning with a letter or alphabet extender
<b>Default:</b>	See <a href="#">Table 16 on page 83</a>
<b>Update:</b>	option 3 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The initial value of the BSDS AND ACTIVE LOG ICF CATALOG ALIAS field and how its value sets the high level qualifier of the BSDS, active log, and archive log data set names on panel DSNTIPH depend on the use case:

*Table 16. Use cases for the BSDS AND ACTIVE LOG ICF CATALOG ALIAS field*

INSTALL TYPE on panel DSNTIPA 1	Data sharing?	Can be changed?	Initial value source	This field used as high-level qualifier for BSDS, active log, and archive log data set names on DSNTIPH?
INSTALL	No	Yes	DSNTIDXn VBSDSLOG parameter, if it is not NULL;	Yes, if the value is modified
			otherwise, the CATALOG ALIAS field on panel DSNTIPA2 (CATALOG AND DIRECTORY)	Yes, if this field is different than the CATALOG ALIAS field

Table 16. Use cases for the BSDS AND ACTIVE LOG ICF CATALOG ALIAS field (continued)

INSTALL TYPE on panel DSNTIPA 1	Data sharing?	Can be changed?	Initial value source	This field used as high-level qualifier for BSDS, active log, and archive log data set names on DSNTIPH?
INSTALL	First member	Yes	DSNTIDX $n$ VBSDSLOG parameter, if it is not NULL;	Yes
			otherwise, the CATALOG ALIAS field on panel DSNTIPA2 (CATALOG AND DIRECTORY)	Yes
INSTALL	Subsequent member	No	DSNTIDX $n$ VBSDSLOG parameter	Yes
MIGRATE	Any	No	CATALOG ALIAS on panel DSNTIPA2	No, input from the DSNTIDX $n$ member is used
UPDATE	N/A	No	DSNTIDX $n$ VBSDSLOG parameter	No, input from the DSNTIDX $n$ member is used

#### Related reference

DSNTIPH: System resource data set names panel

The entries on the DSNTIPH panel specify the names of bootstrap data sets, active logs, and archive logs. These entries also specify the number of copies (1 for single logging or 2 for dual logging) for the active and archive logs.

### LOG COPY 1, BSDS 2 field

When installing Db2, you can change the values of the LOG COPY 1, BSDS 2 field. Specify the storage management properties for the first copy of the active log data set and the second copy of the bootstrap data set (BSDS).

When migrating Db2, you cannot change any values in this field.

This field has four columns where you can indicate the volume serial number and the SMS classes for data, management, and storage that are to be used for defining particular data sets or storage groups. The acceptable values and default values for each column are shown in the following table. All fields are optional.

Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.

Also edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.

Table 17. Acceptable values and defaults for field columns

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## LOG COPY 2, BSDS 1 field

When installing Db2, you can change the values of the LOG COPY 2, BSDS 1 field. Use this field to specify the storage management properties for the second copy of the active log and the first copy of the BSDS.

When migrating Db2, you cannot change any values in this field.

This field has four columns where you can indicate the volume serial number and the SMS classes for data, management, and storage that are to be used for defining particular data sets or storage groups. The acceptable values and default values for each column are shown in the following table. All fields are optional.

Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.

Also edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.

*Table 18. Acceptable values and defaults for field columns*

Column	VOL/SER	DATA CLASS	MGMT CLASS	STOR CLASS
Acceptable values:	Blank or a valid z/OS volume serial number	Blank or a valid SMS data class name	Blank or a valid SMS management class name	Blank or a valid SMS storage class name
Default:	Blank	Blank	Blank	Blank
Update:	None	None	None	None
DSNZPxxx:	None	None	None	None

A blank value in a column directs the CLIST to remove the corresponding storage-management-related parameters from all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field. A non-blank value is used by the CLIST to customize the corresponding storage-management-related parameters in all JCL, AMS, ALLOC, and DDL statements that are used to create data sets and storage groups that are associated with the field.

**Recommendation:** To help performance and recovery, avoid dependency on a single storage device by using an SMS scheme that uses more than one volume serial number.

## DSNTIP00: Activate a function level panel

Use the DSNTIP00 panel to specify a target function level and other related settings.

```

DSNTIP00          ACTIVATE A FUNCTION LEVEL FOR DB2
====>

Enter the current and target DB2 function levels:
 1 CURRENT FUNCTION LEVEL====>          (DB2's current function level)
 2 TARGET FUNCTION LEVEL ====> V12R1M500 (Function level to be activated)

Enter the default application compatibility level:
 3 APPL COMPAT LEVEL      ====> V12R1M500 (DB2 function level or V11R1 or V10R1)

Enter the default SQL level for the precompiler:
 4 PRECOMPILER SQL LEVEL  ====> V12R1M500 (DB2 function level or V11R1 or V10R1)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
    
```

The purpose of this panel depends on the value of the USE Z/OSMF WORKFLOW field on panel DSNTIPA1:

- When the USE Z/OSMF WORKFLOW field value is NO, the CLIST uses the settings specified on this panel to customize jobs for migration to Db2 12 at function level V12R1M100. Then you can use the ACTIVATE function of the CLIST to activate function level 500 or higher.
- When the USE Z/OSMF WORKFLOW field value is YES, the CLIST uses the settings specified on this panel to customize jobs for activating the specified Db2 function level and for setting the specified APPLCOMPAT and SQLLEVEL settings after completion of migration to Db2 12 function level. For z/OSMF migrations, all fields on this panel are selected as z/OSMF variables and the settings are stored in DSNTIVMN, the variable input file for the DSNTIWMN workflow. You can use the DSNTIWMN workflow to complete the migration of a subsystem or data sharing group to function level 500 or higher. In Db2 data sharing, do not run DSNTIWMN before all members of the group are migrated to Db2 12 at function level V12R1M100.

How you use CURRENT FUNCTION LEVEL and TARGET FUNCTION LEVEL fields of this panel depend on your activity. In some situations the fields are protected and cannot be changed. The following table describes how the values are used in particular situations.

Activity	CURRENT FUNCTION LEVEL field	TARGET FUNCTION LEVEL field (FUNCLVL)	JCL templates updated (result value)
Installing a new Db2 subsystem or originating data sharing member by using z/OSMF or not.	The field is blank and protected.	The default is V12R1M500. You can modify the value to specify a higher function level.	<ul style="list-style-type: none"> <li>• DSNTIJTC (FUNCLVL)</li> <li>• DSNTIJAF (FUNCLVL)</li> </ul>
Installing subsequent data sharing members, including by using z/OSMF	The field is blank and protected.	The default is FUNCLVL from the DSNTIDxx output member from the first group member.	None.
Enabling data sharing	The field is blank and protected.	The default is FUNCLVL from the DSNTIDxx member from the first group member.	None.
Migrating a Db2 subsystem or the first data sharing member to Db2 12	The field is blank and protected.	The default value is V12R1M100 and it is protected.	<ul style="list-style-type: none"> <li>• DSNTIJTC (catalog level V12R1M500)</li> </ul>



Table 19. DSNTIP00 default and valid values and JCL template actions (continued)

Activity	CURRENT FUNCTION LEVEL field	TARGET FUNCTION LEVEL field (FUNCLVL)	JCL templates updated (result value)
Migrating subsequent group members to Db2 12	The field is blank and protected.	The default value is V12R1M100 and it is protected.	None.
Activating function levels	The default is FUNCLVL from DSNTIDxx	The default is blank. You can specify V12R1M500 or higher.	<ul style="list-style-type: none"> <li>• DSNTIJA1 (V12R1M501)<sup>“1”</sup> on page 87</li> <li>• DSNTIJTC (FUNCLVL)</li> <li>• DSNTIJAF (FUNCLVL)</li> </ul>
Using z/OSMF to migrate a Db2 subsystem or the first data sharing member to Db2 12	The field is blank and protected.	The default is V12R1M500. You can modify the value to specify higher function levels.	<ul style="list-style-type: none"> <li>• DSNTIJA1 (V12R1M501)<sup>“2”</sup> on page 87</li> <li>• DSNTIJTC (FUNCLVL)</li> <li>• DSNTIJAF (FUNCLVL)</li> </ul>
Using z/OSMF to migrate subsequent group members to Db2 12	The field is blank and protected.	The default is FUNCLVL from the DSNTIDxx output member from the first group member, and the field is protected.	None.
Using z/OSMF to activate a function level	The default is FUNCLVL from the input DSNTIDxx member. You can specify V12R1M100 or higher.	The field is blank. You can specify V12R1M100 or higher.	<ul style="list-style-type: none"> <li>• DSNTIJTC (FUNCLVL)</li> <li>• DSNTIJAF (FUNCLVL)</li> </ul>
Updating subsystem parameters	The field is blank and protected.	The default is FUNCLVL from DSNTIDxx, and the field is protected.	None.

**Notes:**

1. DSNTIJA1 is generated only if CURRENT FUNCTION LEVEL is V12R1M100 and TARGET FUNCTION LEVEL is V12R1M502 or higher.
2. DSNTIJA1 is generated only if TARGET FUNCTION LEVEL is V12R1M502 or higher.

**Related tasks**

[Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

**Related reference**

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

[USE Z/OSMF WORKFLOW field](#)

The USE Z/OSMF WORKFLOW field specifies whether to run the CLIST with panels that support the creating of z/OSMF workflows for migrating or installing Db2.

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

[INSTALL TYPE field](#)

The value of the INSTALL TYPE field specifies whether you are installing, updating, or migrating to Db2 12, activating a Db2 12 function level, or preparing artifacts for creating services to provision Db2 subsystems.

#### Related information

[PI70406: Add ACTIVATE mode to the Db2 installation CLIST](#)

## CURRENT FUNCTION LEVEL field

The value of the CURRENT FUNCTION LEVEL field indicates the currently activated Db2 function level for certain situations.

<b>Acceptable values:</b>	<i>function-level</i>
<b>Default:</b>	Blank or the FUNCLVL value from the input DSNTIDxx member.
<b>Update</b>	None
<b>DSNZPxxx:</b>	None

#### *function-level*

The current activated function level. The format is *VvvRrMmmm*, where *vv* is the version, *r* is the release, and *mmm* is the modification level. For example, V12R1M510 identifies function level 510. For a list of all available function levels in Db2 12, see [Db2 12 function levels \(Db2 for z/OS What's New?\)](#).

How the CLIST uses this field depends on the INSTALL TYPE value that you specify on panel DSNTIPA1:

- For ACTIVATE, the CURRENT FUNCTION LEVEL field is set to the FUNCLVL value from the input DSNTIDxx member. You can change the value. The CLIST uses this field and the TARGET FUNCTION LEVEL field to generate the correct set of jobs required to activate the specified target function level.
- For other INSTALL TYPE values, the CURRENT FUNCTION LEVEL field is blank and cannot be changed.

## z/OSMF migration

The CURRENT FUNCTION LEVEL field value is never a z/OSMF variable and cannot be selected as such.

#### Related concepts

[Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#)

#### Related tasks

[Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

#### Related reference

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

## TARGET FUNCTION LEVEL field

The value of the TARGET FUNCTION LEVEL field specifies a Db2 function level to activate.

<b>Acceptable values:</b>	<i>function-level</i>
<b>Default:</b>	Situation dependent. See <a href="#">“DSNTIP00: Activate a function level panel” on page 86</a> .
<b>Update</b>	None
<b>DSNZPxxx:</b>	None

### ***function-level***

The value used in the -ACTIVATE command in the DSNTIJAF job. The format is *VvvRrMmmm*, where *vv* is the version, *r* is the release, and *mmm* is the modification level. For example, V12R1M510 identifies function level 510. For a list of all available function levels in Db2 12, see [Db2 12 function levels \(Db2 for z/OS What's New?\)](#).

Changing function levels does not always change the catalog level but you should always run the DSNTIJTC job before running the DSNTIJAF job. If the current catalog level supports the requested function level, DSNTIJTC ends with return code 4 and informational messages. Activating a lower function level never changes the catalog level.

How the CLIST uses this field depends on the INSTALL TYPE value that you specify on panel DSNTIPA1:

#### **MIGRATE**

When z/OSMF is used, this field is always selected as a z/OSMF variable, and the value specifies the function level that is activated at the end of the z/OSMF migration process.

when z/OSMF is not used, the CLIST completes migration to Db2 12 at function level V12R1M100.

#### **INSTALL or ACTIVATE**

The CLIST applies the value of this field to the -ACTIVATE FUNCTION LEVEL command in the DSNTIJAF job and in the CATMAINT utility control statement in the DSNTIJTC job.

#### **UPDATE**

The CLIST ignores this field.

### **z/OSMF migration**

The DB2 FUNCTION LEVEL field value is always selected as a z/OSMF variable and the setting indicate the target Db2 12 level after the migration process completes.

#### **Related concepts**

[Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#)

#### **Related tasks**

[Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

#### **Related reference**

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

### **APPL COMPAT LEVEL field (APPLCOMPAT subsystem parameter)**

The APPLCOMPAT subsystem parameter specifies the default value to use when the APPLCOMPAT bind option is not specified in a BIND command, or the APPLCOMPAT value is not specified or stored in the Db2 catalog for a REBIND command. Its value does not prevent specific applications from running at higher application compatibility levels.

**Tip:** Do not raise the default application compatibility level of the Db2 subsystem immediately after migrating or activating a new function level. Instead, wait until applications have been verified to work correctly at the higher function level, and any incompatibilities have been resolved. For details, see [Enabling default application compatibility with function level 500 or higher \(Db2 Application programming and SQL\)](#).

**Tip:** Set all Db2 data sharing members to the same value.

<b>Acceptable values:</b>	<i>function-level</i> , V11R1, V10R1
<b>Default:</b>	V11R1 or V10R1, as specified in the CLIST migration input member of the Db2 subsystem or first member of the data sharing group; V12R1M500 for installation
<b>Update:</b>	option 5 on panel DSNTIPB

<b>DSNZPxxx:</b>	DSN6SPRM.APPLCOMPAT
------------------	---------------------

The following values can be used to specify the default APPLCOMPAT bind option value for package binds and rebinds:

### **VvvRrMmmm**

Compatibility with the behavior of the identified Db2 function level. For example, V12R1M510 specifies compatibility with the highest available Db2 12 function level. The equivalent function level or higher must be activated.

For the new capabilities that become available in each application compatibility level, see:

- [SQL changes in Db2 13 application compatibility levels](#)
- [SQL changes in Db2 12 application compatibility levels](#)

**Tip:** Extra program preparation steps might be required to increase the application compatibility level for applications that use data server clients or drivers to access Db2 for z/OS. For more information, see [Setting application compatibility levels for data server clients and drivers \(Db2 Application programming and SQL\)](#).

### **V12R1**

Compatibility with the behavior of Db2 12 function level 500. This value has the same result as specifying V12R1M500.

### **V11R1**

Compatibility with the behavior of Db2 11 new-function mode. After migration to Db2 12, this value has the same result as specifying V12R1M100. For more information, see [V11R1 application compatibility level \(Db2 Application programming and SQL\)](#)

### **V10R1**

Compatibility with the behavior of DB2 10 new-function mode. For more information, see [V10R1 application compatibility level \(Db2 Application programming and SQL\)](#).

## **z/OSMF migration**

The APPL COMPAT LEVEL field value is always selected as a z/OSMF variable. The setting indicates the target application compatibility level for Db2 after the migration process completes.

### **Related concepts**

[Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

[Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#)

### **Related tasks**

[Controlling the Db2 application compatibility level \(Db2 for z/OS What's New?\)](#)

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

### **Related reference**

[APPLCOMPAT bind option \(Db2 Commands\)](#)

## **PRECOMPILER SQL LEVEL field (SQLLEVEL DECP value)**

Specifies the Db2 function level or release to be used by the precompiler and coprocessor for determining the allowed SQL syntax in the absence of an explicit specification of the SQLLEVEL option. Db2 also uses

this parameter to set the SYSIBM.DEFAULT\_SQLLEVEL built-in global variable. In most cases, set this field to the current Db2 function level.

<b>Acceptable values:</b>	V10R1, V11R1, <i>function-level</i>
<b>Default:</b>	Installation: V12R1M500 z/OSMF migration: V12R1M500 Migration: V12R1M100
<b>Update:</b>	option 5 on panel DSNTIPB.
<b>DSNZPxxx:</b>	DSNHDECP.SQLLEVEL

### ***function-level***

The precompiler and coprocessor accept only SQL syntax that is valid in a Db2 12 function level. The format is *VvvRrMmmm*, where *vv* is the version, *r* is the release, and *mmm* is the modification level.

### **V11R1 or V12R1M100**

The precompiler and coprocessor accept only SQL syntax that is valid in Db2 11 new-function mode.

### **V10R1**

The precompiler and coprocessor accept only SQL syntax that is valid in DB2 10 new-function mode.

The function level activated on the Db2 subsystem does not restrict the SQLLEVEL value. However, you must ensure that you bind the resulting DBRM with the correct application compatibility level on a Db2 subsystem with the correct function level activated.

An online update to SQLLEVEL DECP parameter has immediate effect for the precompiler and coprocessor. However the SYSIBM.DEFAULT\_SQLLEVEL built-in global variable update requires a restart of Db2.

### **z/OSMF migration**

The SQLLEVEL DECP value is always selected as a z/OSMF variable and the setting is used to indicate the target SQLLEVEL level for Db2 after the migration process completes.

### **Related concepts**

[Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#)

### **Related tasks**

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

### **Related reference**

[DEFAULT\\_SQLLEVEL \(Db2 SQL\)](#)

## **DSNTIPK: Define group or member panel**

The DSNTIPK panel follows panel DSNTIPA2 when you select a data sharing function (GROUP, MEMBER, or ENABLE).

You must start Db2 and IRLM group names with an alphabetic character. You should carefully consider the naming convention for a data sharing system. See “Naming in Db2 data sharing” on page 608 for guidance on planning a naming convention before you choose names for the fields on panel DSNTIPK.

```

DSNTIPK          INSTALL DB2 - DEFINE GROUP OR MEMBER
====> _

Check parameters and reenter to change:

 1 GROUP NAME    ==> DSNCAT   Name of the DB2 group
 2 MEMBER NAME   ==> DSN1    Name of DB2 member in group
 3 WORK FILE DB  ==> DSN1    Work file database name for this member
 4 GROUP ATTACH  ==>         Group attach name for TSO, batch, utilities
 5 SUBGRP ATTACH ==>         Subgroup attach name for this member
 6 RANDOM ATTACH ==> YES     NO or YES. Allow this member to be used
                             at random for group attachment requests
 7 DEL CF STRUCTS==> NO     NO or YES. Attempt to delete coupling
                             facility structures during restart.
 8 PEER RECOVERY ==> NONE   NONE, RECOVER, ASSIST, or BOTH. Allow
                             this member to participate in peer
                             recovery

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 9. Define group or member panel: DSNTIPK

## GROUP NAME field (GRPNAME subsystem parameter)

The GRPNAME subsystem parameter identifies the name of a new or existing Db2 data sharing group that is to be used for this subsystem.

<b>Acceptable values:</b>	1–8 characters consisting of letters A–Z, numbers 0–9, \$, #, @
<b>Default:</b>	DSNCAT
<b>DSNZPxxx:</b>	DSN6GRP GRPNAME

The group name encompasses the entire data sharing group and forms the basis for the coupling facility structure names.

To avoid names that IBM uses for its z/OS cross-system coupling facility (XCF) groups, the first character must be an uppercase letter J - Z unless the name begins with DSN. Do not use SYS as the first three characters, and do not use UNDESIG as the group name.

## MEMBER NAME field (MEMBNAME subsystem parameter)

The MEMBNAME subsystem parameter specifies the name of a new or existing Db2 data sharing member that is to be used for this subsystem.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSN1
<b>DSNZPxxx:</b>	DSN6GRP MEMBNAME

**Recommendation:** Use the z/OS subsystem name. Db2 uses this name as its XCF member name. An example of a member name is DB1G. The member name can consist of letters A–Z, numbers 0–9, \$, #, and @.

## WORK FILE DB field

The value of the WORK FILE DB field specifies the name of the work file database that is to be used for the Db2 member.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSN1
<b>DSNZPxxx:</b>	none

Each Db2 member has its own work file database (called DSNDB07 in a non-data-sharing environment). One member of the data sharing group can have the name DSNDB07, but the recommendation is that you use a more meaningful name, such as WRKDSN1. You cannot specify a name that begins with DSNDB unless the name is DSNDB07.

## GROUP ATTACH field (SSID DECP value)

The value of the GROUP ATTACH field specifies a generic group attachment name. This name is to be used for batch programs, the call attachment facility (CAF), the RRS attachment facility (RRSAF), IMS, CICS Transaction Server for z/OS, and utilities.

<b>Acceptable values:</b>	1–4 characters
<b>Default:</b>	none
<b><i>dsnhdcp:</i></b>	SSID

An example of a group attachment name is DBOG. The value that you specify here is also used in the IEFSSNxx member of SYS1.PARMLIB.

If you leave this field blank, the SSID DECP value is set to the value that is specified in the SUBSYSTEM NAME field on panel DSNTIPM.

### Related concepts

Group attachment names and subgroup attachment names

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

[Group attachments and subgroup attachments \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Registering the command prefixes, member group attachment name, and subgroup attachment name](#)

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

### Related reference

[SUBSYSTEM NAME field \(SSID DECP value\)](#)

The SUBSYSTEM NAME field specifies the z/OS subsystem name for Db2.

## SUBGRP ATTACH field

The SUBGRP ATTACH field identifies the name of a new or existing subgroup attachment that is to be associated with this subsystem. A subgroup attachment name can be specified with a group attachment name to organize how TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections find an active Db2 subsystem.

<b>Acceptable values:</b>	blank, 1–4 characters. Characters must be letters A–Z, numbers 0–9, \$, #, or @
<b>Default:</b>	blank
<b>Update:</b>	modify IEFSSNxx and IPL
<b>DSNZPxxx:</b>	none

The value that you specify for the SUBGRP ATTACH field is used in the IEFSSNxx member of SYS1.PARMLIB.

The default value, blank, means that the member that is specified in the MEMBER NAME field is not to be associated with a subgroup attachment. If a subgroup attachment name is entered in the SUBGRP ATTACH field, a group attachment name must also be specified in the GROUP ATTACH field. A subgroup attachment can belong to only one group attachment and cannot have the same name as the group attachment. A member can belong to one subgroup attachment at most.

## Related concepts

[Group attachment names and subgroup attachment names](#)

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

[Group attachments and subgroup attachments \(Db2 Data Sharing Planning and Administration\)](#)

## Related tasks

[Registering the command prefixes, member group attachment name, and subgroup attachment name](#)

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

## RANDOM ATTACH field (RANDOMATT subsystem parameter)

The RANDOMATT subsystem parameter specifies whether this Db2 member can be used for randomized group attachment or subgroup attachment processing. This setting is ignored when the GROUP ATTACH field is blank.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>DSNZPxxx:</b>	DSN6GRP RANDOMATT

### YES

Allows this member to be used, at random, for group attachments or subgroup attachments.

### NO

Prevents this member from being considered for group attachments or subgroup attachments unless no other members of the defined group are available.

## Related concepts

[Group attachment names and subgroup attachment names](#)

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

[Group attachments and subgroup attachments \(Db2 Data Sharing Planning and Administration\)](#)

## DEL CF STRUCTS field (DEL\_CFSTRUCTS\_ON\_RESTART subsystem parameter)

The DEL\_CFSTRUCTS\_ON\_RESTART parameter specifies whether, during restart, Db2 is to attempt to delete the SCA, IRLM lock structure, and any allocated group buffer pools from the coupling facility.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 4 on DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP.DEL_CFSTRUCTS_ON_RESTART

### NO

During restart, Db2 does not attempt to delete the data sharing group's coupling facility structures.

**Recommendation:** Use this setting for production systems.

### YES

During restart, Db2 attempts to delete the data sharing group's coupling facility structures. The deletion is successful only if no other Db2 subsystems are connected to the structures when the deletion is attempted. If the deletion is successful, the deleted structures are recovered as necessary during a group restart or group buffer pool RECOVER-pending (GRECP) recovery process. This process might increase the amount of time that Db2 takes to complete a restart.

**Recommendation:** Use this setting for disaster recovery systems.



Use the same setting for the DEL CF STRUCTS field on all members of a data sharing group.

## PEER RECOVERY field (PEER\_RECOVERY subsystem parameter)

The PEER\_RECOVERY subsystem parameter specifies whether the data sharing member participates in data sharing peer recovery.

Db2 12 introduces this subsystem parameter. It takes effect in function level 100. However, in coexistence Db2 11 members do not participate in peer recovery.

<b>Acceptable values:</b>	NONE, RECOVER, ASSIST, BOTH
<b>Default:</b>	NONE
<b>DSNZPxxx:</b>	DSN6GRP.PEER_RECOVERY

The PEER\_RECOVERY subsystem parameter accepts the following values:

### NONE

This member does not participate in peer recovery. Use this option if you have configured the z/OS Automatic Recovery Manager (ARM) to restart failed Db2 members. NONE is the default value.

### RECOVER

This member is recovered by a peer member if it fails.

### ASSIST

This member attempts to initiate peer recovery for other failed members. When this member detects a failure, it attempts to initiate a LIGHT(YES) restart for the failed member if it has not already been initiated, to recover the retained locks.

### BOTH

Both RECOVER and ASSIST options are activated for this member.

### Related concepts

[Peer recovery for data sharing members \(Db2 Data Sharing Planning and Administration\)](#)

## DSNTIPG: Installation preferences panel

The entries on the DSNTIPG panel specify the authorization IDs for installation and IVP jobs.

```
DSNTIPG                INSTALL DB2 - INSTALLATION PREFERENCES
====>

Enter authorization IDs for installing DB2-supplied routines:
 1 ROUTINES CREATOR  ==> SYSADM    Authid to create and bind DB2 routines
 2 SEC DEF CREATOR   ==> SYSADM    Authid for routines w/ SECURITY DEFINER

Enter authorization IDs for other installation jobs:
 3 INSTALL SQL ID    ==> SYSADM    To process SQL in install jobs
 4 INSTALL PKG OWNER ==>          To own packages bound by install jobs
 5 INSTALL GRANTEE(S) ==> PUBLIC   > To be granted access on objects
                                   created by install jobs

Enter authorization IDs for IVP jobs:
 6 IVP SQL ID        ==> SYSADM    To process SQL in IVP jobs
 7 IVP PACKAGE OWNER ==>          To own packages bound by IVP jobs
 8 IVP GRANTEE(S)    ==> PUBLIC   > To be granted access on objects
                                   created by IVP jobs

Enter default ID for executing steps in provisioning workflow:
 9 PROVISION EXEC ID ==>          To execute provision workflow steps

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 10. Installation preferences panel: DSNTIPG

## ROUTINES CREATOR field

The ROUTINES CREATOR field specifies the CURRENT SQLID setting that is to be used when creating, configuring, and validating most Db2-supplied routines. This field also specifies the default OWNER for binding packages for these routines if the INSTALL PKG OWNER field is blank.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSADM
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The value in the ROUTINES CREATOR field is used by the installation CLIST to set the value of the AUTHID parameter for installation programs DSNTRIN in job DSNTIJRT and DSNTRVFY in job DSNTIJRV. If the INSTALL PKG OWNER field is not specified, the value in the ROUTINES CREATOR field is also used by the installation CLIST to set the value of the DEFPKOWN parameter for DSNTRIN and the PKOWNER parameter for DSNTRVFY.

DSNTRIN uses the value of the AUTHID parameter as the CURRENT SQLID for creating and configuring Db2-supplied routines. It also uses the value of the DEFPKOWN parameter to determine the default OWNER for binding the package for a Db2-supplied routine when an owner is not explicitly specified through the PKOWNER parameter in the routine's configuration control statement. If the DEFPKOWN parameter is not present, DSNTRIN uses the AUTHID parameter to determine the default OWNER.

DSNTRVFY uses the value of the AUTHID parameter as the CURRENT SQLID for validating Db2-supplied routines. It also uses the value of the PKOWNER parameter as the default OWNER for binding packages for routine validation. If the DEFPKOWN parameter is not present, DSNTRVFY uses the AUTHID parameter to determine the OWNER.

If you use installation SYSOPR authority for Db2 installation or migration, set the ROUTINES CREATOR field to SYSINSTL. Also, set the SEC DEF CREATOR and INSTALL SQL ID fields to SYSINSTL and the INSTALL PKG OWNER field to a non-blank value.

If the value of DSNTRIN parameter AUTHID is SYSINSTL, and an ID with installation SYSADM or installation SYSOPR authority is used to execute DSNTRIN to create or alter a Db2-supplied routine, Db2 identifies the routine as system-defined in the SYSIBM.SYSROUTINES catalog table.

### Related concepts

[Implementing Db2 system-defined routines \(Db2 Administration Guide\)](#)

### Related reference

[SYSROUTINES catalog table \(Db2 SQL\)](#)

## SEC DEF CREATOR field

The SEC DEF CREATOR field specifies the CURRENT SQLID value for creating and configuring Db2-supplied routines that are defined with the SECURITY DEFINER option.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSADM
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The value that you enter in the SEC DEF CREATOR field is assigned by the installation CLIST as the setting of the SECDEFID parameter for installation program DSNTRIN in job DSNTIJRT.

The SECDEFID parameter is used by the DSNTRIN program as the CURRENT SQLID setting when creating and configuring Db2-supplied routines that have the SECURITY DEFINER attribute. The default OWNER of

any packages bound for the routines is specified in the INSTALL PKG OWNER field. If the INSTALL PKG OWNER field is not specified, the default OWNER is the value of the ROUTINES CREATOR field.

If you use the installation SYSOPR authority for Db2 installation or migration, set the SEC DEF CREATOR field to SYSINSTL. You must also set the ROUTINES CREATOR and INSTALL SQL ID fields to SYSINSTL and define SYSINSTL in RACF.

**Requirement:** Specify an ID that can be used as a logon ID because it will be used by WLM to execute routines that have the SECURITY DEFINER attribute.

### Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

### Related reference

[ROUTINES CREATOR field](#)

The ROUTINES CREATOR field specifies the CURRENT SQLID setting that is to be used when creating, configuring, and validating most Db2-supplied routines. This field also specifies the default OWNER for binding packages for these routines if the INSTALL PKG OWNER field is blank.

## INSTALL SQL ID field

The INSTALL SQL ID field specifies the CURRENT SQLID setting that is to be used when SQL is processed by most Db2 installation and sample jobs.

The INSTALL SQL ID does not apply to the DSNTIJRT and DSNTIJRV jobs. For these jobs, use the ROUTINES CREATOR and SEC DEF CREATOR fields, to specify the CURRENT SQLID.

<b>Acceptable values:</b>	1–8 characters. The first character must be alphabetic.
<b>Default:</b>	SYSADM
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of this field as the value of CURRENT SQLID for installation jobs except DSNTIJRT and DSNTIJRV.

If you use the installation SYSOPR authority for Db2 installation, specify an installation system administrator ID. For Db2 migration, specify in the INSTALL PKG OWNER field an authorization ID with at least DBADM WITHOUT ACCESSCTRL authorization. Also, set the ROUTINES CREATOR, SEC DEF CREATOR, and INSTALL SQL ID fields to SYSINSTL.

### Related reference

[INSTALL PKG OWNER field](#)

The INSTALL PKG OWNER field specifies the authorization ID to assign as the owner of packages and plans that are bound by most installation and sample jobs.

[SEC DEF CREATOR field](#)

The SEC DEF CREATOR field specifies the CURRENT SQLID value for creating and configuring Db2-supplied routines that are defined with the SECURITY DEFINER option.

[ROUTINES CREATOR field](#)

The ROUTINES CREATOR field specifies the CURRENT SQLID setting that is to be used when creating, configuring, and validating most Db2-supplied routines. This field also specifies the default OWNER for binding packages for these routines if the INSTALL PKG OWNER field is blank.

[IVP PACKAGE OWNER field](#)

The IVP PACKAGE OWNER field specifies the authorization ID to be assigned as the owner of packages and plans that are bound by Db2 sample jobs.

[IVP SQL ID field](#)

The IVP SQL ID field specifies the CURRENT SQLID setting when SQL is processed by most Db2 sample jobs.

## INSTALL PKG OWNER field

The INSTALL PKG OWNER field specifies the authorization ID to assign as the owner of packages and plans that are bound by most installation and sample jobs.

When the INSTALL PKG OWNER field is specified, it also sets the default owner of packages that are bound by the DSNTIJRT and DSNTIJRV jobs. When it is not specified, the default package owner is the authorization ID that is specified in the ROUTINES CREATOR field. You can specify the package ownership for individual routines on installation panels DSNTIPRA through DSNTIPRP.

<b>Acceptable values:</b>	1–8 characters. The first character must be alphabetic.
<b>Default:</b>	blank
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of the INSTALL PKG OWNER field, which is the value of the OWNER parameter in BIND statements that are processed by installation jobs. If a value for this field is not specified, the OWNER clause is omitted from those BIND statements, except for those processed by jobs DSNTIJRT and DSNTIJRV. The INSTALL PKG OWNER field is required when the ROUTINES CREATOR, SEC DEF CREATOR, and INSTALL SQL ID fields are set to SYSINSTL.

If you use installation SYSOPR authority for Db2 installation, specify an installation system administrator ID in the INSTALL PKG OWNER field.

If you use installation SYSOPR authority for migration, specify an authorization ID with at least DBADM WITHOUT ACCESSCTRL authority in the INSTALL PKG OWNER field.

When you specify a value in the INSTALL PKG OWNER field, you must also set the ROUTINES CREATOR, SEC DEF CREATOR, and INSTALL SQL ID fields to SYSINSTL.

## INSTALL GRANTEE(S) field

The INSTALL GRANTEE(S) field specifies the authorization IDs that are to be granted access to objects that are created and bound by most installation and sample jobs.

This field does not apply to the DSNTIJRT and DSNTIJRV jobs. Use installation panels DSNTIPRA - DSNTIPRP to specify authorization IDs for routines that are provided by Db2. For more information, see “DSNTIPR1: Parameters for Db2-supplied routines panel” on page 327.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas. The authorization IDs that you enter in this field are granted the following privileges:

- The USE privilege for buffer pool BP0, the SYSDEFLT storage group, and table space DSNCB04.SYSDEFLT
- The CREATETAB and CREATETS privileges for the temporary database, DSNCB04
- The DELETE, INSERT, SELECT, and UPDATE privileges for tables and created global temporary tables that are created by installation jobs other than DSNTIJRT
- The EXECUTE privilege for packages and plans that are bound by installation jobs other than DSNTIJRT

PUBLIC grants the privileges to all users on the current server, including database requests using DRDA access. For regulatory compliance, do not use PUBLIC.

## IVP SQL ID field

The IVP SQL ID field specifies the CURRENT SQLID setting when SQL is processed by most Db2 sample jobs.

<b>Acceptable values:</b>	1–8 characters, the first of which must be alphabetic
<b>Default:</b>	SYSADM
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of the IVP SQL ID field, which is the CURRENT SQLID value for IVP jobs.

### Related tasks

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## IVP PACKAGE OWNER field

The IVP PACKAGE OWNER field specifies the authorization ID to be assigned as the owner of packages and plans that are bound by Db2 sample jobs.

<b>Acceptable values:</b>	1–8 characters, the first of which must be alphabetic
<b>Default:</b>	blank
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of the IVP PACKAGE OWNER field, which is the setting of the OWNER parameter in BIND statements processed by sample jobs. If this field is not specified, the OWNER clause is omitted from those BIND statements.

### Related tasks

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## IVP GRANTEE(S) field

The IVP GRANTEE(S) field specifies the authorization IDs that are to be granted access to objects created and bound by Db2 sample jobs.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas. The authorization IDs that you enter in this field are granted the following privileges:

- The USE privilege for STOGROUPs and table spaces that are created by IVP jobs

- The DBADM privilege for databases that are created by IVP jobs
- The DELETE, INSERT, SELECT, and UPDATE privileges for tables and created global temporary tables that are created by IVP jobs
- The EXECUTE privilege for packages and plans that are bound by IVP jobs
- The BIND privilege on most plans that are bound by IVP jobs.

PUBLIC grants the privileges to all users on the current server, including database requests using DRDA access. For regulatory compliance, do not use PUBLIC.

#### Related tasks

Verifying successful Db2 12 installation or migration with sample applications

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## PROVISION EXEC ID field

The PROVISION EXEC ID field specifies the default user ID for executing steps in a provisioning workflow.

This field is required, modifiable, and always selected as a z/OSMF variable when `INSTALL TYPE ==> PROVISION` is specified on panel DSNTIPA1 or DSNTILA1. Otherwise, this field is protected and always deselected as a z/OSMF variable.

<b>Acceptable values:</b>	1–8 characters. The first character must be a letter.
<b>Default:</b>	SYSADM
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none
<b>z/OSMF variable:</b>	AGEXECID

#### Related tasks

Creating artifacts for provisioning Db2 by running the installation CLIST

You can run the installation CLIST to create artifacts for provisioning Db2 subsystems and data sharing groups.

#### Related reference

DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

INSTALL TYPE field

The value of the INSTALL TYPE field specifies whether you are installing, updating, or migrating to Db2 12, activating a Db2 12 function level, or preparing artifacts for creating services to provision Db2 subsystems.

## DSNTIPG1: Installation preferences panel 2

The entries on the DSNTIPG1 panel specify configuration options for writing image copies of the catalog and directory that are created by job DSNTIJIC to disk, , and preferences for objects and packages created by DSNTRIN in DSNTIJRT.

```
DSNTIPG1          INSTALL DB2 - INSTALLATION PREFERENCES PANEL 2
====>

Enter the prefix for data sets created by installation and IVP jobs:
 1 INSTALL IC PREFIX ====> DSN1210          For COPY data sets
 2 INSTALL DS PREFIX ====> DSN1210          For other data sets

Enter preferences for creating DB2 directory and catalog image copy data sets:
 3 IC DATA SET UNIT NAME ==> SYSDA

 4 IC TEMPLATE EXPRESSION ==> DSNCAT.&DB..&SN..&IC..D&JU..T&TI.
 5 IC TEMPLATE DATA CLASS ==>
 6 IC TEMPLATE MGMT CLASS ==>
 7 IC TEMPLATE STOR CLASS ==>

Enter preferences for objects and packages created by DSNTRIN in DSNTIJRT:
 8 DATABASE AND TABLESPACE STORAGE GROUP ====>
 9 INDEX STORAGE GROUP ==>
10 PKG APPLCOMPAT ====> DEFAULT          DEFAULT, Db2 function level, V11R1
11 PKG PLANMGMT   ====> DEFAULT          DEFAULT, BASIC, EXTENDED, OFF
12 MQ ADMIN ID(S) ====>                 > To be granted access on Db2 MQ tables

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

```
DSNTIPG1          INSTALL DB2 - INSTALLATION PREFERENCES PANEL 2
====>

Enter the prefix for data sets created by installation and IVP jobs:
 1 INSTALL IC PREFIX ====> DSN1210          For COPY data sets
 2 INSTALL DS PREFIX ====> DSN1210          For other data sets

Enter preferences for creating DB2 directory and catalog image copy data sets:
 3 IC DATA SET UNIT NAME ==> SYSDA

 4 IC TEMPLATE EXPRESSION ==> DSNCAT.&DB..&SN..&IC..D&JU..T&TI.
 5 IC TEMPLATE DATA CLASS ==>
 6 IC TEMPLATE MGMT CLASS ==>
 7 IC TEMPLATE STOR CLASS ==>

Enter preferences for objects and packages created by DSNTRIN in DSNTIJRT:
 8 DATABASE AND TABLESPACE STORAGE GROUP ====>
 9 INDEX STORAGE GROUP ==>
10 PKG APPLCOMPAT ====> DEFAULT          DEFAULT, Db2 function level, V11R1
11 PKG PLANMGMT   ====> DEFAULT          DEFAULT, BASIC, EXTENDED, OFF

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 11. Installation preferences panel: DSNTIPG1

### Related tasks

[Creating an image copy of the Db2 directory and catalog: DSNTIJIC](#)

After you add a data sharing member, you need to create a backup copy of the Db2 directory and catalog. Use the DSNTIJIC job that was generated during the installation or migration of the originating member to create the image copy.

[Migration step 5: Take image copies of the directory and catalog: DSNTIJIC](#)

For backup purposes, create a copy of the catalog and directory of the system that you are migrating.

[Installation step 23: Back up the Db2 directory and catalog: DSNTIJIC](#)

For backup purposes, create a copy of the Db2 directory and catalog.

[Copying catalog and directory objects \(Db2 Utilities\)](#)

## INSTALL IC PREFIX field

The INSTALL IC PREFIX field specifies the prefix for image copy data sets that are created by Db2 installation and IVP jobs.

<b>Acceptable values:</b>	1–17 characters that form a valid z/OS data set name prefix
<b>Default:</b>	DSN1210
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of this field as the prefix for all image copy data sets that are created by Db2 installation and IVP jobs.

## INSTALL DS PREFIX field

The INSTALL DS PREFIX field specifies the prefix for most data sets that are created by most Db2 installation and IVP jobs. This field does not apply to data sets that are created by job DSNTIJIN.

<b>Acceptable values:</b>	1–17 characters that form a valid z/OS data set name prefix
<b>Default:</b>	DSN1210
<b>Update:</b>	option 6 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The installation CLIST assigns the value of this field as the prefix for most data sets that are created by Db2 installation and IVP jobs. However, the following exceptions apply:

- Image copy data sets use the prefix that is specified by the INSTALL IC PREFIX field.
- Db2 sample application libraries (*prefix*.DBRMLIB.DATA, *prefix*.RUNLIB.LOAD, and *prefix*.SRCLIB.DATA) use the prefix that is specified by the DATA SET NAME PREFIX field on panel DSNTIPA1.
- Db2 catalog and directory data sets and the Db2 administrative task scheduler file use the prefix that is specified by the CATALOG ALIAS field on panel DSNTIPA2.
- BSDS and active log copy data sets use the fields on panel DSNTIPH to specify the full name.

## IC DATA SET UNIT NAME field

The IC DATA SET UNIT NAME field specifies the device type or unit name for allocating image copy data sets that are created by Db2 installation jobs.

<b>Acceptable values:</b>	Valid device type or unit name
<b>Default:</b>	SYSDA
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	None

The installation CLIST assigns the value of this field as the device type for allocating image copies data sets created by Db2 installation jobs. By default, these jobs allocate image copies on disk. If the field specifies a tape device (TAPE, 3480, 3490, 3590), the installation CLIST converts these jobs to allocate the image copies on tape. Such conversion might increase the number of job steps to be processed.

In particular for installation job DSNTIJIC, the job for creating image copies of the Db2 catalog and directory the field value has the following effects:



- Specifying a tape device causes the installation CLIST to configure the DSNTIJIC job for serial copy processing and using JCL for allocating image copy data sets. Copy data sets are named *prefix.IMAGCOPY.space-name*, where *prefix* is the value specified in the INSTALL IC PREFIX field and *space-name* is the name of each table space in the Db2 catalog and directory.
- Specifying a disk device causes the installation CLIST to configure the DSNTIJIC job for parallel copy processing through Db2 utility LISTDEF statements and TEMPLATE statements for allocating image copy data sets. Copy data sets are named according to the value specified in the IC TEMPLATE EXPRESSION field.

### Related tasks

[Creating an image copy of the Db2 directory and catalog: DSNTIJIC \(optional\)](#)

If you decide to image copy the Db2 directory and catalog, use the DSNTIJIC job that was generated during the installation or migration of the originating member. You do not need to make an image copy of the Db2 catalog or user data sets for recovery because Db2 uses image copies that were made before you enabled data sharing.

### Related reference

[IC TEMPLATE EXPRESSION field](#)

The IC TEMPLATE EXPRESSION field specifies the Db2 TEMPLATE utility expression for allocating image copy data sets created by Db2 installation jobs.

[Syntax and options of the LISTDEF control statement \(Db2 Utilities\)](#)

[Sample LISTDEF control statements \(Db2 Utilities\)](#)

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

[Sample TEMPLATE control statements \(Db2 Utilities\)](#)

## IC TEMPLATE EXPRESSION field

The IC TEMPLATE EXPRESSION field specifies the Db2 TEMPLATE utility expression for allocating image copy data sets created by Db2 installation jobs.

<b>Acceptable values:</b>	Valid TEMPLATE utility control statement
<b>Default:</b>	DSNCAT.&DB..&SN..&IC..D&JU..T&TI.
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	None

The installation CLIST assigns the value of this field as the TEMPLATE expression for allocating image copy data sets created by Db2 installation jobs. See the IC DATA SET UNIT NAME field for considerations regarding DSNTIJIC, the job for creating image copies of the Db2 catalog and directory.

### Related tasks

[Creating an image copy of the Db2 directory and catalog: DSNTIJIC \(optional\)](#)

If you decide to image copy the Db2 directory and catalog, use the DSNTIJIC job that was generated during the installation or migration of the originating member. You do not need to make an image copy of the Db2 catalog or user data sets for recovery because Db2 uses image copies that were made before you enabled data sharing.

### Related reference

[IC DATA SET UNIT NAME field](#)

The IC DATA SET UNIT NAME field specifies the device type or unit name for allocating image copy data sets that are created by Db2 installation jobs.

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

[Sample TEMPLATE control statements \(Db2 Utilities\)](#)

## IC TEMPLATE DATA CLASS field

The IC TEMPLATE DATA CLASS field specifies the SMS data class name for allocating image copy data sets created by Db2 installation jobs.

<b>Acceptable values:</b>	Blank or a valid SMS data class name
<b>Default:</b>	Blank
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	None.

The installation CLIST assigns the value of this field, if specified, as the DATACLAS option of the TEMPLATE utility control statement for allocating image copy data sets created by DB2 installation jobs. If this field is blank, the DATACLAS option does not appear in the TEMPLATE utility control statement.

The installation CLIST does not use this field if the IC DATA SET UNIT NAME specifies a tape device.

### Related reference

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

[Sample TEMPLATE control statements \(Db2 Utilities\)](#)

## IC TEMPLATE MGMT CLASS field

The IC TEMPLATE MGMT CLASS field specifies the SMS management class name for allocating image copy data sets created by Db2 installation jobs.

<b>Acceptable values:</b>	Blank or a valid SMS management class name
<b>Default:</b>	Blank
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	None

The installation CLIST assigns the value of this field, if specified, as the MGMTCLAS option of the TEMPLATE utility control statement for allocating image copy data sets created by Db2 installation jobs. If this field is blank, the MGMTCLAS option does not appear in the TEMPLATE utility control statement.

The installation CLIST does not use this field if the IC DATA SET UNIT NAME specifies a tape device.

### Related reference

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

[Sample TEMPLATE control statements \(Db2 Utilities\)](#)

## IC TEMPLATE STOR CLASS field

The IC TEMPLATE STOR CLASS field specifies the SMS storage class name for allocating image copy data sets created by Db2 installation jobs.

<b>Acceptable values:</b>	Blank or a valid SMS data class name
<b>Default:</b>	Blank
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	

The installation CLIST assigns the value of this field, if specified, as the STORCLAS option of the TEMPLATE utility control statement for allocating image copy data sets created by Db2 installation jobs. If this field is blank, the STORCLAS option does not appear in the TEMPLATE utility control statement.

The installation CLIST does not use this field if the IC DATA SET UNIT NAME specifies a tape device.

## Related reference

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

[Sample TEMPLATE control statements \(Db2 Utilities\)](#)

## DATABASE AND TABLESPACE STORAGE GROUP field

The DATABASE AND TABLESPACE STORAGE GROUP field specifies the STOGROUP setting for the DB2OPT parameter in job DSNTIJRT.

DSNTIJRT/DSNTRIN uses this value for creating databases and table spaces that are used by the routines that are supplied with Db2.

<b>Acceptable values:</b>	SYSDEFLT or <i>stogroup-name</i>
<b>Default:</b>	SYSDEFLT
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

### SYSDEFLT

The system default storage group.

### *stogroup-name*

A valid storage group name.

### Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

[Db2 storage groups \(Introduction to Db2 for z/OS\)](#)

## INDEX STORAGE GROUP field

The INDEX STORAGE GROUP field specifies the INDEXSTOG setting for the DB2OPT parameter in job DSNTIJRT.

DSNTIJRT/DSNTRIN uses this value for creating indexes instead of the default SYSDEFLT storage group.

<b>Acceptable values:</b>	SYSDEFLT or <i>stogroup-name</i>
<b>Default:</b>	SYSDEFLT
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

### SYSDEFLT

The system default storage group.

### *stogroup-name*

A valid storage group name.

### Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

[Db2 storage groups \(Introduction to Db2 for z/OS\)](#)

## PKG APPLCOMPAT field

The PKG APPLCOMPAT field specifies the RTN\_PKG\_APPLCOMPAT setting for the DB2OPT parameter in job DSNTIJRT.

<b>Acceptable values:</b>	DEFAULT, V11R1, or <i>Db2-function-level</i>
<b>Default:</b>	DEFAULT
<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

### DEFAULT

Specifies the following actions:

- DSNTIJRT/DSNTRIN omit the APPLCOMPAT bind option from generated BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN bypass checking the APPLCOMPAT level of valid “current” packages for Db2-supplied routines to see if a REBIND is needed, where “current” means that the package CONTOKEN matches that of the current DBRM

The result of this option matches the behavior before [APAR PH50704](#).

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

### Db2-function-level, V11R1

*Db2-function-level* is a VvvRrMmmm format value equivalent to or lower than the current function level of the Db2 subsystem.

Specifies the following actions.

- DSNTIJRT/DSNTRIN add the APPLCOMPAT bind option, with the valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, to generate BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN generate REBIND statements with the APPLCOMPAT option set to a valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, for “current” packages for Db2-supplied routines because the APPLCOMPAT level of the valid "current" package does not agree with the DB2OPT RTN\_PKG\_APPLCOMPAT, where “current” means that the package CONTOKEN matches that of the current DBRM. For example, DSNTRIN generates the following REBIND statement with DB2OPT RTN\_PKG\_APPLCOMPAT=V12R1M509:

```
REBIND PACKAGE(DSNADM.DSNADMCD.(V13R1))
      APPLCOMPAT(V12R1M509)
```

### Related concepts

[Job DSNTIJRT](#)

[Job DSNTIJRT](#) installs and configures Db2-supplied routines by executing the DSNTRIN program.

[Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related reference

[APPLCOMPAT bind option \(Db2 Commands\)](#)

## PKG PLANMGMT field

The PKG PLANMGMT field specifies the RTN\_PKG\_PLANMGMT setting for the DB2OPT parameter in job DSNTIJRT.

<b>Acceptable values:</b>	DEFAULT, EXTENDED, BASIC, OFF
<b>Default:</b>	DEFAULT

<b>Update:</b>	option 7 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

#### DEFAULT

DSNTIJRT/DSNTRIN do not add the PLANMGMT rebind option to generated REBIND statements for packages for Db2-supplied routines.

#### EXTENDED, BASIC, OFF

DSNTIJRT and DSNTRIN add the PLANMGMT rebind option, with the valid DB2OPT RTN\_PKG\_PLANMGMT setting, to generated REBIND statements for packages for Db2-supplied routines.

For more information see [PLANMGMT bind option \(Db2 Commands\)](#).

#### Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

#### Related tasks

[Saving and switching to previous access paths \(Db2 Performance\)](#)

## DSNTIPH: System resource data set names panel

The entries on the DSNTIPH panel specify the names of bootstrap data sets, active logs, and archive logs. These entries also specify the number of copies (1 for single logging or 2 for dual logging) for the active and archive logs.

Fields 1, 2, 4, 5, 7, and 8 on the DSNTIPH panel contain the prefix that was entered in the BSDS AND ACTIVE LOG ICF CATALOG ALIAS field on installation panel DSNTIPA4. If you scroll back to panel DSNTIPA4 and change the BSDS AND ACTIVE LOG ICF CATALOG ALIAS value, the values for fields 1, 2, 4, 5, 7, and 8 on DSNTIPH change. When you scroll from panel DSNTIPA4 to panel DSNTIPH, check these values and enter them again if necessary. In MIGRATE or UPDATE modes, the BSDS AND ACTIVE LOG ICF CATALOG ALIAS value cannot be changed, so the fields on DSNTIPH are not affected.

Dual logging improves reliability of recovering and, for active log reads, eases device contention.

**Recommendation:** Specify dual logging for both active and archive logs. If you specify dual logging, and an error occurs during offload to the archive logs, Db2 restarts the archive process using the second copy of the active log.

```

DSNTIPH          INSTALL DB2 - SYSTEM RESOURCE DATA SET NAMES
====>

Enter data below:

Bootstrap Data Sets (BSDS):
* 1 COPY 1 NAME      ==> DSNBSLG.BSDS01
* 2 COPY 2 NAME      ==> DSNBSLG.BSDS02

Active Logs:
 3 NUMBER OF COPIES ==> 2          2 or 1.  Number of active log copies
* 4 COPY 1 PREFIX    ==> DSNBSLG.LOGCOPY1
* 5 COPY 2 PREFIX    ==> DSNBSLG.LOGCOPY2

Archive Logs:
 6 NUMBER OF COPIES ==> 2          2 or 1.  Number of archive log copies
* 7 COPY 1 PREFIX    ==> DSNBSLG.ARCHLOG1
* 8 COPY 2 PREFIX    ==> DSNBSLG.ARCHLOG2
 9 TIMESTAMP ARCHIVES ==> NO          NO, YES, or EXT (Extended date format)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 12. System resource data set names: DSNTIPH

## COPY 1 NAME field

The value of the COPY 1 NAME field specifies the fully qualified name that is to be used for the first copy of the bootstrap data set.

<b>Acceptable values:</b>	valid data set name; 1–33 characters
<b>Default:</b>	DSNCAT.BSDS01 or DSNCAT.DSN1.BSDS01
<b>Update:</b>	option 8 on panel DSNTIPB; not during migration
<b>DSNZPxxx:</b>	none

For non-data-sharing environments, the default prefix is DSNCAT.BSDSxx. For data sharing environments, the default prefix is DSNCAT.DSN1.BSDSxx. The resulting data set name is DSNCAT.BSDSxx.Annnnnnn or DSNCAT.DSN1.BSDSxx.Annnnnnn where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to supply another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- xx is **01** for the first copy of the logs and **02** for the second copy.
- Annnnnnn is generated by Db2.

For the definition of a valid data set name, see [Valid data set name](#).

## COPY 2 NAME field

The value of the COPY 2 NAME field specifies the fully qualified name that is to be used for the second copy of the bootstrap data set.

<b>Acceptable values:</b>	valid data set name; 1–33 characters
<b>Default:</b>	DSNCAT.BSDS02 or DSNCAT.DSN1.BSDS02
<b>Update:</b>	option 8 on panel DSNTIPB; not during migration
<b>DSNZPxxx:</b>	none

For non-data-sharing environments, the default prefix is DSNCAT.BSDSxx. For data sharing environments, the default prefix is DSNCAT.DSN1.BSDSxx. The resulting data set name is DSNCAT.BSDSxx.Annnnnnn or DSNCAT.DSN1.BSDSxx.Annnnnnn where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to supply another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- xx is **01** for the first copy of the logs and **02** for the second copy.
- Annnnnnn is generated by Db2.

For the definition of a valid data set name, see [Valid data set name](#).

## NUMBER OF COPIES field (TWOACTV subsystem parameter)

The TWOACTV subsystem parameter specifies the number of copies of the active log that Db2 is to maintain: 1 (single logging) or 2 (dual logging).

<b>Acceptable values:</b>	1, 2
<b>Default:</b>	2

<b>Update:</b>	option 8 on panel DSNTIPB; not during migration
<b>DSNZPxxx:</b>	DSN6LOGP TWOACTV

Dual logging increases reliability of recovery. If your Db2 subsystem creates copies of the archive log on tape, two tape drives must be available during the offload process.

## COPY 1 PREFIX field

The value of the COPY 1 PREFIX field specifies the prefix that is to be used for the first copy of the active log data sets.

<b>Acceptable values:</b>	valid data set name prefix; 1–30 characters
<b>Default:</b>	DSNCAT.LOGCOPY1 or DSNCAT.DSN1.LOGCOPY1
<b>Update:</b>	option 8 on panel DSNTIPB; not during migration
<b>DSNZPxxx:</b>	none

For non-data-sharing environments, the default prefix is DSNCAT.LOGCOPYx. For data sharing environments, the default prefix is DSNCAT.DSN1.LOGCOPYx. The resulting data set name is DSNCAT.LOGCOPYx.Annnnnnn or DSNCAT.DSN1.LOGCOPYx.Annnnnnn, where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to specify another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the of the MEMBER NAME field on panel DSNTIPK.
- LOGCOPY is part of the data set prefix that you can change on this panel.
- x is **1** for the first copy of the logs and **2** for the second copy.
- nnnnnnn is the data set number.

For the definition of a valid data set name, see [Valid data set name](#).

## COPY 2 PREFIX field

The value of the COPY 2 PREFIX field specifies the prefix that is to be used for the second copy of the active log data sets.

<b>Acceptable values:</b>	valid data set name prefix; 1–30 characters
<b>Default:</b>	DSNCAT.LOGCOPY2 or DSNCAT.DSN1.LOGCOPY2
<b>Update:</b>	option 8 on panel DSNTIPB; not during migration
<b>DSNZPxxx:</b>	none

If you are using single logging, accept the default value. Do not leave the entry blank.

For non-data-sharing environments, the default prefix is DSNCAT.LOGCOPYx. For data sharing environments, the default prefix is DSNCAT.DSN1.LOGCOPYx. The resulting data set name is DSNCAT.LOGCOPYx.Annnnnnn or DSNCAT.DSN1.LOGCOPYx.Annnnnnn, where:

- DSNCAT is the value of the CATALOG ALIAS field on panel DSNTIPA2. You can change this portion of the data set prefix on this panel. If you change it, you need to specify another catalog alias. This additional catalog alias is not automatically defined by the installation process.
- DSN1 is the value of the MEMBER NAME field on panel DSNTIPK.
- LOGCOPY is part of the data set prefix that you can change on this panel.
- x is **1** for the first copy of the logs and **2** for the second copy.
- nnnnnnn is the data set number.

For the definition of a valid data set name, see [Valid data set name](#).

## NUMBER OF COPIES field (TWOARCH subsystem parameter)

The TWOARCH subsystem parameter specifies the number of copies of the archive log that Db2 is to produce during offloading.

<b>Acceptable values:</b>	1, 2
<b>Default:</b>	2
<b>Update:</b>	option 8 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP TWOARCH

If you run the installation or migration CLIST, the setting of the NUMBER OF COPIES field determines the setting of the TWOARCH subsystem parameter. Valid values of the TWOARCH subsystem parameter are NO and YES.

### 1

Db2 produces a single copy of the archive log during offloading. This setting corresponds with a value of NO for the TWOARCH subsystem parameter.

### 2

Db2 produces two copies of the archive log during offloading. Dual logging increases reliability of recovery. This setting corresponds with a value of YES for the TWOARCH subsystem parameter.

## COPY 1 PREFIX field (ARCPFX1 subsystem parameter)

The ARCPFX1 subsystem parameter specifies the prefix that is to be used for the first copy of the archive log data set.

<b>Acceptable values:</b>	valid data set name prefix; 1–35 characters
<b>Default:</b>	DSNCAT.ARCHLOG1 or DSNCAT.DSN1.ARCLG1
<b>Update:</b>	option 8 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP ARCPFX1

For definitions of valid data set names, see [Valid data set name](#).

## COPY 2 PREFIX field (ARCPFX2 subsystem parameter)

The ARCPFX2 subsystem parameter specifies the prefix that is to be used for the second copy of the archive log data set. If you use single logging, accept the default value.

<b>Acceptable values:</b>	valid data set name prefix; 1–35 characters
<b>Default:</b>	DSNCAT.ARCHLOG2 or DSNCAT.DSN1.ARCLG2
<b>Update:</b>	option 8 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP ARCPFX2

Do not leave the COPY 2 PREFIX field blank.

## TIMESTAMP ARCHIVES field (TSTAMP subsystem parameter)

The TSTAMP subsystem parameter specifies whether the Db2 archive log data set name is to contain the date and time that the archive log data set was created.

<b>Acceptable values:</b>	NO, YES, EXT
---------------------------	--------------



<b>Default:</b>	NO
<b>Update:</b>	option 8 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP TSTAMP

**NO**

The archive data set name does not contain a timestamp.

**YES**

The maximum allowable length of the user-controlled portion of the archive log prefix is reduced from 35 characters to 19 characters. This reduction in size permits the 16-character date and time qualifiers (timestamp) to be added to the archive log data set prefix. The timestamp format is as follows:

```
.Dyyddd.Thhmmss,t
```

where:

**D**

is the letter D.

**yy**

is the last two digits of the year.

**ddd**

is the day of the year.

**T**

is the letter T.

**hh**

is the hour.

**mm**

is the minutes.

**ss**

is the seconds.

**t**

is tenths of a second.

**EXT**

The archive data set name contains a timestamp with an **extended** date component in the format:

```
.Dyyyyddd.
```

A value of EXT in this field causes the lengths of the values that are entered for field COPY 1 PREFIX and field COPY 2 PREFIX to be audited to ensure that neither exceeds 17 bytes (19 bytes for other settings of TIMESTAMP ARCHIVES).

## | DSNTIPT: Db2 data set names panel

The entries on the DSNTIPT panel establish data set names for the libraries that are used in the Db2 CLIST and JCL that Db2 provides. The values that you enter on this panel are edited into all pertinent sample and installation jobs.

You can enter these values in one of three ways: same data set name prefix, no data set name prefix, or a new data set name prefix. The following table summarizes these selections.

*Table 20. Summary of values*

<b>If you use ...</b>	<b>Then</b>
Same data set name prefix or data set names	Current data sets are deleted and reallocated for installation and migration.

Table 20. Summary of values (continued)

If you use ...	Then
No data set names	No new output is created. Previous output remains intact.
New prefix	Output is saved in new data set. Previous output remains intact.

When you run the CLIST in INSTALL or MIGRATE mode, the following warning message is displayed for any output data set that already exists:

```
DSNT434I WARNING, DATA SETS MARKED WITH ASTERISKS EXIST AND WILL BE OVERWRITTEN
```

To avoid deleting these data sets, take one of the following actions:

- Press Enter to leave the installation process.
- Change the data set names.

Press Enter again if you want to continue; this overwrites your data sets.

When you run the CLIST in UDPATE mode, this panel is displayed immediately after panel DSNTIPA1. This allows you to check the SDSNSAMP data set name to see if it is the one you want to use for the DSNTIJUZ job. Data sets are marked with an asterisk but not deleted or reallocated if you use the same name. Instead, the data set is compressed, and only the DSNTIJUZ member is replaced within the data set. Other members in the data set are left unchanged. When the CLIST completes processing and returns to panel DSNTIPA1, the following message is displayed:

```
WARNING MESSAGE(S) WAS PRODUCED DURING CLIST TAILORING SESSION
```

```
DSNTIPT          INSTALL DB2 - DATA SET NAMES PANEL 1
====>

Data sets allocated by the installation CLIST for edited output:
 1 TEMP CLIST LIBRARY ===> prefix.NEW.SDSNTEMP
 2 SAMPLE LIBRARY    ===> prefix.NEW.SDSNSAMP
Data sets allocated by the installation jobs:
 3 CLIST LIBRARY     ===> prefix.NEW.SDSNCLST
 4 APPLICATION DBRM  ===> prefix.DBRMLIB.DATA.suffix
 5 APPLICATION LOAD  ===> prefix.RUNLIB.LOAD.suffix
 6 DECLARATION LIBRARY===> prefix.SRCLIB.DATA.suffix
Data sets allocated by SMP/E and other methods:
 7 LINK LIST LIBRARY ===> prefix.SDSNLINK.suffix
 8 LOAD LIBRARY      ===> prefix.SDSNLOAD.suffix
 9 JDBC AND SQLJ DLLS ===> prefix.SDSNLOD2.suffix
10 MACRO LIBRARY     ===> prefix.SDSNMACS.suffix
11 EXIT LIBRARY      ===> prefix.SDSNEXIT.suffix
12 DBRM LIBRARY      ===> prefix.SDSNDBRM.suffix
13 IRLM LOAD LIBRARY ===> prefix.SDXRRESL.suffix
14 IVP DATA LIBRARY ===> prefix.SDSNIVPD.suffix
15 INCLUDE LIBRARY   ===> prefix.SDSNC.H
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 13. Db2 data set names panel: DSNTIPT

**TEMP CLIST LIBRARY** and **SAMPLE LIBRARY** are data sets that are allocated by the installation CLIST for edited output. CLIST LIBRARY is allocated by DSNTIJVC. If the INPUT MEMBER NAME field on installation panel DSNTIPA1 is set to DSNTIDXA or DSNTIDXB, the three data sets default to *prefix.NEW.SDSNTEMP*, *prefix.NEW.SDSNCLST*, and *prefix.NEW.SDSNSAMP* respectively. In these names, *prefix* is the value that is entered for the DATA SET NAME PREFIX field on installation panel DSNTIPA1. The following table shows the job-tailoring fields.

Table 21. Job-tailoring fields

Mode	Tailored output	No tailored output
Installing	All three fields entered	All three fields blank

Table 21. Job-tailoring fields (continued)

Mode	Tailored output	No tailored output
Migrating	All three fields entered	All three fields blank
Updating	SAMPLE LIBRARY entered	SAMPLE LIBRARY blank

Db2 adds blanks to these fields after a successful tailoring session to avoid writing over the tailored output.

## TEMP CLIST LIBRARY field

The value of the TEMP CLIST LIBRARY field specifies the name of the data set where edited CLISTs are to be placed.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix</i> .NEW.SDSNTEMP
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This field must not be blank if you are tailoring output.

The data set that is specified in the TEMP CLIST LIBRARY field is created only when the installation CLIST is run in INSTALL mode or MIGRATE mode.

## SAMPLE LIBRARY field

The value of the SAMPLE LIBRARY field specifies the name of the edited JCL library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix</i> .NEW.SDSNSAMP
<b>Update:</b>	option 9 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

This field must not be blank if you are tailoring output.

When the installation CLIST is run in INSTALL mode or MIGRATE mode, the data set that is specified in the SAMPLE LIBRARY field is created. If the sample library data set exists, but some members of the data set are missing, you can run the CLIST in INSTALL mode or MIGRATE mode to replace the missing members.

Run the installation CLIST in ACTIVATE mode when you are activating a new function level. Run the CLIST in UPDATE mode when you need to update subsystem parameters. You do not need to run the CLIST in INSTALL or MIGRATE mode again before you run it in ACTIVATE or UPDATE mode. In ACTIVATE mode or UPDATE mode, you can specify an existing or a new sample library data set name.

If you do not need to keep the existing DSNTIJUZ member, specify the existing sample library data set name. The installation CLIST will overwrite the original DSNTIJUZ member.

If you want to create an updated copy of the DSNTIJUZ member, and you need to keep the existing copy of the DSNTIJUZ member, take one of the following actions:

- Rename the existing DSNTIJUZ member. When the CLIST runs, it generates a new DSNTIJUZ member. The renamed member has the same subsystem parameter values as the original DSNTIJUZ member, and the new DSNTIJUZ member has the updated subsystem parameter values.
- Specify a new sample library data set name. When the CLIST runs, it creates a new sample library data set. The DSNTIJUZ member in the new data set contains the updated subsystem parameter values.

## CLIST LIBRARY field

The CLIST LIBRARY field identifies the name of the data set into which job DSNTIJVC is to load all CLISTs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.NEW.SDSNCLST</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This field must not be blank if you are tailoring output.

The data set that is specified in the CLIST LIBRARY field is created only when the installation CLIST is run in INSTALL mode or MIGRATE mode.

## APPLICATION DBRM field

The value of the APPLICATION DBRM field specifies the name of the library that is to be used for Db2 sample application DBRMs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.DBRMLIB.DATA.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The APPLICATION DBRM field, APPLICATION LOAD field, and DECLARATION LIBRARY field are for Db2-provided sample applications. The names of your own development libraries are most likely different from the default values that are shown here. Job DSNTIJMV references another set of DBRMLIB, RUNLIB, and SRCLIB data sets for SYS1.PROCLIB. These fields must not be blank. For more information, see [“Installation step 2: Define Db2 to IRLM and MVS: DSNTIJMV” on page 429.](#)

## APPLICATION LOAD field

The value of the APPLICATION LOAD field specifies the name of the Db2 sample application load module library.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.RUNLIB.LOAD.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The APPLICATION DBRM field, APPLICATION LOAD field, and DECLARATION LIBRARY field are for Db2-provided sample applications. The names of your own development libraries most likely are different from the default values that are shown here. Job DSNTIJMV references another set of DBRMLIB, RUNLIB, and SRCLIB data sets for SYS1.PROCLIB. These fields must not be blank. For more information, see [“Installation step 2: Define Db2 to IRLM and MVS: DSNTIJMV” on page 429.](#)

## DECLARATION LIBRARY field

The value of the DECLARATION LIBRARY field specifies the name of the Db2 declaration library that is to be used for sample application include files.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SRCLIB.DATA.suffix</i>

<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The DECLARATION LIBRARY field is for Db2-provided sample applications. The name of your own development library is most likely different from the default value for this field.

### LINK LIST LIBRARY field

The LINK LIST LIBRARY field specifies the name of the APF-authorized Db2 early code library.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNLINK.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The LINK LIST LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

### LOAD LIBRARY field

The value of the LOAD LIBRARY field specifies the name of the main APF-authorized Db2 load module library that is to be used by installation and sample jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNLOAD.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The LOAD LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

### JDBC AND SQLJ DLLS field

The JDBC AND SQLJ DLLS field specifies the name of the main DLL library for Db2 Java support. This library is used by installation and sample jobs and some of the stored procedures that are provided by Db2.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNLOD2.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The JDBC AND SQLJ DLLS field specifies the name of a data set that is allocated during SMP processing. This field cannot be blank.

### MACRO LIBRARY field

The value of the MACRO LIBRARY field specifies the name of the macro library that is to be used by installation and sample jobs. This library contains the CICS and IMS attachment facility macros, the initialization parameter macros, and some data-mapping macros that are needed for some applications.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
---------------------------	--

<b>Default:</b>	<i>prefix.SDSNMACS.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The MACRO LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

### EXIT LIBRARY field

The value of the EXIT LIBRARY field specifies the name of the library where your DSNZPxxx module, application defaults load module (*dsnhdcp*), and exit routines are to be placed.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNEXIT.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

When you use *prefix.SDSNLOAD* and *prefix.SDSNEXIT* together, list *prefix.SDSNEXIT* first to override the IBM defaults in *prefix.SDSNLOAD*.

The EXIT LIBRARY field specifies the name of a data set that is allocated during SMP processing. This field must not be blank.

### DBRM LIBRARY field

The value of the DBRM LIBRARY field identifies the name of the library where the DBRMs that are shipped with Db2 are to be placed.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNDBRM.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The DBRM LIBRARY field specifies the names of data sets that are allocated during SMP processing. This field must not be blank.

### IRLM LOAD LIBRARY field

The value of the IRLM LOAD LIBRARY field specifies the name of the IRLM load library data set that is to be used in the IRLM procedure.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDXRRESL.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This field must not be blank. It specifies the name of a data set that is allocated during SMP processing.

## IVP DATA LIBRARY field

The value of the IVP DATA LIBRARY field specifies the data set name of SDSNIVPD. SDSNIVPD is the SMP/E target library for the Db2 installation verification procedure (IVP) input data and for the expected output from the sample applications.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNIVPD.suffix</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

## INCLUDE LIBRARY field

The value of the INCLUDE LIBRARY field identifies the name of the include library data set that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	<i>prefix.SDSNC.H</i>
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This library is used in the Db2 language PROCS for C and C++.

## DSNTIPU: Host language data set names panel 1

The entries on panels DSNTIPU, DSNTIPU1, and DSNTIPW establish data set names for other product libraries. The values that you enter on these panels are edited into sample and installation jobs. If you do not have the product, accept the default values. Jobs for those particular products should not be run.

Db2 makes assumptions about which one of the possible C, C++, and PL/I compilers that you are using, depending on the values you supply or leave as default in the C, C++, and PL/I fields.

Many data set names for other products appear in the jobs. You can enter most of these data sets on this panel and on the next two installation panels, DSNTIPU1 and DSNTIPW. These names are shown in the following table as they appear in the jobs that are shipped with Db2. Change the names of the data sets if they are different at your site.

Table 22. Data set names that are used in jobs for related products

Job	Data set name	Function
DSNTEJ1	SYS1.MACLIB	Assembler macro library
	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ1L	CEE.SCEELKED	Language Environment linkage editor library
	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ1P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ1U	CEE.SCEERUN	Language Environment dynamic run time library
	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ2A	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)

Table 22. Data set names that are used in jobs for related products (continued)

Job	Data set name	Function
DSNTEJ2C	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2D	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2E	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ2F	SYS1.MACLIB	Assembler macro library
	SYS1.VSF2FORT	VS Fortran run time library
DSNTEJ2P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ3C	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ3P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ4C	IMSVS.RESLIB	IMS linkage editor library
	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ4P	IMSVS.RESLIB	IMS linkage editor library
	CEE.SCEELKED	PL/I linkage editor base library
	CEE.SCEERUN	PL/I dynamic run time base library
DSNTEJ5A	CICS410.SDFHLOAD	CICS command translator and linkage editor
	CICS410.SDFHMAC	CICS macro library
	SYS1.MACLIB	Assembler macro library
DSNTEJ5C	CICS410.SDFHLOAD	CICS command translator and linkage editor library
	IGY.SIGYCOMP	Enterprise COBOL for z/OS
		See also the list of libraries that are used by DSNH CLIST in <a href="#">DSNH command procedure (TSO CLIST) (Db2 Commands)</a>
DSNTEJ5P	CICS410.SDFHLOAD	CICS command translator and linkage editor library
	CICS410.SDFHPLI	CICS PL/I linkage editor library
	CEE.SCEELKED	Language Environment link editor library
DSNTEJ6D	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6P	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6R	CEE.SCEERUN	Language Environment dynamic run time library
	CEE.SCEEH.H	C library headers
	CEE.SCEELKED	Language Environment linkage editor library
DSNTEJ6S	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6T	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6U	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6V	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6W	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ6Z	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ61	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ62	CEE.SCEERUN	Language Environment dynamic run time library



Table 22. Data set names that are used in jobs for related products (continued)

<b>Job</b>	<b>Data set name</b>	<b>Function</b>
DSNTEJ63	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ64	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ65	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ66	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ7	SYS1.SORTLIB	DFSORT load modules (can be deleted if DFSORT is in link list)
DSNTEJ71	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ73	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ75	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ76	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ77	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJ78	CEE.SCEERUN	Language Environment dynamic run time library
DSNTEJXP	CEE.SCEERUN	Language Environment dynamic run time library
DSNTIJMV	SYS1.MACLIB	Assembler macro library
	CEE.SCEERUN	Language Environment dynamic run time library
	CEE.SCEELKED	Language Environment linkage editor library
	EDCPRLK	Language Environment pre-link editor library
	CEE.SCEEMSGP	Language Environment pre-link message file
	CBC.SCCNCMP	C/C++ for z/OS compiler library
	CCNDRVR	C/C++ compiler load module
	CEE.SCEEH.H	C library headers
	CEE.SCLBH.H	C++ library headers
	CEE.SCEECPP	C++ autolink library
	CBC.SCLBCPP	C++ class library
	CICS.SCLBCPP	CICS library for COBOL
	CICS.SDFHLOAD	CICS command translator and linkage editor
	CICS.SDFLPLI	CICS library for PL/I
	<i>prefix</i> .SDSNLOAD(DSNHPC)	Db2 precompiler
	<i>prefix</i> .SDSNLOAD	Db2 linkage editor library
	DSNHPC	Db2 precompiler module
	GDDM.SADMSAM	GDDM macro library
	GDDM.SADMMOD	GDDM load module library
	IGY.SIGYCOMP	Enterprise COBOL for z/OS compiler library
	IGYCRCTL	Enterprise COBOL for z/OS compiler load module
	IMSVS.RESLIB	IMS linkage editor library
	ISP.SISPLOAD	ISPF ISPLINK module

Table 22. Data set names that are used in jobs for related products (continued)

Job	Data set name	Function
	IBM.SIBMZCMP	Enterprise PL/I for z/OS compiler library
	SYS1.VSF2FORT	VS Fortran run time library

Use this panel to define the data set names of your IBM Language Environment, C/370, or C/C++ program product libraries. For more information about these libraries, consult the appropriate program product documentation. For more information about these libraries, consult the appropriate program product documentation.

Data sets that are specified on this panel are used by the Db2 installation process to tailor the Db2 language procedures that are generated by installation job DSNTIJMV:

- DSNHASM can be used to prepare Db2 programs using assembly language
- DSNHC can be used to prepare Db2 programs that use C.
- DSNHCPP can be used to prepare Db2 programs that use C++.
- DSNHCPP2 can be used to prepare a class and a client for a Db2 object-oriented program that use C++.
- DSNHCPPS contains the header file search path that is to be used by DSNHCPP and DSNHCPP2.
- DSNHFOR can be used to prepare Db2 programs using FORTRAN
- DSNHICOB can be used to prepare Db2 programs using COBOL
- DSNHPLI can be used to prepare Db2 programs using PL/I
- DSNHSQL can be used to prepare Db2 external SQL procedures

Data sets that you specify on this panel are also used by the Db2 installation process to tailor the Db2 Interactive (DB2I) program preparation CLIST, DSNH.

When the compiler fields are left blank, the DSNH CLIST and the provided JCL procedures operate differently. The DSNH CLIST issues a specific call statement, using the default load module data set name as the argument of the call. The JCL procedures use the z/OS link list to find the data set in which the load module resides.

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Use fields 1 through 4 of DSNTIPU to specify the IBM Language Environment run time environment, link editor, and pre-link editor message libraries. The CLIST assumes that these libraries are used by all language products except FORTRAN.

Use fields 6 through 15 on panel DSNTIPU to define C/370 (C only), AD/Cycle, or C/C++ for z/OS. If you need to define C++, you must also define C/C++ for C.

If C is not installed on your system:

- Accept the default values for fields 6 through 15 of DSNTIPU. Accept the default values for fields 6 through 13.
- Do not run IVP jobs DSNTJ2D, DSNTJ2U, DSNTJ6D, DSNTJ6R, DSNTJ6T, DSNTJ63, DSNTJ6W, DSNTJ6Z, DSNTJ64, DSNTJ65, DSNTJ66, DSNTJ71, DSNTJ73, and DSNTJ75.

If C++ is not installed on your system:

- Accept the default values for fields 6 through 15 of DSNTIPU. Accept the default values for fields 6 through 13.
- Do not run jobs DSNTJ2E or DSNTJ6V. Skip steps PH02US08 and PH02US09 of IVP job DSNTJ2U.
- Remove all statements that refer to DAYNAME and MONTHNAME from part DSNTESU in the *prefix.SDSNSAMP* library if C++ is not available.

If COBOL is not installed on your system:

- Accept the default value for fields 1 and 2 of DSNTIPU. Accept the default value for field 14.

- Do not run IVP jobs DSNTJ2C, DSNTJ3C, DSNTJ4C, DSNTJ5C, DSNTJ61, DSNTJ62, DSNTJ76, DSNTJ77, and DSNTJ78.

If Fortran is not installed on your system:

- Accept the default values for fields 3 and 4 of DSNTIPU1. Accept the default values for fields 15 and 16.
- Do not run IVP job DSNTJ2F.

If PL/I is not installed on your system:

- Accept the default values for fields 5 and 6 of DSNTIPU1. Accept the default values for field 17.
- Do not run IVP jobs DSNTJ1P, DSNTJ2P, DSNTJ3P, DSNTJ4P, DSNTJ5P, DSNTJ6P, DSNTJ6S, and DSNTJ6U.

```

DSNTIPU          INSTALL DB2 - HOST LANGUAGE DATA SET NAMES PANEL 1
====>

Enter data set names below:
 1 IBM LE RUNTIME LIBRARY   ===> CEE.SCEERUN
 2 IBM LE RUNTIME LIBRARY 2 ===> CEE.SCEERUN2
 3 IBM LE LINK EDIT LIB    ===> CEE.SCEELKED
 4 IBM LE PRELINK MSG LIB  ===> CEE.SCEEMSGP

 5 HIGH LEVEL ASSEMBLER LIB ===>

 6 C/CPP COMPILER MODULE   ===> CCNDRVR
 7 C/CPP COMPILER LIBRARY  ===> CBC.SCCNCMP
 8 C/CPP HEADER LIBRARY    ===> CEE.SCEEH.H
 9 C/370 COMPILER MESSAGES ===>
10 C LE PRELINKER PHASE   ===> NO
11 CPP LE PRELINKER PHASE ===> NO
12 CPP CLASS LIB HEADERS  ===> CEE.SCLBH.H
13 CPP AUTO CALL LIBRARY  ===> CEE.SCEECPP
14 CPP CLASS LIBRARY      ===> CBC.SCLBCPP
15 CPP PROCEDURE LIBRARY  ===> CBC.SCCNUTL

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 14. Host language data set names panel 1: DSNTIPU

## IBM LE RUNTIME LIBRARY field

The IBM LE RUNTIME LIBRARY field identifies the name of the IBM Language Environment dynamic run time library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEERUN
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SCEERUN. Leave this field blank if SCEERUN is in the link list. If you enter a value in this field, it is used in the STEPLIB concatenation of the JCL procedures generated by installation job DSNTIJMV, including the following procedures:

- The database services address space (*ssnmDBM1*) and system services address space (*ssnmMSTR*) for Db2
- The Db2–supplied WLM procedures DSNWLM and DSNCICS
- The Db2 language procedures
- The JOBLIB concatenation of many IVP jobs

If you plan to use Db2 to run XPLINK or AMODE 64 applications, provide the SCEERUN and SCEERUN2 libraries for IBM Language Environment in the z/OS program search order. See [Description of Language Environment target libraries \(z/OS Language Environment Customization\)](#) for more information.

## IBM LE RUNTIME LIBRARY 2 field

The IBM LE RUNTIME LIBRARY 2 field identifies the name of the IBM Language Environment dynamic runtime library for programs that require the library to be in an extended partitioned data set (PDSE).

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEERUN2
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SCEERUN2. Leave this field blank if SCEERUN2 is in the link list. If you enter a value in this field, it is used in the STEPLIB concatenation of the DSNDBM1 JCL procedure that is generated by installation job DSNTIJMV.

If you plan to use Db2 to run XPLINK or AMODE 64 applications, provide the SCEERUN and SCEERUN2 libraries for IBM Language Environment in the z/OS program search order. See [Description of Language Environment target libraries \(z/OS Language Environment Customization\)](#) for more information.

## IBM LE LINK EDIT LIB field

The IBM LE LINK EDIT LIB field identifies the name of the IBM Language Environment linkage editor library that sample and installation jobs are to use.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEELKED
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SCEELKED. SCEELKED is required to link-edit load modules for C, C++, COBOL, and PL/I application programs. The value that you enter here is used to customize the Db2 language procedures and the DSNH CLIST.

## IBM LE PRELINK MSG LIB field

The IBM LE PRELINK MSG LIB field identifies the data set name for messages that are to be issued by the IBM Language Environment pre-linkage editor (EDCPRLK).

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEEMSGP
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The SMP/E target data set name typically includes the qualifier SCEEMSGP. SCEEMSGP is required to pre-link edit load modules for C, C++, COBOL, and PL/I application programs. The value that you enter here is used to customize Db2 language procedures and the DSNH CLIST.

## HIGH LEVEL ASSEMBLER LIB field

The value of the HIGH LEVEL ASSEMBLER LIB field specifies the data set name of the assembler load module library. This value is to be used by sample and installation jobs.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none

<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SASMMOD1. The value that you specify for this field is used to customize the DSNHASM language procedure and the DSNH CLIST. It is also added to the STEPLIB concatenation of each Db2-provided job that uses the assembler. You can leave this field blank if the library is in the link list.

## C/CPP COMPILER MODULE field

The C/CPP COMPILER MODULE field specifies the load module name of the C/370 or C/C++ compiler that is to be used on your system.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CCNDRVR
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The default value is CCNDRVR for C/C++ for z/OS. The value that you enter here is used to determine the configuration for the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, the DSNH CLIST, and the IVP jobs that use C and C++.

- If the entry begins with the string "EDC", the CLIST configures your system to use C/370.

**Important:** You cannot use C/370 and C++.

- If the entry begins with any other value, including blanks, the CLIST configures your system to use C/C++ for z/OS.

## C/CPP COMPILER LIBRARY field

The C/CPP COMPILER LIBRARY FIELD specifies the name of the compiler library that is to be used for C/C++ or C/370.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCCNCMP
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This value is used to customize the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, and the DSNH CLIST. This field can be left blank if the compiler library is in the link list.

The following guidelines apply to the target data set name:

- For C/C++ for z/OS, the SMP/E target data set name typically includes the qualifier SCCNCMP.
- For C/370, the SMP/E target data set name typically includes the qualifier SEDCDCMP or SEDCCOMP.

## C/CPP HEADER LIBRARY field

The C/CPP HEADER LIBRARY field specifies the name of the header include library that is to be used for C/C++ or C/370.

<b>Acceptable values:</b>	blank, or valid load module name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEEH.H
<b>Update:</b>	cannot change during update

<b>DSNZPxxx:</b>	none
------------------	------

- For C/C++, the SMP/E target data set name typically includes the qualifier SCEEH.H.
- For C/370, the SMP/E target data set name typically includes the qualifier SEDCDCMP or SEDCCOMP.

This value is used to customize the DSNHC, DSNHCPP, DSNHCPP2, and DSNHSQL language procedures, and the DSNH CLIST. This field can be left blank if the compiler library is in the link list.

## C/370 COMPILER MESSAGES field

The value of the C/370 COMPILER MESSAGES field is the name of the message library that is to be used for the C/370 compiler.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SEDCDMSG or SEDCMSGS. If you are using C or C++, leave this field blank. This value is used to customize the DSNHC and DSNHSQL language procedures and the DSNH CLIST.

You can specify C/C++ for MVS/ESA V3R1, or C/C++ for MVS/ESA V3R2. These are shipped as single products, but you need to define them separately on this line and on line 1, depending on your need for C or C++. If you specify a name in this field, a STEPLIB is added to the compiler step of the DSNHCPP and DSNHCPP2 procedures in job DSNTIJMV, and to the C++ portion of the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.

## C LE PRELINKER PHASE field

The value of the C LE PRELINKER PHASE field indicates whether to customize the DSNHC language procedure to include a procedure step that executes the IBM Language Environment prelinker.

<b>Acceptable values:</b>	NO or YES
<b>Default:</b>	NO
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### NO

Indicates that DSNHC is customized to prepare C programs without using the prelinker. Object code is passed directly from the compiler to the z/OS binder to create a program object, which must reside in a partitioned data set extended (PDSE). NO is the default setting.

### YES

Indicates that DSNHC is customized to prepare C programs using the prelinker. Object code is passed from the compiler to the IBM Language Environment Prelinker and then to the z/OS binder. The binder creates a load module if the output library is a partitioned data set (PDS). It creates a program object if the output library is a PDSE.

## CPP LE PRELINKER PHASE field

The value of the CPP LE PRELINKER PHASE field indicates whether to customize the DSNHCPP and DSNHCPP2 language procedure to include a procedure step that executes the IBM Language Environment prelinker.

<b>Acceptable values:</b>	NO or YES
<b>Default:</b>	NO
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### NO

Indicates that DSNHCPP and DSNHCPP2 are customized to prepare C++ programs without using the prelinker. Object code is passed directly from the compiler to the z/OS binder to create a program object, which must reside in a partitioned data set extended (PDSE). NO is the default setting.

### YES

Indicates that DSNHCPP and DSNHCPP2 are customized to prepare C++ programs using the prelinker. Object code is passed from the compiler to the IBM Language Environment Prelinker and then to the z/OS binder. The binder creates a load module if the output library is a partitioned data set (PDS). It creates a program object if the output library is a PDSE.

## CPP CLASS LIB HEADERS field

The value of the CPP CLASS LIB HEADERS field specifies the data set name for the C++ class header files.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CBC.SCLBH.H
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

Accept the default value if C++ is not available on your system.

For C/C++ for z/OS, the data set name typically includes the qualifier CBC.SCLBH.H.

If you specify a name in this field, it is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP AUTO CALL LIBRARY field

The value of the CPP AUTO CALL LIBRARY field specifies the data set name of the C++ auto call library.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCEECPP
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This data set name typically includes the qualifier SCEECPP. Accept the default value if C++ is not available on your system. The value of the CPP AUTO CALL LIBRARY field is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP CLASS LIBRARY field

The value of the CPP CLASS LIBRARY field specifies the data set name of the C++ class library.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCLBCPP
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

Accept the default value if C++ is not available on your system.

For C/C++ for z/OS, the data set name typically includes the qualifier SCLBCPP.

The value of the CPP CLASS LIBRARY field is used to customize the DSNHCPP and DSNHCPP2 language procedures and the DSNH CLIST.

## CPP PROCEDURE LIBRARY field

The value of the CPP PROCEDURE LIBRARY field specifies the data set name for the C++ procedure library.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CEE.SCCNUTL
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

Accept the default value if C++ is not available on your system.

For C/C++ for z/OS, the data set name typically includes the qualifier SCCNUTL.

## DSNTIPU1: Host language data set names panel 2

The entries on panels DSNTIPU, DSNTIPU1, and DSNTIPW establish data set names for other product libraries. The values that you enter on these panels are edited into sample and installation jobs. Accept the default values for products that you do not have.

Data set names for other products appear in the jobs. These names are shown in the table in [Host language data set names panel 1: DSNTIPU](#) as they appear in the jobs that are shipped with Db2. Change the names of the data sets if they are different at your site.

```
DSNTIPU1          INSTALL DB2 - HOST LANGUAGE DATA SET NAMES PANEL 2
====>

Enter data set names below:
 1 COBOL COMPILER LIBRARY   ===>
 2 COBOL LE PRELINKER PHASE ===> NO

 3 FORTRAN COMPILER LIBRARY ===>
 4 FORTRAN LINK EDIT LIB    ===> SYS1.VSF2FORT

 5 PL/I COMPILER LIBRARY    ===>
 6 PL/I LE PRELINKER PHASE  ===> NO

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 15. Data set names panel 2: DSNTIPU1



## COBOL COMPILER LIBRARY field

The value of the COBOL COMPILER LIBRARY field identifies the name of the compiler library that is to be used for COBOL.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The data set name typically includes the qualifier SIGYCOMP. The value that you enter here is used to customize the DSNHICOB language procedure and the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.

## COBOL LE PRELINKER PHASE field

The value of the COBOL LE PRELINKER PHASE field indicates whether to customize the DSNHICOB language procedure to include a procedure step that executes the IBM Language Environment prelinker.

<b>Acceptable values:</b>	NO or YES
<b>Default:</b>	NO
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### NO

Specifies that the DSNHICOB procedure is customized to prepare COBOL programs without using the prelinker. NO is required when using IBM Enterprise COBOL Version 5.1 and later releases. It is acceptable for older versions of the COBOL compiler that are supported by this release of Db2. Additional DD statements are allocated for the COBOL compiler and object code is passed directly from the compiler to the z/OS binder to create a program object, which must reside in a partitioned data set extended (PDSE). NO is the default setting.

### YES

Specifies that the DSNHICOB procedure is customized to prepare COBOL programs using the prelinker. YES is acceptable only when using IBM Enterprise COBOL Version 4.2 and older releases. Object code is passed from the compiler to the IBM Language Environment prelinker and then to the z/OS binder. The binder creates a load module if the output library is a partitioned data set (PDS). It creates a program object if the output library is a PDSE.

## FORTRAN COMPILER LIBRARY field

The FORTRAN COMPILER LIBRARY field identifies the data set name of the Fortran compiler library that is to be used by the Db2 installation process.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

If you specify a value here, it is used to customize the DSNHFOR language procedure and the DSNH CLIST. You can leave this field blank if the compiler library is in the link list.

## FORTRAN LINK EDIT LIB field

The FORTRAN LINK EDIT LIB field identifies the data set name of the Fortran linkage editor library that is to be used by the Db2 installation process.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	SYS1.VSF2FORT
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

The value that you enter here is used to customize the DSNHFOR language procedure and the DSNH CLIST. Accept the default value if FORTRAN is not available on your system, and do not run IVP job DSNTIJ2F.

## PL/I COMPILER LIBRARY field

The value of the PL/I COMPILER LIBRARY field specifies the name of the PL/I compiler library that is to be used by installation and sample jobs.

<b>Acceptable values:</b>	blank, or valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

For Enterprise PL/I, the data set name typically includes the qualifier SIBMZCMP. The value that you enter here is used to customize the DSNHPLI language procedure and the DSNH CLIST. You can leave the field blank if the PL/I compiler library is in the system link list.

## PL/I LE PRELINKER PHASE field

The value of the PL/I LE PRELINKER PHASE field indicates whether to customize the DSNHPLI language procedure to include a procedure step that executes the IBM Language Environment prelinker.

<b>Acceptable values:</b>	NO or YES
<b>Default:</b>	NO
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### NO

Indicates that DSNHPLI is customized to prepare PL/I programs without using the prelinker. Object code is passed directly from the compiler to the z/OS binder to create a program object, which must reside in a partitioned data set extended (PDSE).

### YES

Indicates that DSNHPLI is customized to prepare PL/I programs using the prelinker. Object code is passed from the compiler to the IBM Language Environment prelinker and then to the z/OS binder. The binder creates a load module if the output library is a partitioned data set (PDS). It creates a program object if the output library is a PDSE.

## DSNTIPW: Other data set names panel

The entries on the DSNTIPW panel establish data set names for the libraries of other products in your system. The values that are entered on this panel are edited into all pertinent sample and installation jobs.

If you do not have the product, accept the default. The default cannot be blank.

Many data set names for other products appear in the jobs. You can enter most of these data set names on this panel and on installation panel DSNTIPU and DSNTIPU1. These names are shown in the table in [Host language data set names panel 1: DSNTIPU](#) as they appear in the jobs that are shipped with . Change the names of the data sets if they are different at your site.

```
DSNTIPW          INSTALL DB2 - DATA SET NAMES PANEL 3
====>

Enter data set names below:
 1 SYSTEM MACLIB          ==> SYS1.MACLIB
 2 SYSTEM PROCEDURES     ==> SYS1.PROCLIB
 3 SORT LIBRARY          ==> SYS1.SORTLIB
 4 IMS RESLIB            ==>
 5 ISPF ISPLINK MODULE   ==> ISP.SISPLoad
 6 GDDM MACLIB           ==> GDDM.SADMSAM
 7 GDDM LOAD MODULES     ==> GDDM.SADMMOD
 8 CICS LOAD LIBRARY     ==> CICSTS.SDFHLOAD
 9 CICS MACRO LIBRARY    ==> CICSTS.SDFHMAC
10 CICS COBOL LIBRARY    ==> CICSTS.SDFHCOB
11 CICS PL/I LIBRARY     ==> CICSTS.SDFHPL1
12 CICS EXCI LIBRARY     ==> CICSTS.SDFHEXCI

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 16. Other data set names panel: DSNTIPW

### SYSTEM MACLIB field

The value of the SYSTEM MACLIB field specifies the data set name of the assembler macro library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	SYS1.MACLIB
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### SYSTEM PROCEDURES field

The value of the SYSTEM PROCEDURES field specifies the data set name of the system procedures library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	SYS1.PROCLIB
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

## SORT LIBRARY field

The value of the SORT LIBRARY field specifies the name of the data set where the DFSORT load module resides.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	SYS1.SORTLIB
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

If you use the Db2 Sort for z/OS product, Db2 does not use the value of this field. However, you should set this value to a valid data set name in case you need to use DFSORT as a fallback. The following guidance applies if Db2 Sort for z/OS is not installed.

If you use DFSORT, and your load library is not in the link list, you can change the DSNUPROC JCL procedure in job DSNTIJMV.

If DFSORT is installed as your primary z/OS sort product, you do not need to take any action to make DFSORT available to Db2. If multiple releases of DFSORT are installed, ensure that DFSORT R14 is found first in the system search order.

If DFSORT is not installed as your primary z/OS sort product, use one of the following methods to enable Db2 to use DFSORT:

- Add the DFSORT SORTLPA library to the link pack area list; then add the DFSORT SICELINK library to the link list.
- Add the DFSORT SICELINK library to the link list; then add the DFSORT SORTLPA library to the link list.

**Important:** If any non-IBM primary sort product is installed in the link list, install DFSORT in the link list, in system search order, after the non-IBM primary sort product.

**Recommendation:** If any non-IBM primary sort product is installed in the link pack area, add the DFSORT libraries to the link list.

- Add the DFSORT SICELINK library to the JOBLIB statement; then add the DFSORT SORTLPA library to the JOBLIB statement.
- Add the DFSORT SICELINK library to the STEPLIB DD statement; then add the DFSORT SORTLPA library to the STEPLIB DD statement.
- Add the DFSORT modules to a private library that is equivalent to one of the above configurations.

**Important:** If your non-IBM primary sort product is run from a private library, you must use DFSORT in the same way.

If you install DFSORT in the link pack area or link library, you must install it after you install the non-IBM primary sort product.

Db2 uses only the SORT and MERGE functions in DFSORT. If you want to use DFSORT for any other uses outside of this limited Db2 support, you must separately order and license DFSORT.

### Related information

[DFSORT Installation and Customization](#)

## IMS RESLIB field

The IMS RESLIB field identifies the data set name of the IMS linkage editor library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	none

<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

If you do not have IMS, you do not need to connect Db2 to IMS, and you can skip the phase 4 sample application jobs DSNTEJ4C and DSNTEJ4P.

### ISPF ISPLINK MODULE field

The ISPF ISPLINK MODULE field identifies the data set name of the ISPF load module library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	ISP.SISPLoad
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### GDDM MACLIB field

The GDDM MACLIB field identifies the data set name of the GDDM macro library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	GDDM.SADMSAM
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This field and the GDDM LOAD MODULES field must both have a valid data set name or must both be blank. The data set name that you specify in this field is included in the compiler step SYSLIB DD concatenations of DSNHASHM, DSNHC, DSNHCOB, DSNHCOB2, DSNHICOB, DSNHICB2, and DSNHPLI. The installation CLIST only generates sample jobs DSNTEJ75 and DSNTEJ78 if you specify a GDDM MACLIB name.

### GDDM LOAD MODULES field

The GDDM LOAD MODULES field identifies the data set name of the GDDM load module library that is to be used by sample and installation jobs.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	GDDM.SADMMOD
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

This field and the GDDM MACLIB field must both have a valid data set name or must both be blank. The data set name that you specify in this field is included in the link-edit SYSLIB concatenations of DSNHASHM, DSNHC, DSNHCOB, DSNHCOB2, DSNHICOB, DSNHICB2, and DSNHPLI.

### CICS LOAD LIBRARY field

The CICS LOAD LIBRARY field identifies the data set name that is to be used for the CICS load module library.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
---------------------------	--

<b>Default:</b>	CICSTS.SDFHLOAD
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

If you do not use CICS, use a blank in the CICS LOAD LIBRARY field.

### **CICS MACRO LIBRARY field**

The CICS MACRO LIBRARY field identifies the data set name that is to be used for the CICS macro library.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CICSTS.SDFHMAC
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### **CICS COBOL LIBRARY field**

The CICS COBOL LIBRARY FIELD specifies the data set name for the CICS library that the COBOL programs are to use.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CICSTS.SDFHCOB
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### **CICS PL/I LIBRARY field**

The CICS PL/I LIBRARY field identifies the data set name for the CICS library that PL/I programs are to use.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CICSTS.SDFHPLI
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

### **CICS EXCI LIBRARY field**

The CICS EXCI LIBRARY field identifies the data set name for the CICS library that contains the CICS EXCI load modules.

<b>Acceptable values:</b>	valid data set name: see <a href="#">Valid data set name</a>
<b>Default:</b>	CICS.SDFHEXCI
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

## DSNTIPD: Sizes panel 1

The entries on the DSNTIPD panel establish the size of the Db2 catalog, directory, and log data sets. Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

The values that you supply on this panel are estimates that are used in calculating sizes for main storage and data sets. The values do not reduce any system limits and do not preclude an application or user from exceeding these estimates, within reasonable limits. For example, if you specify 500 databases, you could create 600. However, if you exceed the values by a large margin, you might encounter a shortage of main storage or use many secondary extents for some data sets. You can usually change the main storage values by using the next panel. If you cannot change these values, see [“Updating subsystem parameter and application default values”](#) on page 373 for the appropriate method.

The installation CLIST contains formulas that calculate the space for each catalog data set and the indexes that Db2 requires for each data set. Data that you enter on this panel is used in these formulas. Use integers. Do not enter fractions. You can use K (as in 32 K) for multiples of 1024 bytes and M (as in 16 M) for multiples of 1,048,576 bytes in most fields, but do not exceed the maximum value that is accepted by the field. For example, for the PACKAGE LISTS field, which has a maximum of 32,000, you can enter 31 K, meaning 31,744 bytes. Values of 32 K and above exceed the maximum acceptable value for this field.

Many of the fields on this panel affect the values of the EDMSTATC and EDMDBDC parameters in macro DSN6SPRM.

If you are migrating, Db2 12 adopts the Db2 catalog, directory, BSDS, and active logs from your previous version. Therefore, during migration, you cannot change any of the fields on this panel that affect those data sets.

### Updating the parameters:

You can alter the characteristics of the Db2 catalog, directory, BSDS, and active and archive logs by using the methods described on [“Updating subsystem parameters that cannot be updated by using DSNTIPB”](#) on page 379. You cannot actually change the values of these parameters.

```
DSNTIPD          INSTALL DB2 - SIZES PANEL 1
====> _

Check numbers and reenter to change:
 1 DATABASES          ===> 200      In this subsystem
 2 TABLES            ===> 20       Per database (average)
 3 COLUMNS            ===> 10       Per table (average)
 4 VIEWS               ===> 3        Per table (average)
 5 TABLE SPACES      ===> 20       Per database (average)
 6 PLANS                ===> 200     In this subsystem
 7 PLAN STATEMENTS    ===> 30       SQL statements per plan (average)
 8 PACKAGES            ===> 300     In this subsystem
 9 PACKAGE STATEMENTS ===> 10      SQL statements per package (average)
10 PACKAGE LISTS      ===> 2        Package lists per plan (average)
11 EXECUTED STMTS     ===> 15      SQL statements executed (average)
12 TABLES IN STMT    ===> 2        Tables per SQL statement (average)
13 LOB INLINE LENGTH  ===> 0        Default length of inline LOBs (0-32680)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 17. Sizes panel 1: DSNTIPD

### Related tasks

#### [Calculating storage requirements with the installation CLIST](#)

By providing information about the sizes of your Db2 environment, you can use the installation CLIST to calculate certain storage requirements for your Db2 subsystem.

### Related reference

#### [DSNTIPD: CLIST calculations panel 1](#)

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

### DATABASES field for panel DSNTIPD

The value of the DATABASES field of panel DSNTIPD indicates the estimated number of user databases that are to exist in your subsystem.

<b>Acceptable values:</b>	1–64000
<b>Default:</b>	200
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

### TABLES field

The value of the TABLES field indicates the estimated average number of tables that is to exist for each database in your subsystem.

<b>Acceptable values:</b>	1–400
<b>Default:</b>	20
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

### COLUMNS field

The value of the COLUMNS field identifies the average number of columns per table in your subsystem. This value is to be used in calculating sizes for main storage and data sets.

<b>Acceptable values:</b>	1–750
<b>Default:</b>	10
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

### VIEWS field

The value of the VIEWS field specifies the estimated average number of views that are to exist for each table in your subsystem.

<b>Acceptable values:</b>	1–200
<b>Default:</b>	3
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a>
<b>DSNZPxxx:</b>	none



## TABLE SPACES field

The value of the TABLE SPACES field indicates the estimated average number of table spaces that is to exist per database in your subsystem.

<b>Acceptable values:</b>	1–400
<b>Default:</b>	20
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

## PLANS field

The value of the PLANS field is the estimated number of application plans that are to exist in your subsystem. Each program requires a separate application plan.

<b>Acceptable values:</b>	1–32000
<b>Default:</b>	200
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

## PLAN STATEMENTS field

The value of the PLAN STATEMENTS field specifies the estimated average number of SQL statements that are to exist for each application plan.

<b>Acceptable values:</b>	1–32000
<b>Default:</b>	30
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

## PACKAGES field

The value of the PACKAGES field specifies the estimated number of packages that are to exist in the system.

<b>Acceptable values:</b>	1–256000
<b>Default:</b>	300
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

## PACKAGE STATEMENTS field

The value of the PACKAGE STATEMENTS field specifies the estimated number of individual SQL statements that are to exist for each package.

<b>Acceptable values:</b>	1–32000
---------------------------	---------

<b>Default:</b>	10
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

### PACKAGE LISTS field

The value of the PACKAGE LISTS field is the average number of packages that are estimated to be in a package list for each plan.

<b>Acceptable values:</b>	1–32000
<b>Default:</b>	2
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

### EXECUTED STMTS field

The value of the EXECUTED STMTS field is an estimate of the average number of SQL statements that are to be executed per plan.

<b>Acceptable values:</b>	1–32000
<b>Default:</b>	15
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; not during migration
<b>DSNZPxxx:</b>	none

The number of SQL statements that are executed can be less than the number of statements that are written.

### TABLES IN STMT field

The value of the TABLES IN STMT field indicates the estimated average number of tables that is to be used per SQL statement.

<b>Acceptable values:</b>	1–16
<b>Default:</b>	2
<b>Update:</b>	see <a href="#">“Updating subsystem parameter and application default values” on page 373</a> ; cannot update during migration
<b>DSNZPxxx:</b>	none

Some SQL statements use more than one table (for example, those using joins, unions, or subselect clauses). Consider how often you expect to use such statements when choosing a value for this parameter.

## LOB INLINE LENGTH field (LOB\_INLINE\_LENGTH subsystem parameter)

The LOB\_INLINE\_LENGTH subsystem parameter specifies the default length (in bytes) that is to be used for inline LOB columns.

An *inline LOB* is the portion of a LOB column that resides in the containing table's base table space rather than in the column's auxiliary table space. The value in this field is used when the INLINE LENGTH option is not specified in the definition of a LOB column in a CREATE TABLE or ALTER TABLE ADD statement.

<b>Acceptable values:</b>	0–32680
<b>Default:</b>	0
<b>Update:</b>	option 13 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP LOB_INLINE_LENGTH

When you enter a value in this field, keep the following points in mind:

- A value of 0 causes LOB columns to be created with no inline attribute by default.
- Odd values are rounded to the next even integer for any DBCLOB column created. For example, if you enter 1023, then 1024 bytes of data for new DBCLOB columns reside in the base table.
- The value of this parameter is in bytes, regardless of the LOB column's data type or subtype.
- If the value of this parameter causes the page size to be exceeded for a table in a universal table space, Db2 uses a LOB inline length value of 0 instead of this parameter value when it recalculates the record size.

### Related tasks

[Improving performance for LOB data \(Db2 Performance\)](#)

### Related reference

[CREATE TABLE statement \(Db2 SQL\)](#)

[ALTER TABLE statement \(Db2 SQL\)](#)

## DSNTIP7: SQL OBJECT DEFAULTS PANEL 1

The entries on the DSNTIP7 panel provide general default settings for creating table spaces.

```
DSNTIP7                INSTALL DB2 - SQL OBJECT DEFAULTS PANEL 1
====>
Enter general options for table spaces and indexes below:
  1 VARY DS CONTROL INTERVAL  ===> YES           Optimize VSAM CONTROL INTERVAL
                                                to page size for DS allocation
  2 TABLE SPACE ALLOCATION    ===> 0             Default space allocation in KB
                                                for table spaces (0 for DB2
                                                default or 1-4194304)
  3 INDEX SPACE ALLOCATION     ===> 0             Default space allocation in KB
                                                for index spaces (0 for DB2
                                                default or 1-4194304)
  4 TS COMPRESSION TYPE      ===> FIXED_LENGTH  For creating and reorganizing
                                                compressed table spaces
                                                (FIXED_LENGTH or HUFFMAN)
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 18. SQL OBJECT DEFAULTS PANEL 1: DSNTIP7

## VARY DS CONTROL INTERVAL field (DSVCI subsystem parameter)

The DSVCI subsystem parameter controls whether Db2-managed data sets that are created by CREATE TABLESPACE or CREATE INDEX statements are to have variable VSAM control intervals.

**Deprecated subsystem parameter:** Non-default settings for DSVCI are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value YES.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 14 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP DSVCI

#### YES

Db2 creates Db2-managed data sets for table spaces and index spaces. The Db2-managed data sets have a VSAM control interval that corresponds to the buffer pool that is used for the table space or index space.

#### NO

Db2-managed data sets are created with a fixed control interval of 4 KB, regardless of the buffer pool size.

This parameter is online-updatable. If you change this value from NO to YES, any pre-existing or migrated data sets remain in 4 KB control intervals until they are redefined. If you change this value from YES to NO, any pre-existing or migrated data sets in 8 KB, 16 KB, or 32 KB control intervals remain in those control intervals until they are redefined. You can explicitly redefine a data set. In addition, data sets are implicitly redefined by utilities such as LOAD REPLACE, REORG TABLESPACE, or RECOVER.

### TABLE SPACE ALLOCATION field (TSQTY subsystem parameter)

The TSQTY subsystem parameter specifies the amount of space in KB that is to be allocated for primary and secondary spaces. This parameter applies to Db2-defined data sets for table spaces that are created without the PRIQTY and SECQTY clauses.

<b>Acceptable values:</b>	0–4194304
<b>Default:</b>	0
<b>Update:</b>	option 14 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TSQTY

A value of 0 indicates that Db2 is to use a default value of 1 cylinder for a non-LOB table space or 10 cylinders for a LOB table space.

In a data sharing environment, this parameter has group scope.

#### Related concepts

[How SQL statements are invoked \(Db2 SQL\)](#)

### INDEX SPACE ALLOCATION field (IXQTY subsystem parameter)

The IXQTY subsystem parameter controls the amount of space in KB that is to be allocated for primary and secondary spaces. This parameter applies to Db2-defined data sets for index spaces that are created without the PRIQTY and SECQTY clauses.

<b>Acceptable values:</b>	0–4194304
<b>Default:</b>	0
<b>Update:</b>	option 14 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IXQTY

A value of 0 indicates that Db2 is to use a default allocation of one cylinder.

In a data sharing environment, this parameter has group scope.

## TS COMPRESSION TYPE field (TS\_COMPRESSION\_TYPE subsystem parameter)

The TS\_COMPRESSION\_TYPE subsystem parameter specifies the default compression algorithm to use when Db2 inserts sufficient data into, loads into, or reorganizes table spaces defined to use compression. This also specifies the compression algorithm Db2 uses to compress the SPT01 table space. This subsystem parameter is not used for LOB table spaces.

[FL 504](#)

[FL 509](#) This subsystem parameter applies only to table spaces or table space partitions that are defined with compression and without an explicit compression algorithm.

<b>Acceptable values:</b>	FIXED_LENGTH, HUFFMAN
<b>Default:</b>	FIXED_LENGTH
<b>Update:</b>	option 14 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.TS_COMPRESSION_TYPE

### FIXED\_LENGTH

Db2 uses a fixed-length compression algorithm to perform compression and decompression of data stored in the table space. This is the default setting.

### HUFFMAN

Db2 uses Huffman compression provided by IBM z14® or later hardware to perform compression and decompression of data stored in the table space. Huffman compression applies only to universal table spaces. All other table space types use fixed-length compression, regardless of the TS\_COMPRESSION\_TYPE subsystem parameter setting.

### Related tasks

[Compressing your data \(Db2 Performance\)](#)

## DSNTIP71: SQL OBJECT DEFAULTS PANEL 2

The first entry on the DSNTIP71 panel provides a general default setting for creating table spaces. The remaining fields define default values for the system-required objects that Db2 creates automatically. Db2 uses these options for any indexes or table spaces that it implicitly creates.

```

DSNTIP71          INSTALL DB2 - SQL OBJECT DEFAULTS PANEL 2
====>

Enter general options for table spaces and indexes below (continued):
1  DEFAULT PARTITION SEGSIZE====> 32      For explicitly-created table spaces
                                           (0, 4, 8, 12, ..., 56, 60, or 64)
2  PERCENT FREE FOR UPDATE   ===> 0      Percent of space per page reserved
                                           for update (AUTO or 0 - 99)
3  PAGE SET PAGE NUMBERING  ===> ABSOLUTE For creating range-partitioned
                                           table spaces (ABSOLUTE or RELATIVE)
4  RETRY STOPPED OBJECTS    ===> NO      Up to IRLM timeout limit (NO or YES)
5  PAD INDEXES BY DEFAULT   ===> NO      Pad new indexes by default
6  INDEX MEMORY CONTROL     ===> AUTO    MB of space for fast index traversal
                                           (AUTO, DISABLE, or 10 - 200000)
6a FOR SELECTED INDEXES ONLY====> NO    When INDEX MEMORY CONTROL is 10 -
                                           200000 or AUTO only (NO or YES)
7  FTB NON UNIQUE INDEX     ===> NO      Fast index traversal for non-unique
                                           index (NO or YES)
8  DDL MATERIALIZATION     ===> 1      1 = ALWAYS_IMMEDIATE
                                           2 = ALWAYS_PENDING
9  DEFAULT INSERT ALGORITHM ===> 1      0=ALWAYS BASIC 1=BASIC 2=Algorithm 2

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 19. SQL OBJECT DEFAULTS PANEL 2: DSNTIP71

## DEFAULT PARTITION SEGSIZE field (DPSEGSZ subsystem parameter)

The DPSEGSZ subsystem parameter specifies the default segment size in pages for a CREATE TABLESPACE statement that omits the SEGSIZE clause.

<b>Acceptable values:</b>	0, 4–64 (multiples of 4)
<b>Default:</b>	32
<b>Update:</b>	option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP.DPSEGSZ

FL 504 The DPSEGSZ subsystem parameter has no effect for the creation of table spaces in a work file database or implicitly created table spaces. For explicit CREATE TABLESPACE statements that omit the SEGSIZE clause, it has the following effects:

### 0

The default value is SEGSIZE 32.

### 4–64 (multiples of 4)

The default SEGSIZE value is the specified value.

### Related concepts

[Table space types and characteristics in Db2 for z/OS \(Db2 Administration Guide\)](#)

### Related reference

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

### Related information

[Implementing Db2 table spaces \(Db2 Administration Guide\)](#)

## PERCENT FREE FOR UPDATE field (PCTFREE\_UPD subsystem parameter)

The PCTFREE\_UPD subsystem parameter specifies the default value to use for the PCTFREE FOR UPDATE clause of CREATE TABLESPACE or ALTER TABLESPACE statements. It specifies the default amount of free space to reserve on each page for use by subsequent UPDATE operations when data is added to the table by INSERT operations or utilities.

<b>Acceptable values:</b>	AUTO, 0–99
<b>Default:</b>	0
<b>Update:</b>	option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.PCTFREE_UPD
<b>Data sharing scope:</b>	The recommendation is to use the same value on all members.

This value is used as the default FOR UPDATE value when no PCTFREE FOR UPDATE clause is specified for a CREATE TABLESPACE or ALTER TABLESPACE statement.

### AUTO

Db2 uses real-time statistics values to automatically calculate the percentage of free space that is to be used by update operations. This value is equivalent to specifying PCTFREE FOR UPDATE -1 in the CREATE TABLESPACE or ALTER TABLESPACE statement.

### 0–99

Db2 reserves the specified percentage of space for use by update operations.

### Related tasks

[Reserving free space in table spaces \(Db2 Performance\)](#)

### Related reference

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

[ALTER TABLESPACE statement \(Db2 SQL\)](#)

## PAGE SET PAGE NUMBERING field (PAGESET\_PAGENUM subsystem parameter)

The PAGESET\_PAGENUM subsystem parameter specifies whether partition-by-range table spaces and associated partitioned indexes are created to use absolute page numbers across partitions or relative page numbers.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	RELATIVE or ABSOLUTE
<b>Default:</b>	ABSOLUTE
<b>Update:</b>	option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.PAGESET_PAGENUM
<b>Data sharing scope:</b>	Use the same value on all members.

### RELATIVE

Partition-by-range table spaces are created so that PGNUM in the page header has no partition number, and the partition number is contained only in the header page for the partition. The same numbering system applies to partitioned indexes on a table in a table space with relative page numbering.

### ABSOLUTE

Partition-by-range table spaces and associated indexes are created with absolute page numbers. The default for PAGESET\_PAGENUM is ABSOLUTE.

### Related reference

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

[CREATE TABLE statement \(Db2 SQL\)](#)

## RETRY STOPPED OBJECTS field (RETRY\_STOPPED\_OBJECTS subsystem parameter)

The RETRY\_STOPPED\_OBJECTS subsystem parameter specifies whether Db2 immediately rejects requests for a stopped object or rechecks whether the object is started, up to the IRLM timeout limit.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Data sharing scope:</b>	It is recommended but not required that all members use the same setting.
<b>Online changeable:</b>	Yes
<b>Update:</b>	Option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.RETRY_STOPPED_OBJECTS

### NO

Db2 immediately rejects requests for stopped objects.

### YES

Db2 retries requests for stopped objects in case the object is restarted, up to IRLM timeout limit, which is specified by the value of the IRLMRWT subsystem parameter.

### Related reference

[RESOURCE TIMEOUT field \(IRLMRWT subsystem parameter\)](#)

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

## PAD INDEXES BY DEFAULT field (PADIX subsystem parameter)

The PADIX subsystem parameter determines whether new indexes are to be padded by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.PADIX

### NO

New indexes will not be padded unless the PADDED option is specified on the CREATE INDEX statement.

This is the default value.

### YES

New indexes will be padded unless the NOT PADDED option is specified on the CREATE INDEX statement.

This parameter affects only indexes that have at least one varying-length column.

### Related concepts

[Indexes that are padded or not padded \(Db2 Administration Guide\)](#)

## INDEX MEMORY CONTROL field (INDEX\_MEMORY\_CONTROL subsystem parameter)

The INDEX\_MEMORY\_CONTROL subsystem parameter specifies the amount of memory that Db2 allocates for fast traversing of indexes (sometimes called "fast traverse blocks" or "FTB").

Db2 12 introduces this subsystem parameter. It takes effect in function level 100. However, during coexistence with Db2 11, no storage is allocated for fast index traversal of group buffer pool dependent indexes.

<b>Acceptable values:</b>	<b>INDEX MEMORY CONTROL field</b> AUTO, DISABLE, or <i>n</i> <b>FOR SELECTED INDEXES ONLY field</b> NO or YES <b>INDEX_MEMORY_CONTROL subsystem parameter</b> AUTO, DISABLE, <i>n</i> , (SELECTED,AUTO), or (SELECTED, <i>n</i> ) The range for <i>n</i> is 10–200000.
<b>Default:</b>	<b>INDEX MEMORY CONTROL field</b> AUTO <b>FOR SELECTED INDEXES ONLY field</b> NO <b>INDEX_MEMORY_CONTROL subsystem parameter</b> AUTO
<b>Data sharing scope:</b>	It is recommended that all members use the same setting
<b>Online changeable:</b>	Yes
<b>Update:</b>	Option 15 on panel DSNTIPB



<b>DSNZPxxx:</b>	DSN6SPRM.INDEX_MEMORY_CONTROL
------------------	-------------------------------

**AUTO**

Db2 sets the upper limit to 20 percent of the currently allocated buffer pool storage, or 10 MB, whichever is larger.

**DISABLE**

Db2 returns any existing storage that is allocated for fast index traversal and allocates no more storage for fast index traversal.

This setting is accepted only when FOR SELECTED INDEXES ONLY is NO on panel DSNTIP71.

**10–200000**

Specifies the storage limit for fast index traversal, in megabytes.

**(SELECTED,AUTO)**

Specifies that fast index traversal is enabled only for specific indexes, and Db2 calculates the storage size limit. When this setting is specified, Db2 considers fast index traversal only for indexes recorded with ACTION='A' in the SYSIBM.SYSINDEXCONTROL catalog table.

This setting is used when INDEX MEMORY CONTROL is AUTO and FOR SELECTED INDEXES ONLY is YES on panel DSNTIP71.

**(SELECTED,n)**

Specifies that fast index traversal is enabled only for selected indexes, and *n* specifies the storage size limit. When this setting is specified, Db2 considers fast index traversal only for indexes recorded with ACTION='A' in the SYSIBM.SYSINDEXCONTROL catalog table.

This setting is used when the INDEX MEMORY CONTROL field is *n* in the range 10–200000, and the FOR SELECTED INDEXES ONLY field is YES on panel DSNTIP71.

**Related concepts**

[Fast index traversal \(Db2 Performance\)](#)

**Related tasks**

[Enabling or disabling fast index traversal at the index level \(Db2 Performance\)](#)

**Related reference**

[SYSINDEXCONTROL catalog table \(Db2 SQL\)](#)

**FTB\_NON\_UNIQUE\_INDEX field (FTB\_NON\_UNIQUE\_INDEX subsystem parameter)**

The FTB\_NON\_UNIQUE\_INDEX subsystem parameter specifies whether fast index traversal (FTB) is enabled for non-unique indexes.

[FL 508](#)

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Data sharing scope:</b>	It is recommended that all members use the same setting
<b>Online changeable:</b>	Yes
<b>Update:</b>	Option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.FTB_NON_UNIQUE_INDEX

**YES**

Fast index traversal for non-unique indexes is enabled.

**NO**

Fast index traversal for non-unique indexes is disabled. This is the default setting.

## Related concepts

[Fast index traversal \(Db2 Performance\)](#)

## Related tasks

[Enabling or disabling fast index traversal at the index level \(Db2 Performance\)](#)

## Related reference

[SYSINDEXCONTROL catalog table \(Db2 SQL\)](#)

## DDL MATERIALIZATION field (DDL\_MATERIALIZATION subsystem parameter)

The DDL\_MATERIALIZATION subsystem parameter specifies when Db2 materializes changes to object definitions.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

It applies only for ALTER TABLE statements that specify the ALTER COLUMN and SET DATA TYPE keywords to change the data type, length, precision, or scale of a column. The column must be in a table in a universal table space, or in a table space that has an unmaterialized pending alter to convert it to a universal table space. The data sets for the table space must already be created.

This option is ignored in other cases, such as when alter operations must be executed as a pending alteration or must be executed as an immediate alteration.

<b>Acceptable values:</b>	ALWAYS_IMMEDIATE, ALWAYS_PENDING
<b>Default:</b>	ALWAYS_IMMEDIATE
<b>Data sharing scope:</b>	It is recommended that all members use the same setting
<b>Update:</b>	Option 15 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DDL_MATERIALIZATION

This option specifies whether object definition changes are executed as immediate or pending alterations:

### 1 (ALWAYS\_IMMEDIATE)

For applicable requests, changes are materialized at the time that the request is executed, and the containing table space is placed in AREO\* or REORP status. If there are any existing unmaterialized pending changes, the request fails.

### 2 (ALWAYS\_PENDING)

For applicable requests, changes are not materialized at the time that the request is executed, and the affected objects are available until it is convenient to implement the changes. The containing table space is placed in AREOR status. If any immediate options are specified in the same statement, the change request fails. If any subsequent immediate changes are executed before a pending change is materialized, those subsequent immediate changes fail.

## Related concepts

[Pending data definition changes \(Db2 Administration Guide\)](#)

## Related reference

[ALTER TABLE statement \(Db2 SQL\)](#)

## DEFAULT INSERT ALGORITHM field (DEFAULT\_INSERT\_ALGORITHM subsystem parameter)

The DEFAULT\_INSERT\_ALGORITHM subsystem parameter specifies the default algorithm for inserting data into table spaces.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	0, 1, 2
<b>Default:</b>	1
<b>Data sharing scope:</b>	Same setting recommended on all members
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SPRM.DEFAULT_INSERT_ALGORITHM

The following list describes how the DEFAULT\_INSERT\_ALGORITHM subsystem parameter setting is applied in relation to the INSERT ALGORITHM clauses of the CREATE TABLESPACE and ALTER TABLESPACE statements:

- 0**  
The basic insert algorithm (insert algorithm 1) is always used regardless of any INSERT ALGORITHM parameter setting that might have been specified when the table space was created or altered.
- 1**  
The basic insert algorithm is used unless INSERT ALGORITHM 2 was specified when the table space was created or altered. This is the default setting.
- 2**  
Insert algorithm 2 is used unless INSERT ALGORITHM 1 was specified when the table space was created or altered.

**Related concepts**

[Insert algorithm 2 \(Db2 Performance\)](#)

**Related reference**

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

[ALTER TABLESPACE statement \(Db2 SQL\)](#)

## DSNTIP72: SQL OBJECT DEFAULTS PANEL 3

The entries on the DSNTIP72 panel provide options for accessing stopped objects, and options for renaming tables.

```

DSNTIP72          INSTALL DB2 - SQL OBJECT DEFAULTS PANEL 3
====>

Enter options for implicitly-created table spaces and indexes:
 1 DEFINE DATA SETS      ===> YES      When creating a table space or index
 2 USE DATA COMPRESSION  ===> NO       When creating a table space

Enter options for index-controlled table spaces and indexes:
 3 PREVENT ALTER LIMITKEY ===> NO      Disable alter limit key for index-
                                         controlled partitioned table spaces
 4 EXCLUDE PART KEY COLUMNS ===> YES   When converting index-controlled
                                         partitioned tables to table-
                                         controlled partitioning (NO, YES)

Enter whether to allow or disallow renaming of tables referenced in a view
definition or the definition of an SQL table function (ALLOW_DEP_VIEW_SQLTUDF
or DISALLOW_DEP_VIEW_SQLTUDF):
 5 RENAME TABLE        ===> DISALLOW_DEP_VIEW_SQLTUDF

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 20. SQL OBJECT DEFAULTS PANEL 3: DSNTIP72

## DEFINE DATA SETS field (IMPDSDEF subsystem parameter)

The IMPDSDEF subsystem parameter specifies whether Db2 is to define the underlying data set for certain implicitly created table spaces and indexes.

This parameter applies to:

- Base table spaces
- Index spaces of indexes that are implicitly created on base tables
- Implicitly created LOB or XML table spaces
- Auxiliary indexes
- Node ID indexes
- Document ID indexes

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option16 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IMPDSDEF

### YES

Underlying data sets are defined when the table space or index space is created. This is the default setting.

### NO

Underlying data sets are defined when data is first inserted into the table or index.

However, if all of the following conditions are met, underlying data sets are defined when the table space or index space is created:

- The table contains an LOB column.
- The table is in a clone relationship.
- The containing table space is a partition-by-growth table space.

## USE DATA COMPRESSION field (IMPTSCMP subsystem parameter)

The IMPTSCMP subsystem parameter determines whether an implicitly created table space is to use data compression.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 16 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IMPTSCMP

### NO

Disables data compression. This is the default value.

### YES

Enables data compression for implicitly created table spaces.

The value of the USE DATA COMPRESSION field applies only to implicitly created base table spaces. It is not used for implicitly created LOB or XML table spaces.

## PREVENT ALTER LIMITKEY field (PREVENT\_ALTERTB\_LIMITKEY subsystem parameter)

PREVENT\_ALTERTB\_LIMITKEY determines whether Db2 disallows altering the limit key by using an ALTER TABLE statement for index-controlled partitioned table spaces. This alter operation places the table space in REORG-pending (REORP) restrictive status, and the data is unavailable until the affected partitions are reorganized. Use PREVENT\_ALTERTB\_LIMITKEY to avoid this data unavailability.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 16 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PREVENT_ALTERTB_LIMITKEY

### NO

Specifies that you can alter a limit key by using an ALTER TABLE statement for index-controlled partitioned table spaces.

NO is the default.

### YES

Specifies that altering a limit key by using an ALTER TABLE statement for index-controlled partitioned table spaces is not permitted. An ALTER TABLE statement must not attempt to alter the limit key for an index-controlled partitioned table.

### Related tasks

[Creating tables partitioned by data value ranges \(Db2 Administration Guide\)](#)

[Changing the boundary between partitions \(Db2 Administration Guide\)](#)

### Related reference

[REORG-pending status \(Db2 Utilities\)](#)

## EXCLUDE PART KEY COLUMNS field (IX\_TB\_PART\_CONV\_EXCLUDE subsystem parameter)

Specifies whether to exclude trailing columns from the table-controlled partitioning keys when table spaces are converted from index-controlled partitioning to table-controlled partitioning.

**Deprecated subsystem parameter:** Non-default settings for IX\_TB\_PART\_CONV\_EXCLUDE are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value YES.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 16 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM IX_TB_PART_CONV_EXCLUDE

### YES

When converting from index-controlled partitioning to table-controlled partitioning, Db2 defines the new partitioning key to use only significant columns of the original partitioning index by default. If all partitions contain 'FF'x for a column in the internal limit key value that is stored in the table's SYSINDEXPART.LIMITKEY entry, Db2 excludes that column. Such columns were specified with a value of 'FF'x, MAXVALUE, MINVALUE, or no value when the index-controlled partitioning index was defined. However, if a new limit key value is specified for a column in an ALTER TABLE statement that is issued in one of the following cases, the column is used to define the new partitioning key regardless of whether the column was originally specified with a value of 'FF'x, MAXVALUE, or MINVALUE:

- To add a new partition

- To change a partition boundary
- To rotate a partition to last on an index-controlled partitioned table space

## NO

When converting from index-controlled partitioning to table-controlled partitioning, Db2 uses all columns of the original partitioning index to define the new partitioning key. This definition includes the trailing columns of the original partitioning index that do not affect the partitioning.

This parameter does not affect the automatic conversion to table-controlled partitioning when a CREATE INDEX statement is issued with an ENDING AT clause and without a CLUSTER clause. In this case, the Db2 subsystem uses the partitioning key that is specified by the CREATE INDEX statement.

**Learn more:** For comprehensive background, how-to information, and examples for various paths for converting your deprecated "classic" partitioned (non-UTS) table spaces to partition-by-range table spaces, see the white paper [Conversion from index-controlled partitioning to Universal Table Space \(UTS\)](#).

### Related tasks

[Converting partitioned \(non-UTS\) table spaces to partition-by-range universal table spaces \(Db2 Administration Guide\)](#)

### Related reference

[CREATE INDEX statement \(Db2 SQL\)](#)

## RENAME TABLE field (RENAMETABLE subsystem parameter)

The RENAMETABLE subsystem parameter specifies whether RENAME TABLE issues an error or allows the operation when RENAME TABLE is issued for a table that is referenced in a view definition or the definition of an SQL table function.

<b>Acceptable values:</b>	DISALLOW_DEP_VIEW_SQLTUDF, ALLOW_DEP_VIEW_SQLTUDF
<b>Default:</b>	DISALLOW_DEP_VIEW_SQLTUDF
<b>Update:</b>	option16 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RENAMETABLE

### DISALLOW\_DEP\_VIEW\_SQLTUDF

Db2 issues an error when RENAME TABLE is issued for a table that is referenced in the definition of a view or an SQL table function.

### ALLOW\_DEP\_VIEW\_SQLTUDF

Db2 does not issue an error when RENAME TABLE is issued for a table that is referenced in the definition of a view or an SQL table function.

When a RENAME TABLE statement is issued for such a table, the Db2 database manager takes the following actions:

- Updates internal information about object dependencies, but does not change the text representations of statements that created or altered views or routines that depend on the renamed table in the SYSIBM.SYSVIEWS or SYSIBM.SYSROUTINES catalog tables.
- Invalidates statements that refer to the table that is renamed

In a data sharing environment, specify the same value of RENAMETABLE for all members.

### Related reference

[SYSROUTINES catalog table \(Db2 SQL\)](#)

[SYSVIEWS catalog table \(Db2 SQL\)](#)

## DSNTIP9: Work file database panel

The fields on the DSNTIP9 panel configure the 4 KB and 32 KB page size table spaces in the Db2 work file database.

The values in these fields determine the following:

- The total amount of space that is available for each type of table space.
- The number of table spaces that are to be created during the installation or migration process for each type of table space. In INSTALL mode, you must specify at least 1 for each of the 4 types of work file table spaces: 4 KB sort work, 32 KB sort work, 4 KB temporary work, and 32 KB temporary work. In MIGRATE mode, you can specify 0 for any or all of these table spaces.
- The segment size of each type of table space.

The settings on this panel are used to tailor installation job DSNTIJTM, which creates the work file database. For more information about job DSNTIJTM, see [“Installation step 18: Create default storage group, define temporary work files, and bind Db2 REXX Language Support: DSNTIJTM”](#) on page 452. To determine the storage requirements for work file database table spaces, see [“Work file database storage requirements”](#) on page 11.

Sort work table space in the work file database are used as temporary space for SQL statements and triggers that require working storage. In particular, this includes statements that use the following types of operations:

- GROUP BY or HAVING (without index)
- ORDER BY (without index)
- DISTINCT (without index)
- UNION (except UNION ALL)
- EXISTS (subselect)
- ANY (subselect)
- SOME (subselect)
- ALL (subselect)
- Some joins

Temporary work table spaces in the work file database are used for declared global temporary tables. They can increase in size beyond the primary allocation. When the value of the INSTALL TYPE field is INSTALL, temporary work table spaces are created as either partition-by-growth or segmented table spaces, depending on the amount of primary space per table space.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

You can add a work file table space or change the size of an existing one by deleting and redefining it. Db2 needs to be started for these activities and you do not need to stop the work file database. All Db2 users share the work file database table spaces. You cannot use utilities on the work file database table spaces.

You can create additional work file table spaces at any time, including during migration. Creating additional work file table spaces can improve Db2 performance by reducing device contention among applications that require working storage.

For temporary work only, the work file database can contain partition-by-growth table spaces to increase the available space for declared global temporary tables and reduce the possibility of receiving SQLCODE -904. A partition-by-growth table space can grow up to 128 TB. The maximum number of partitions to which the partition-by-growth table space can grow and the maximum size of the table space are determined by the MAXPARTITIONS and DSSIZE values that are specified for the table space.

**Important:** Db2 12 uses more 32KB work files than previous Db2 releases. For migration to Db2 12, you might need to increase your 32KB work file allocations for work file data sets and work file buffer pools.

**Recommendation:** If you have not already done so, drop work file table spaces for temporary work and re-create them as partition-by-growth table spaces. (Existing table spaces cannot be altered to become partition-by-growth table spaces.)

## Updating the parameters

You can alter the characteristics of the Db2 catalog, directory, work file databases, BSDS, and active and archive logs by using the methods described on [“Updating subsystem parameter and application default values”](#) on page 373.

```

DSNTIP9          INSTALL DB2 - WORK FILE DATABASE
====>

Enter options for creating sort work table spaces:
4K SORT TABLE SPACE:
 1 4K SORT PRIMARY SPACE ==> 20          Total primary space (MB)
 2 4K SORT WORK TS'S    ==> 1           Number of table spaces to create
 3 4K SORT WORK SEG SIZE ==> 16         Segment size
32K SORT TABLE SPACE:
 4 32K SORT PRIMARY SPACE==> 20         Total primary space (MB)
 5 32K SORT WORK TS'S    ==> 1           Number of table spaces to create
 6 32K SORT WORK SEG SIZE==> 16         Segment size
Enter options for creating temporary (DGTT) work file table spaces:
4K TEMP TABLE SPACE:
 7 4K TEMP PRIMARY SPACE ==> 20         Total primary space (MB)
 8 4K TEMP WORK TS'S     ==> 1           Number of table spaces to create
 9 4K TEMP WORK SEG SIZE ==> 16         Segment size
32K SORT TABLE SPACE:
10 32K TEMP PRIMARY SPACE==> 20         Total primary space (MB)
11 32K TEMP WORK TS'S     ==> 1           Number of table spaces to create
12 32K TEMP WORK SEG SIZE==> 16         Segment size

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 21. Work file database panel: DSNTIP9

### Related tasks

[Creating additional work file table spaces to reduce contention \(Db2 Performance\)](#)

## 4K SORT PRIMARY SPACE field

The value of the 4K SORT PRIMARY SPACE field specifies the total amount of space for all 4 KB sort work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

<b>Acceptable values:</b>	for installation: 1–32,702,464; for migration: 0–32,702,464
<b>Default:</b>	for installation: 20; for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 4K SORT PRIMARY SPACE field is divided by the value of the 4K SORT WORK TS'S field to determine the primary space quantity (PRIQTY) for creating each 4 KB type sort work file table space. For example, if you specify a value of 16 for the 4K SORT PRIMARY SPACE field and a value of 4 for the 4K SORT WORK TS'S field, the PRIQTY for each 4 KB type table space is 4096 KB.

The secondary space quantity (SECQTY) value for each 4 KB type table space is always 0.



If you run the CLIST in MIGRATE mode, the value of the 4K SORT PRIMARY SPACE field is used only when additional 4 KB type sort work file table spaces are created. Db2 does not take into account the space that is already used by existing 4 KB type work files.

### 4K SORT WORK TS'S field

The value of the 4K SORT WORK TS'S field specifies the number of 4 KB sort work file table spaces that are to be created.

<b>Acceptable values:</b>	for installation: 1–499; for migration: 0–500
<b>Default:</b>	for installation: 1 for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used for creating new 4 KB type sort work file table spaces. Db2 does not take into account the number of existing 4 KB type sort work file table spaces.

### 4K SORT WORK SEG SIZE field

The value of the 4K SORT WORK SEG SIZE field specifies the segment size that is to be used for 4 KB sort work file table spaces. The value must be a multiple of 4 in the range 4–64, inclusive.

<b>Acceptable values:</b>	4, 8, 12, ..., 60, 64 (multiples of 4)
<b>Default:</b>	16
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 4K SORT WORK SEG SIZE field does not apply to existing 4 KB work file table spaces.

### 32K SORT PRIMARY SPACE field

The value of the 32K SORT PRIMARY SPACE field specifies the total amount of space for all 32 KB sort work table spaces in the work file database. This value is specified in MB but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike temporary work table spaces, sort work table spaces are always segmented table spaces and cannot increase in size.

<b>Acceptable values:</b>	for installation: 1–32,702,464; for migration: 0–32,702,464
<b>Default:</b>	for installation: 20; for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 32K SORT PRIMARY SPACE field is divided by the value of the 32K SORT WORK TS'S field to determine the primary space quantity (PRIQTY) for creating each 32 KB type sort work file table space. For example, if you specify a value of 16 for the 32K SORT PRIMARY SPACE field and a value of 4 for the 32K SORT WORK TS'S field, the PRIQTY for each 32 KB type table space is 4096 KB.

The secondary space quantity (SECQTY) value for each 32 KB type table space is always 0.

If you run the CLIST in MIGRATE mode, the value of the 32K SORT PRIMARY SPACE field is used only when additional 32 KB type sort work file table spaces are created. Db2 does not take into account the space that is already used by existing 32 KB type work files.

### 32K SORT WORK TS'S field

The value of the 32K SORT WORK TS'S field specifies the number of 32 KB sort work file table spaces that are to be created.

<b>Acceptable values:</b>	for installation: 1–499; for migration: 0–500
<b>Default:</b>	for installation: 1 for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used for creating new 32 KB type sort work file table spaces. Db2 does not take into account the number of existing 32 KB type sort work file table spaces.

### 32K SORT WORK SEG SIZE field

The value of the 32K SORT WORK SEG SIZE field specifies the segment size that is to be used for 32 KB sort work file table spaces. The value must be a multiple of 4 in the range 4–64, inclusive.

<b>Acceptable values:</b>	4, 8, 12, ..., 60, 64 (multiples of 4)
<b>Default:</b>	16
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 32K SORT WORK SEG SIZE field does not apply to existing 32 KB work file table spaces.

### 4K TEMP PRIMARY SPACE field

The value of the 4K TEMP PRIMARY SPACE field specifies the total amount of space for all 4 KB temporary work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike sort work table spaces, temporary work table spaces can increase in size beyond the primary allocation. In installation mode, temporary work table spaces, unlike sort work table spaces, are created as either partition-by-growth table spaces or segmented table spaces, depending on the amount of primary space per table space.

<b>Acceptable values:</b>	for installation: 1–8,388,608,000; for migration: 0–32,702,464
<b>Default:</b>	for installation: 20; for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 4K TEMP PRIMARY SPACE field is divided by the value of the 4K TEMP WORK TS'S field to determine either of the following values:

- The primary space quantity (PRIQTY)

- The maximum number of partitions (MAXPARTITIONS) and the maximum size (DSSIZE) of each partition

The PRIQTY value is used for creating each 4 KB type temporary work table space as a segmented table space. The MAXPARTITIONS and DSSIZE values are used for creating each 4 KB type temporary work table space as a partition-by-growth table space.

When there is 1 GB or less per table space, segmented table spaces are created by using the PRIQTY parameter. Otherwise, partition-by-growth table spaces are created by using the DSSIZE and MAXPARTITIONS parameters. If necessary, the CLIST curtails the calculated space at 16,384 GB, which is the maximum for a 4 KB page size partition-by-growth table space.

For example:

- If you specify a value of 16 for the 4K TEMP PRIMARY SPACE field and a value of 4 for the 4K TEMP WORK TS'S field, the PRIQTY for each 4 KB type table space is 4096 KB.
- If you specify a value of 16G for the 4K TEMP PRIMARY SPACE field and a value of 4 for the 4K TEMP WORK TS'S field, the MAXPARTITIONS for each 4 KB type table space is 1 with a DSSIZE of 4.

If you run the CLIST in MIGRATE mode, the value of the 4K TEMP PRIMARY SPACE field is used only when additional 4 KB type work file table spaces are created. Db2 does not take into account the space that is already used by existing 4 KB type work files.

### 4K TEMP WORK TS'S field

The value of the 4K TEMP WORK TS'S field specifies the number of 4 KB temporary work file table spaces that are to be created.

<b>Acceptable values:</b>	for installation: 1–499; for migration: 0–500
<b>Default:</b>	for installation: 1; for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in MIGRATE mode, and you enter a non-zero value, the value is used when new 4 KB type temporary work file table spaces are created. Db2 does not take into account the number of existing 4 KB type temporary work file table spaces.

### 4K TEMP WORK SEG SIZE field

The value of the 4K TEMP WORK SEG SIZE field specifies the segment size that is to be used for 4 KB temporary work file table spaces. The value must be a multiple of 4 between 4 and 64, inclusive.

<b>Acceptable values:</b>	4, 8, 12, ..., 60, 64 (multiples of 4)
<b>Default:</b>	16
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

## 32K TEMP PRIMARY SPACE field

The value of the 32K TEMP PRIMARY SPACE field specifies the total amount of space for all 32 KB temporary work table spaces in the work file database. This value is specified in MB, but you can enter the value in GB by specifying a suffix of G, for example 1024G.

Unlike sort work table spaces, temporary work table spaces can increase in size beyond the primary allocation. In installation mode, temporary work table spaces, unlike sort work table spaces, are created as either partition-by-growth or segmented table spaces, depending on the amount of primary space per table space.

<b>Acceptable values:</b>	for installation: 1–67,108,864,000; for migration: 0–32,702,464
<b>Default:</b>	for installation: 20; for migration: 0
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

The value of the 32K TEMP PRIMARY SPACE field is divided by the value of the 32K TEMP WORK TS'S field to determine either of the following values:

- The primary space quantity (PRIQTY)
- The maximum number of partitions (MAXPARTITIONS) and the maximum size (DSSIZE) of each partition

The PRIQTY value is used for creating each 32 KB type temporary work table space as a segmented table space. The MAXPARTITIONS and DSSIZE values are used for creating each 32 KB type temporary work table space as a partition-by-growth table space.

When there is 1 GB or less per table space, segmented table spaces are created by using the PRIQTY parameter. Otherwise, partition-by-growth table spaces are created using the DSSIZE and MAXPARTITIONS parameters. If necessary, the CLIST curtails the calculated space at 131,072 GB, which is the maximum for a 32 KB page size partition-by-growth table space.

For table spaces that are larger than 16,384 GB, data sets must be associated with a Data Facility Storage Management Subsystem (DFSMS) data class that has been specified with extended format and extended addressability.

For example:

- If you specify a value of 16 for the 32K TEMP PRIMARY SPACE field and a value of 4 for the 32K TEMP WORK TS'S field, the PRIQTY value for each 32 KB type table space is 4096 KB.
- If you specify a value of 16G for the 32K TEMP PRIMARY SPACE field and a value of 4 for the 32K TEMP WORK TS'S field, the MAXPARTITIONS value for each 32 KB type table space is 1 and the DSSIZE is 4.

If you run the CLIST in MIGRATE mode, the value of the 32K TEMP PRIMARY SPACE field is used only when additional 32 KB type work file table spaces or partition-by-growth table spaces are created. Db2 does not take into account the space that is already used by existing 32 KB type work files or partition-by-growth table spaces. If necessary, the CLIST curtails the calculated space at 131,072 GB, which is the maximum for a 32 KB page size partition-by-growth table space.

## 32K TEMP WORK TS'S field

The value of the 32K TEMP WORK TS'S field specifies the number of 32 KB temporary work file table spaces that are to be created.

<b>Acceptable values:</b>	for installation: 1–499; for migration: 0–500
<b>Default:</b>	for installation: 1; for migration: 0
<b>Update:</b>	none

<b>DSNZPxxx:</b>	none
------------------	------

The sum of the values of the 4K SORT WORK TS'S field, the 32K SORT WORK TS'S field, the 4K TEMP WORK TS'S field, and the 32K TEMP WORK TS'S field cannot exceed 500.

If you run the CLIST in INSTALL mode, you must enter a value of at least 1.

If you run the CLIST in INSTALL mode, and you do not have an existing 32 KB work file table space, enter a non-zero value. If you enter a non-zero value, the value is used for creating new 32 KB type temporary work file table spaces. Db2 does not take into account the number of existing 32 KB type temporary work file table spaces.

### 32K TEMP WORK SEG SIZE field

The value of the 32K TEMP WORK SEG SIZE field specifies the segment size that is to be used for 32 KB temporary work file table spaces. The value must be a multiple of 4 in the range 4–64, inclusive.

<b>Acceptable values:</b>	4, 8, 12, ..., 60, 64 (multiples of 4)
<b>Default:</b>	16
<b>Update:</b>	none
<b>DSNZPxxx:</b>	none

## DSNTIP91: Work file database panel 2

The fields on the DSNTIP91 panel configures options for managing the Db2 work file database and thresholds for reporting excess work file space usage.

**Updating the parameters:** You can use the UPDATE mode of the installation CLIST to update any value on this panel.

```

DSNTIP91          INSTALL DB2 - WORK FILE DATABASE - PANEL 2
====>

Enter options for managing the work file database:
 1 MAX TEMP STG/AGENT  ===> 0           Maximum MB of temp storage per agent
 2 SEPARATE WORK FILES ===> NO          Separate work according to TS type
 3 MAX TEMP RID        ===> NOLIMIT     Max RID blocks of temp storage per
                                         RID list (NOLIMIT, NONE, 1 -329166)

Enter thresholds for reporting excess work file space usage:
 4 AGENT LEVEL THRESHOLD ===> 0 Percent of work file storage (0-100)
 5 SYSTEM LEVEL THRESHOLD===> 90 Percent of work file storage (0-100)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 22. Work file database panel 2: DSNTIP91

### Related tasks

[Creating additional work file table spaces to reduce contention \(Db2 Performance\)](#)

### MAX TEMP STG/AGENT field (MAXTEMPS subsystem parameter)

The MAXTEMPS subsystem parameter determines the maximum amount of temporary storage in the work file database that a single agent can use at any given time for any type of usage. The usage can be

for sort work files, created global temporary tables, declared global temporary tables, scrollable cursors result tables, and so on.

<b>Acceptable values:</b>	0–2147483647
<b>Default:</b>	0
<b>Update:</b>	option 18 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAXTEMPS

An entry of 0 means that no limit is enforced.

By default, the specified value for MAXTEMPS is in MB, and in job DSNTIJUZ, the parameter value must be specified in MB. However, you can enter a GB value in the MAX TEMP STG/AGENT field of the installation CLIST by specifying a suffix of G, for example 4G.

### SEPARATE WORK FILES field (WFDBSEP subsystem parameter)

The WFDBSEP subsystem parameter specifies whether Db2 unconditionally separates table spaces in the work file database based on the allocation attributes of the table spaces.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 18 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.WFDBSEP

#### NO

Db2 attempts to direct work file operations based on the preferred table space allocation attributes in the following table. If no table space is available with the preferred attributes, Db2 selects a table space with a non-preferred allocation type.

#### YES

Db2 attempts directs work file operations only to table spaces with the preferred allocation attributes in the following table. When YES is specified and no table space is available with the preferred attributes, Db2 issues an error message, a negative SQLCODE, or both.

DGTTs cannot span table spaces when this setting is used.

### Preferred allocation attributes for Db2 work files

Regardless of the specified WFDBSEP setting, Db2 always prefers to use table spaces with the following allocation attributes for declared global temporary table (DGTT) and other work file operations such as sort.

Work file operation	Preferred table space attributes
<b>DGTT work</b>	<ol style="list-style-type: none"> <li>1. A Db2-managed (STOGROUP) partition-by-growth (PBG) table space (with any SECQTY value)</li> <li>2. A segmented (non-UTS) table space with a non-zero SECQTY value</li> </ol>
<b>Sort work</b>	<ol style="list-style-type: none"> <li>1. A Db2-managed segmented (non-UTS) table spaces with a zero SECQTY value</li> <li>2. A user-managed table space, regardless of secondary space allocation</li> </ol>

## Related concepts

[How sort work files are allocated \(Db2 Performance\)](#)

[Table space types and characteristics in Db2 for z/OS \(Db2 Administration Guide\)](#)

## Related tasks

[Creating additional work file table spaces to reduce contention \(Db2 Performance\)](#)

## MAX TEMP RID field (MAXTEMPS\_RID subsystem parameter)

The MAXTEMPS\_RID subsystem parameter determines the maximum amount of temporary storage in the work file database that a single RID list can use at a time.

The work file storage is used for the RID list when the RID pool storage cannot be used to contain all the RIDs. In other words, when RID pool storage overflow occurs for a RID list, the Db2 subsystem attempts to store the RID list in work file storage instead of falling back to a relational scan. This subsystem parameter specifies the maximum number of RIDs (measured in RID blocks) that the subsystem is allowed to store in the work file. If the maximum number of RIDs is exceeded, the subsystem falls back to a relational scan.

The MAXTEMPS\_RID subsystem parameter does not affect RID list processing for pair-wise join.

<b>Acceptable values:</b>	NONE, NOLIMIT, or 1–329166
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 18 on panel DSNTIPB
<b>DSNZPxxx:</b>	MAXTEMPS_RID

The MAXTEMPS\_RID value is specified in number of RID blocks. An entry of NONE means that the RID list processing will not use work file storage. An entry of NOLIMIT means that the number of RID blocks that can be stored in a work file is unrestricted. This is the default behavior.

Each RID block that is stored in the work file occupies 32 KB of work file storage and contains 4077 RIDs. For example, a value of 10000 for MAXTEMPS\_RID limits the number of RIDs that are allowed to be stored in the work file to 40,770,000, or approximately 312.5 MB.

Another subsystem parameter, MAXTEMPS, controls the maximum amount of temporary storage in the work file database that a single agent can use at a time for any type of usage. The scope of the parameter includes work file usage for storing RIDs. Therefore, if MAXTEMPS is set to a non-zero value, it overrides the setting of MAXTEMPS\_RID in some cases.

For example, consider the following scenario:

MAXTEMPS is set to 2G, meaning that 2 GB of work file storage is allowed to be used by the agent. MAXTEMPS\_RID is set to 20000, meaning that 20,000 RID blocks are allowed to be stored in a work file, which translates to 625 MB of work file storage. Suppose that a RID list processing encountered a RID pool overflow, and therefore, the Db2 subsystem is using work file storage to store the RID list. Suppose that 65,328,000 RIDs are fetched into the RID list. The list therefore, takes up 16,000 RID blocks, which is below the MAXTEMPS\_RID value of 20000. If no other activity is using much work file storage in the agent, the RID list should be successfully stored in a work file, and RID processing could continue. However, if other activities in the agent are using more than 1.5 GB of work file storage, less than 500 MB of work file storage is available to the agent (MAXTEMPS - 1.5 GB). The 16,000 RID blocks cannot fit in the 500 MB of available space. RID processing will not have enough work file storage and will fall back to a relational scan although the MAXTEMPS\_RID value is well above the amount that the RID list needs.

## Related tasks

[Managing RID pool size \(Db2 Performance\)](#)

## Related reference

[RID POOL SIZE field \(MAXRBLK subsystem parameter\)](#)

The MAXRBLK subsystem parameter specifies the amount of storage in kilobytes that is needed for the RID pool.

#### MAX TEMP STG/AGENT field (MAXTEMPS subsystem parameter)

The MAXTEMPS subsystem parameter determines the maximum amount of temporary storage in the work file database that a single agent can use at any given time for any type of usage. The usage can be for sort work files, created global temporary tables, declared global temporary tables, scrollable cursors result tables, and so on.

### **AGENT LEVEL THRESHOLD field (WFSTGUSE\_AGENT\_THRESHOLD subsystem parameter)**

The WFSTGUSE\_AGENT\_THRESHOLD subsystem parameter determines the percentage of available space in the work file database on a Db2 subsystem or data sharing member that can be consumed by a single agent before a warning message is issued.

Space in the work file database can be configured for declared temporary table work and for sort work. Sort work includes work for global temporary tables and transition tables for triggers.

<b>Acceptable values:</b>	0–100
<b>Default:</b>	0
<b>Update:</b>	option 18 on panel DSNTIPB
<b>DSNZPxxx:</b>	WFSTGUSE_AGENT_THRESHOLD

#### **0**

Db2 does not issue agent-level space usage warnings for the work file database.

#### **1–100**

If the WFDBSEP subsystem parameter is set to YES, Db2 issues a warning message when the percentage of total temporary work file space or the percentage of total sort work file space that is consumed by an agent exceeds this value.

If WFDBSEP is set to NO, Db2 issues a warning message when the percentage of all work file space that is consumed by an agent exceeds this value.

#### **Related reference**

#### SEPARATE WORK FILES field (WFDBSEP subsystem parameter)

The WFDBSEP subsystem parameter specifies whether Db2 unconditionally separates table spaces in the work file database based on the allocation attributes of the table spaces.

### **SYSTEM LEVEL THRESHOLD field (WFSTGUSE\_SYSTEM\_THRESHOLD subsystem parameter)**

The WFSTGUSE\_SYSTEM\_THRESHOLD subsystem parameter determines the percentage of available space in the work file database on a Db2 subsystem or data sharing member that can be consumed by all agents before a warning message is issued.

Space in the work file database can be configured for declared temporary table work and for sort work. Sort work includes work for global temporary tables and transition tables for triggers.

<b>Acceptable values:</b>	0–100
<b>Default:</b>	90
<b>Update:</b>	option 18 on panel DSNTIPB
<b>DSNZPxxx:</b>	WFSTGUSE_SYSTEM_THRESHOLD



## 1-100

If the WFDBSEP subsystem parameter is set to YES, Db2 issues a warning message when the percentage of total temporary work file space or the percentage of total sort work file space that is consumed by all agents exceeds this value.

If WFDBSEP is set to NO, Db2 issues a warning message when the percentage of all work file space that is consumed by all agents exceeds this value.

## 0

Db2 does not issue system-level space usage warnings for the work file database.

### Related reference

[SEPARATE WORK FILES field \(WFDBSEP subsystem parameter\)](#)

The WFDBSEP subsystem parameter specifies whether Db2 unconditionally separates table spaces in the work file database based on the allocation attributes of the table spaces.

## DSNTIPE: Thread management panel 1

The entries on the DSNTIPE panel determine main storage sizes.

**Updating the parameters:** You can use the UPDATE mode of the CLIST to update any value on this panel.

```
DSNTIPE          INSTALL DB2 - THREAD MANAGEMENT
====>  _

Check numbers and reenter to change:

 1 DATABASES          ==> 200      Concurrently in use
 2 MAX USERS          ==> 200      Concurrently running in DB2
 3 MAX REMOTE ACTIVE  ==> 200      Maximum number of active
                                database access threads
 4 MAX REMOTE CONNECTED ==> 10000    Maximum number of remote DDF
                                connections that are supported
 5 MAX TSO CONNECT    ==> 50       Users on QMF or in DSN command
 6 MAX BATCH CONNECT  ==> 50       Users in DSN command or utilities
 7 MAX KEPT DYN STMTS ==> 5000    Maximum number of prepared dynamic
                                statements saved past commit
                                points or rollbacks
 8 MAX OPEN FILE REFS ==> 100     Maximum concurrent open data sets

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 23. Thread management panel: DSNTIPE

## DATABASES field for panel DSNTIPE

The value of the DATABASES field of panel DSNTIPE indicates the maximum number of databases that are to be open at one time.

<b>Acceptable values:</b>	1-800
<b>Default:</b>	200
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The maximum number of concurrent databases is affected primarily by the DSMAX field on panel DSNTIPC, which specifies the maximum number of open data sets.

### Related tasks

[Programming applications for performance \(Db2 Performance\)](#)

### Related reference

[DSMAX field \(DSMAX subsystem parameter\)](#)

The DSMAX subsystem parameter specifies the maximum number data sets that can be open at one time.

## MAX USERS field (CTHREAD subsystem parameter)

The CTHREAD subsystem parameter controls the maximum number of allied threads that are to be allocated concurrently. *Allied threads* are threads that are started at the local subsystem.

<b>Acceptable values:</b>	1–20000
<b>Default:</b>	200
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP CTHREAD

Count each of the following items as separate users:

- Each TSO user (whether running a DSN command or a Db2 request from QMF)
- Each batch job (whether running a DSN command or a Db2 utility)
- Each IMS region that can access Db2
- Each active CICS transaction that can access Db2
- Each utility (each utility uses one thread, plus one thread for each subtask)
- Each connection from users of CAF and RRSAP
- Each WebSphere application server or other application server that uses JDBC or ODBC has multiple connections to DB2. The number of connections is determined by the application server.

The maximum number of threads accessing data that can be allocated concurrently is the sum of the value of the MAX USERS field and the MAX REMOTE ACTIVE field on panel DSNTIPE. The maximum allowable value for this sum is 20000. When the number of users who are attempting to access Db2 exceeds the number that you specify, excess plan allocation requests are queued. In most situations, the amount of real storage determines the maximum number of threads that Db2 can handle.

Due to parallelism, Db2 utilities each use a minimum of one thread, plus an additional thread for each subtask. Therefore, a single utility might use many threads. Specify a thread value accordingly to accommodate parallelism within utilities. Consider using a value that is higher than the default value or the value that you specified in a previous version of Db2.

## MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

<b>Acceptable values:</b>	0–19999
<b>Default:</b>	200
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP MAXDBAT

The total number of threads accessing data concurrently is the sum of the value of the MAX USERS field and this field, MAX REMOTE ACTIVE. The maximum allowable value for this sum is 20000. If a request for a new connection to Db2 is received and MAX REMOTE ACTIVE has been reached, the resulting action depends on the setting of the DDF THREADS field on panel DSNTIPR.:

### If DDF THREADS is ...

ACTIVE

### Action taken is ...

The allocation request is allowed but any further processing for the connection is queued waiting for an active database access thread to terminate.

**If DDF THREADS is ...****Action taken is ...**

INACTIVE

The allocation request is allowed and is processed when Db2 can assign an unused database access thread slot to the connection.

**Setting MAXDBAT to 0**

You can use a 0 in this field to restrict DDF server activity on a member of a data sharing group, with the following results:

- DDF does not register the member with WLM for member-specific sysplex routing. This does not prevent the member from using WLM for enclave prioritization, but it prevents WLM from including this member in the Sysplex routing data that is sent to remote sites.
- In an SNA network, DDF does not register the member's LU name with the VTAM generic LU name during DDF startup. This causes VTAM generic resource connections to be directed to Db2 members that specify a MAX REMOTE ACTIVE value of greater than 0.
- In a TCP/IP network, DDF does not listen on the DRDA SQL port. This means TCP/IP SQL connections can be accepted only by members that specify a MAXDBAT setting greater than 0.
- DDF rejects requests for the sysplex routing TPN with the following sense code: SNA TPN not available.
- MAX REMOTE CONNECTED (CONDBAT) is lowered to zero by default if it is not set explicitly.
- Db2 will still accept inbound Automatic Resynchronization requests.

**Related reference**DDF THREADS field (CMTSTAT subsystem parameter)

The CMTSTAT subsystem parameter controls whether in-use database access threads (DBATS) can be pooled, for use by other connections, after they successfully commit or roll back. Threads cannot be pooled if they hold cursors, use defined temporary tables, or execute statements from the dynamic statement cache.

MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)

The CONDBAT subsystem parameter sets the maximum number of concurrent inbound DDF connections that are to be allowed.

CONN QUEUE MAX DEPTH field (MAXCONQN subsystem parameter)

If the number of active in-use DBATs has reached the MAXDBAT threshold, the MAXCONQN subsystem parameter specifies the maximum number of inactive or new connection requests that can be queued waiting for a DBAT to process the request.

**MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)**

The CONDBAT subsystem parameter sets the maximum number of concurrent inbound DDF connections that are to be allowed.

<b>Acceptable values:</b>	0–150000
<b>Default:</b>	10000
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP CONDBAT

The CONDBAT value must be greater than or equal to the sum of the connection pool sizes for all applications that connect to Db2 concurrently.

This value must be greater than or equal to the value of the MAXDBAT subsystem parameter. If MAXDBAT is set to zero, CONDBAT is also set to zero. If a request to allocate a new connection to Db2 is received, and the CONDBAT value has been reached or CONDBAT is zero, the connection request is rejected.

**Related tasks**

Setting thread limits for database access threads (Db2 Performance)

### Related reference

MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

CONN QUEUE MAX DEPTH field (MAXCONQN subsystem parameter)

If the number of active in-use DBATs has reached the MAXDBAT threshold, the MAXCONQN subsystem parameter specifies the maximum number of inactive or new connection requests that can be queued waiting for a DBAT to process the request.

### MAX TSO CONNECT field (IDFORE subsystem parameter)

The IDFORE subsystem parameter determines the maximum number of users that can be identified to Db2 from TSO foreground at the same time.

<b>Acceptable values:</b>	1–20000
<b>Default:</b>	50
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IDFORE

Count each of the following items as a separate user:

- Each TSO foreground user that is executing a DSN command.
- Each TSO foreground user that is connected to Db2 through the CAF or RRSAF. This can include QMF users who are running in TSO foreground or user-written CAF or RRSAF applications running in TSO foreground.

When the number of TSO users who are attempting to access Db2 exceeds the number you specify, excess connection requests are rejected. No Db2 subsystem parameter controls the maximum concurrent connections for IMS and CICS. You can control those limits by using IMS and CICS facilities. For the CICS attachment, the maximum number of connections to Db2 by using the resource control table (RCT) TYPE=INIT THRDMAX value.

### MAX BATCH CONNECT field (IDBACK subsystem parameter)

The IDBACK subsystem parameter determines the maximum number of concurrent connections that can be identified to Db2 from batch.

<b>Acceptable values:</b>	1–20000
<b>Default:</b>	50
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IDBACK

**Recommendation:** Use a minimum setting of 30.

Count each of the following items as a separate connection:

- Each Db2 utility.
- Each batch job that uses QMF.
- Each batch job that uses the DSN command processor.
- Each task that is connected to Db2 through the call attachment facility, which runs in batch. Among others, this can include:
  - Batch jobs that use QMF.
  - TCP/IP FTP connections.

- Each RRSAF connection that runs in batch.
- Each WebSphere application server or other application server that uses JDBC or ODBC has multiple connections to Db2. The number of connections is determined by the application server.

Batch job requests to access Db2 that exceed this limit are rejected.

REBUILD INDEX processing uses Db2 connections and might cause message DSNU397I to be issued. If you receive message DSNU397I indicating the REBUILD INDEX utility is constrained, increase the number of concurrent connections.

## MAX KEPT DYN STMTS field (MAXKEEPD subsystem parameter)

The MAXKEEPD subsystem parameter specifies the maximum number of prepared, dynamic SQL statements that are to be saved past the point of commit or rollback. This parameter applies to applications that run with the KEEPDDYNAMIC(YES) bind option.

<b>Acceptable values:</b>	0–204800
<b>Default:</b>	5000
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAXKEEPD

This is a system-wide limit. This parameter does not limit the size of the dynamic cache itself.

When many applications that are bound with KEEPDDYNAMIC(YES) run in a system that has the dynamic statement cache active, they can use a considerable amount of storage in the database services address space (*ssnmDBM1*). This parameter helps limit the amount of storage that these applications use by limiting the total number of prepared statements held by these applications past the point of commit or rollback. If this limit is exceeded, Db2 honors the KEEPDDYNAMIC(YES) behavior, but "implicit" prepares might be necessary to rebuild the executable version of some SQL statements when they are executed after the point of commit or rollback.

If you enter 0, Db2 cannot keep the executable version of dynamic SQL statements past the point of commit or rollback. To retain the KEEPDDYNAMIC(YES) behavior after the point of commit or rollback, Db2 implicitly prepares dynamic SQL statements to rebuild the executable version.

### Related concepts

[Methods for keeping prepared statements after the point of commit or rollback \(Db2 Performance\)](#)

### Related tasks

[Minimizing the use of real and virtual storage \(Db2 Performance\)](#)

### Related reference

[KEEPDDYNAMIC bind option \(Db2 Commands\)](#)

## MAX OPEN FILE REFS field (MAXOFILR subsystem parameter)

The MAXOFILR subsystem parameter specifies the maximum number of data sets that can be open concurrently for the processing of LOB file references.

<b>Acceptable values:</b>	0 to value specified in MAX USERS field
<b>Default:</b>	100
<b>Update:</b>	option 19 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP MAXOFILR

## DSNTIPE1: Thread management panel 2

The entries on the DSNTIPE1 panel determine main storage sizes.

**Updating the parameters:** You can use the UPDATE mode of the CLIST to update any value on this panel.

Figure 24. Thread management panel 2: DSNTIPE1

```
DSNTIPE1 INSTALL DB2 - THREAD MANAGEMENT PANEL 2
===>
Check numbers and reenter to change:
1 MANAGE REAL STORAGE    ===> AUTO      Manage real storage usage (AUTO,OFF,ON)
2 LONG-RUNNING READER    ===> 10      Minutes before read claim warning
3 DATA DEF TIMEOUT       ===> 1        For unavailable resources (-254-254)
4 INDEX CLEANUP THREADS  ===> 10      To remove pseudo empty index pages &
                    pseudo deleted index entries (0-128)

PRESS:  ENTER to continue    RETURN to exit    HELP for more information
```

### MANAGE REAL STORAGE field (REALSTORAGE\_MANAGEMENT subsystem parameter)

The REALSTORAGE\_MANAGEMENT subsystem parameter specifies whether Db2 should manage real storage consumption.

<b>Acceptable values:</b>	AUTO, AUTO1, OFF, ON
<b>Default:</b>	AUTO
<b>Update:</b>	option 20 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REALSTORAGE_MANAGEMENT

#### Important:

Before you apply the PTF for APAR PH47163, Db2 12 always uses the AUTO1 behavior when AUTO is specified. In most cases, it is best to use AUTO1 only if you encounter problems after applying this PTF. Also, in Db2 13 or later, this subsystem parameter is removed, and Db2 always manages real storage automatically.

#### AUTO

Db2 checks the available real storage on the LPAR, and uses the following threshold calculation to determine the storage management behavior to use.

$$(\text{REALAVAIL} > 1.2 * \text{MAXSPACE})$$

REALAVAIL is the amount of currently available real storage on the LPAR, and MAXSPACE is a setting that restricts the virtual storage available to the z/OS DUMPSPRV address space.

Db2 switches behaviors based on the threshold as described in the following table. Db2 issues message DSN5006I when it switches behaviors.

If the amount of available real storage is...	Db2 switches to behavior of the...
Greater than the threshold	<a href="#">OFF</a> setting, and Db2 does not discard unused real storage at thread deallocation or during commit.
Less than or equal to the threshold	<a href="#">AUTO1</a> setting

### AUTO1

Db2 discards thread storage at thread deallocation, or every 120 commits if the thread is reused.

If the available real storage on the LPAR drops below the z/OS Available Frame Queue Low threshold, Db2 enables contraction mode.

In *contraction mode*, Db2 discards every 30 commits. Db2 indicates when it enters contraction mode by issuing console messages DSNV516I and DSNS005I with reason LOW ON AVAILABLE FRAMES. When Db2 leaves contraction mode, it issues message DSNV517I.

### OFF

Db2 does not discard unused real storage frames, unless one of the following conditions is met:

- The LPAR reaches an auxiliary critical state.
- The total real and auxiliary storage reaches the limit specified by the value of the REALSTORAGE\_MAX subsystem parameter.

### ON

Db2 always operates in contraction mode. Discarding the frames results in some CPU overhead, and this option is intended for systems in which the availability of real storage is limited. This value is most likely appropriate for LPARs that have many Db2 subsystems, such as a development LPAR.

### Related tasks

[Calculating real storage requirements](#)

Db2 can use real storage to reduce I/O and processor times and to improve response time and throughput. The amount of real storage that Db2 needs varies greatly.

### Related reference

REALSTORAGE\_MAX in macro DSN6SPRM

Specifies the maximum GB of real and auxiliary storage that Db2 can consume.

### Related information

[DSNV516I \(Db2 Messages\)](#)

[DSNV517I \(Db2 Messages\)](#)

[DSNS005I \(Db2 Messages\)](#)

[DSNS006I \(Db2 Messages\)](#)

## LONG-RUNNING READER field (LRDRTHLD subsystem parameter)

The LRDRTHLD subsystem parameter specifies the number of minutes that an agent is to be allowed to hold a read claim. If a read claim is held longer than allowed, Db2 issues a warning message, DSNB260I, and writes a trace record to report it as a long-running reader.

<b>Acceptable values:</b>	0–1439 minutes
<b>Default:</b>	10
<b>Update:</b>	option 20 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM LRDRTHLD

If you specify a value of 0, Db2 will not report long-running readers.

## Related information

[DSNB260I \(Db2 Messages\)](#)

### DATA DEF TIMEOUT field (DDLTOX subsystem parameter)

The DDLTOX subsystem parameter specifies how long a request for SQL data definition is to wait for a resource before timing out. This parameter is used for the processing of DDL statements and GRANT, REVOKE, and LOCK statements.

<b>Acceptable values:</b>	0–254
<b>Default:</b>	1
<b>Update:</b>	option 20 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DDLTOX

#### 0

Db2 resolves the timeout or deadlock situation by returning an error for data definition, GRANT, REVOKE, and LOCK statements.

#### 1–254

The actual timeout value is the product of the value of this subsystem parameter and the value of the IRLMRWT subsystem parameter. The default value of 1 means that the value of the IRLMRWT subsystem parameter is used as the timeout value.

#### Related reference

[RESOURCE TIMEOUT field \(IRLMRWT subsystem parameter\)](#)

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

### INDEX CLEANUP THREADS field (INDEX\_CLEANUP\_THREADS subsystem parameter)

Specifies the maximum number of threads that can be created to process the cleanup of pseudo-deleted index entries on this subsystem or data sharing member. Pseudo-deleted entries in an index are entries that are logically deleted but still physically present in the index.

<b>Acceptable values:</b>	0–128
<b>Default:</b>	10
<b>Data sharing scope:</b>	Members are not required to use the same setting
<b>Online changeable:</b>	Yes
<b>Update:</b>	option 20 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM INDEX_CLEANUP_THREADS

This parameter works in conjunction with the SYSIBM.SYSINDEXCLEANUP catalog table, which controls cleanup processing of pseudo-deleted index entries.

The default setting is appropriate for most situations. However, a larger setting might be appropriate in cases where large indexed tables or large numbers of indexed tables are constantly modified. A smaller value might be appropriate in cases where thread count is severely constrained.

When INDEX\_CLEANUP\_THREADS is set to 0, no cleanup is performed by the subsystem or data sharing member regardless of the entries in the SYSIBM.SYSINDEXCLEANUP catalog table.

#### Related reference

[SYSINDEXCLEANUP catalog table \(Db2 SQL\)](#)



## DSNTIP1: Buffer pool sizes panel 1

The DSNTIP1 panel is the first of two panels on which you can specify the size of your virtual buffer pools.

### Updating the default buffer pool assignments

You can also change the default buffer pool assignments for user data on this panel. Objects in the catalog and directory always use the following buffer pools, and the assignments cannot be changed: BP0, BP8K0, BP16K0, and BP32K.

It is best to separate the buffer pools for Db2 catalog and directory from the buffer pools for user data to isolate catalog and directory activities. In most cases, choose buffer pools other than the default buffer pools for user data, user indexes, and work files.

For more information about default buffer pool assignments, see [Deciding how many buffer pools to use \(Db2 Performance\)](#).

### Updating the buffer pool sizes

You can change your buffer pool sizes online with the ALTER BUFFERPOOL command, but you cannot change these sizes by running the DSNTINST CLIST in update mode.

**Restriction:** The total amount of storage that is available in all buffer pools cannot exceed 16 TB. The amount of storage that is configured on the subsystem can further limit the buffer pool sizes. If you specify more storage than the total real storage that is available, performance can be impacted.

```
DSNTIP1          INSTALL DB2 - BUFFER POOL SIZES - PANEL 1
===>

Enter 4 KB buffer pool sizes in number of pages.
 1 BP0 ==> 20000          18 BP17 ==> 0           35 BP34 ==> 0
 2 BP1 ==> 0              19 BP18 ==> 0           36 BP35 ==> 0
 3 BP2 ==> 0              20 BP19 ==> 0           37 BP36 ==> 0
 4 BP3 ==> 0              21 BP20 ==> 0           38 BP37 ==> 0
 5 BP4 ==> 0              22 BP21 ==> 0           39 BP38 ==> 0
 6 BP5 ==> 0              23 BP22 ==> 0           40 BP39 ==> 0
 7 BP6 ==> 0              24 BP23 ==> 0           41 BP40 ==> 0
 8 BP7 ==> 0              25 BP24 ==> 0           42 BP41 ==> 0
 9 BP8 ==> 0              26 BP25 ==> 0           43 BP42 ==> 0
10 BP9 ==> 0              27 BP26 ==> 0           44 BP43 ==> 0
11 BP10 ==> 0             28 BP27 ==> 0           45 BP44 ==> 0
12 BP11 ==> 0             29 BP28 ==> 0           46 BP45 ==> 0
13 BP12 ==> 0             30 BP29 ==> 0           47 BP46 ==> 0
14 BP13 ==> 0             31 BP30 ==> 0           48 BP47 ==> 0
15 BP14 ==> 0             32 BP31 ==> 0           49 BP48 ==> 0
16 BP15 ==> 0             33 BP32 ==> 0           50 BP49 ==> 0
17 BP16 ==> 0             34 BP33 ==> 0

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 25. Buffer pool sizes panel 1: DSNTIP1

### Buffer pool sizes fields BP0 - BP49

The values of fields BP0 - BP49 specify the number of 4 KB buffers in each of those virtual buffer pools (BP0 - BP49).

<b>Acceptable values:</b>	BP0: 2000 - 250000000 BP1 - BP49: 0 - 250000000
<b>Default:</b>	BP0: 20000 BP1 - BP49: 0
<b>Update:</b>	ALTER BUFFERPOOL command

<b>DSNZPxxx:</b>	none
------------------	------

### Related tasks

[Assigning database objects to buffer pools \(Db2 Performance\)](#)

[Calculating buffer pool size](#)

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All Db2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

[Monitoring and tuning buffer pools by using online commands \(Db2 Performance\)](#)

### Related reference

[DSNTIP2: Buffer pool sizes panel 2](#)

The DSNTIP2 panel is the second of the two panels that enables you to specify the size of your virtual buffer pools.

[-ALTER BUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

## DSNTIP2: Buffer pool sizes panel 2

The DSNTIP2 panel is the second of the two panels that enables you to specify the size of your virtual buffer pools.

The total size of all buffer pools cannot exceed 16TB.

### Updating the buffer pool sizes

You can change your buffer pool sizes online with the ALTER BUFFERPOOL command. You cannot change these sizes by running the DSNTINST CLIST in update mode.

```

DSNTIP2          INSTALL DB2 - BUFFER POOL SIZES - PANEL 2
===>

Enter 8 KB, 16KB, and 32 KB buffer pool sizes in number of pages.
 1 BP8K0 ==> 2000          11 BP16K0 ==> 500          21 BP32K ==> 250
 2 BP8K1 ==> 0             12 BP16K1 ==> 0             22 BP32K1 ==> 0
 3 BP8K2 ==> 0             13 BP16K2 ==> 0             23 BP32K2 ==> 0
 4 BP8K3 ==> 0             14 BP16K3 ==> 0             24 BP32K3 ==> 0
 5 BP8K4 ==> 0             15 BP16K4 ==> 0             25 BP32K4 ==> 0
 6 BP8K5 ==> 0             16 BP16K5 ==> 0             26 BP32K5 ==> 0
 7 BP8K6 ==> 0             17 BP16K6 ==> 0             27 BP32K6 ==> 0
 8 BP8K7 ==> 0             18 BP16K7 ==> 0             28 BP32K7 ==> 0
 9 BP8K8 ==> 0             19 BP16K8 ==> 0             29 BP32K8 ==> 0
10 BP8K9 ==> 0             20 BP16K9 ==> 0             30 BP32K9 ==> 0

31 DEFAULT 4-KB BUFFER POOL FOR USER DATA ==> BP1          BP0 - BP49
32 DEFAULT 8-KB BUFFER POOL FOR USER DATA ==> BP8K0        BP8K0 - BP8K9
33 DEFAULT 16-KB BUFFER POOL FOR USER DATA ==> BP16K0       BP16K0 - BP16K9
34 DEFAULT 32-KB BUFFER POOL FOR USER DATA ==> BP32K        BP32K - BP32K9
35 DEFAULT BUFFER POOL FOR USER LOB DATA ==> BP0           BP0 - BP32K9
36 DEFAULT BUFFER POOL FOR USER XML DATA ==> BP16K0        BP16K0 - BP16K9
37 DEFAULT BUFFER POOL FOR USER INDEXES ==> BP0             BP0 - BP32K9
PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 26. Buffer pool sizes panel 2: DSNTIP2

### Related tasks

[Deciding how many buffer pools to use \(Db2 Performance\)](#)

[Calculating buffer pool size](#)

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All Db2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

[Monitoring and tuning buffer pools by using online commands \(Db2 Performance\)](#)

### Related reference

[DSNTIP1: Buffer pool sizes panel 1](#)

The DSNTIP1 panel is the first of two panels on which you can specify the size of your virtual buffer pools.  
[-ALTER BUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

## BP8K0–BP32K9 fields for buffer pool sizes fields

The values of fields BP8K0–BP32K9 specify the number of buffers in each of those virtual buffer pools.

<b>Acceptable values:</b>	BP8K0–BP8K9: 0–125000000 BP16K0–BP16K9: 0–62500000 BP32K: 250–31250000 BP32K1–BP32K9: 0–31250000
<b>Default:</b>	BP8K0: 2000 BP16K0: 500 BP32K: 250 All others: 0
<b>Update:</b>	ALTER BUFFERPOOL command
<b>DSNZPxxx:</b>	none

**Restriction:** The sum of the storage that is available in all buffer pools cannot exceed 16 TB. The amount of storage that is configured on the subsystem can further limit the buffer pool sizes.

### Related tasks

[Calculating buffer pool size](#)

*Buffer pools* are areas of virtual storage that are used to satisfy the buffering requirements for one or more table spaces or indexes. All Db2 subsystems use virtual buffer pools, which are backed by central storage or auxiliary storage. Buffer pools are created above the 2 GB bar.

[Deciding how many buffer pools to use \(Db2 Performance\)](#)

## DEFAULT 4-KB BUFFER POOL FOR USER DATA field (TBSBPOOL subsystem parameter)

The TBSBPOOL subsystem parameter specifies the default buffer pool to use for 4 KB page size table spaces that are created implicitly.

<b>Acceptable values:</b>	Any 4 KB buffer pool names
<b>Default:</b>	BPO
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBPOOL

If you do not specify a buffer pool name, Db2 uses the TBSBPOOL value as the default buffer pool for 4 KB page size table spaces. Db2 uses the value differently for the following statements:

### CREATE DATABASE

Db2 uses the TBSBPOOL value.

### CREATE TABLE

If you do not specify a table space name, Db2 implicitly creates a table space and selects the buffer pool as described in [Implicitly defined table spaces \(Db2 Administration Guide\)](#).

### Related concepts

[How SQL statements are invoked \(Db2 SQL\)](#)

## DEFAULT 8-KB BUFFER POOL FOR USER DATA field (TBSBP8K subsystem parameter)

The TBSBP8K subsystem parameter specifies the default buffer pool to use for 8 KB page size table spaces that are created implicitly.

<b>Acceptable values:</b>	Any 8 KB buffer pool names
<b>Default:</b>	BP8K0
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBP8K

If you do not specify a buffer pool name, Db2 uses the TBSBP8K value as the default buffer pool for 8 KB page size table spaces. If you do not specify a table space name for a CREATE TABLE statement, Db2 implicitly creates a table space and selects the buffer pool as described in [Implicitly defined table spaces \(Db2 Administration Guide\)](#).

## DEFAULT 16-KB BUFFER POOL FOR USER DATA field (TBSBP16K subsystem parameter)

The TBSBP16K subsystem parameter specifies the default buffer pool to use for 16 KB page size table spaces that are created implicitly.

<b>Acceptable values:</b>	Any 16 KB buffer pool names
<b>Default:</b>	BP16K0
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBP16K

If you do not specify a buffer pool name, Db2 uses the TBSBP16K value as the default buffer pool for 16 KB page size table spaces. If you do not specify a table space name for a CREATE TABLE statement, Db2 implicitly creates a table space and selects the buffer pool as described in [Implicitly defined table spaces \(Db2 Administration Guide\)](#).

## DEFAULT 32-KB BUFFER POOL FOR USER DATA field (TBSBP32K subsystem parameter)

The TBSBP32K subsystem parameter specifies the default buffer pool to use for 32 KB page size table spaces that are created implicitly.

<b>Acceptable values:</b>	Any 32 KB buffer pool names
<b>Default:</b>	BP32K
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBP32K

If you do not specify a buffer pool name, Db2 uses the TBSBP32K value as the default buffer pool for 32 KB page size table spaces. If you do not specify a table space name for a CREATE TABLE statement, Db2 implicitly creates a table space and selects the buffer pool as described in [Implicitly defined table spaces \(Db2 Administration Guide\)](#).

## DEFAULT BUFFER POOL FOR USER LOB DATA field (TBSBPLOB subsystem parameter)

The TBSBPLOB subsystem parameter specifies the default buffer pool that is to be used for LOB table spaces that are created implicitly. This parameter also applies to LOB tables spaces that are created explicitly without the BUFFERPOOL clause.

<b>Acceptable values:</b>	Any 4 KB, 8 KB, 16 KB, or 32 KB buffer pool names
<b>Default:</b>	BP0
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBPLOB

USE privilege is required on the specified buffer pool to use it by default.

### Related concepts

[How SQL statements are invoked \(Db2 SQL\)](#)

## DEFAULT BUFFER POOL FOR USER XML DATA field (TBSBPXML subsystem parameter)

The TBSBPXML subsystem parameter specifies the default buffer pool that is to be used for XML table spaces that are created implicitly.

<b>Acceptable values:</b>	Any 16 KB buffer pool name
<b>Default:</b>	BP16K0
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TBSBPXML

USE privilege is required on the specified buffer pool to use it by default.

### Related concepts

[How SQL statements are invoked \(Db2 SQL\)](#)

## DEFAULT BUFFER POOL FOR USER INDEXES field (IDXBPOOL subsystem parameter)

The IDXBPOOL subsystem parameter identifies the default buffer pool that is to be used for indexes on user data.

Db2 uses the IDXBPOOL value if a value for INDEXBP is not specified on a CREATE DATABASE statement. Db2 does not use this value for a CREATE INDEX statement without the BUFFERPOOL option. In that case, Db2 uses the default index buffer pool for the database.

<b>Acceptable values:</b>	Any 4-KB, 8-KB, 16-KB, or 32-KB buffer pool names
<b>Default:</b>	BP0
<b>Update:</b>	option 21 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IDXBPOOL

## DSNTIPN: Tracing parameters panel

The entries on the DSNTIPN panel affect the audit, global, accounting, and monitor traces and the checkpoint frequency.

### Scrollable fields

The limited space on this panel means that some input fields are not wide enough to display the entire contents of the field at one time. These fields are defined as ISPF scrollable fields, which lets you see the field contents. A > indicates a field that can be scrolled to the right, and a < indicates a field that can be scrolled to the left.

To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter. (You can also assign your PF keys to be the LEFT, RIGHT, and EXPAND commands.)

```
DSNTIPN          INSTALL DB2 - TRACING PARAMETERS
====>

Enter data below:

  1 AUDIT TRACE      ==> NO      > Audit classes to start. NO,YES,list
  2 TRACE AUTO START ==> NO      > Global classes to start. YES,NO,list
  3 TRACE SIZE      ==> 64K      Trace table size in bytes. 4K-396K
  4 SMF ACCOUNTING  ==> 1,2,3,7, > Accounting classes to start. NO,YES,list
  5 SMF STATISTICS  ==> YES      > Statistics classes to start. NO,YES,list
  6 MAIN STATS TIME ==> 60      Time interval: 5, 10, ..., 60 seconds
  7 DDF STATS TIME  ==> 0      Time interval: 0, 5, ..., 300 seconds
  8 STATISTICS TIME ==> 1      Time interval in minutes. 1-60
  9 STATISTICS SYNC ==> NO      Synchronization within the hour. NO,0-59
 10 DATASET STATS TIME==> 5      Time interval in minutes. 1-60
 11 MONITOR TRACE   ==> NO      > Monitor classes to start. NO,YES,list
 12 MONITOR SIZE    ==> 1M      Default monitor buffer size. 1M-64M
 13 UNICODE IFCIDS  ==> NO      Include UNICODE data when writing IFCIDS
 14 DDF/RRSAF ACCUM ==> 10      Rollup accting for DDF/RRSAF. NO,2-65535
 15 AGGREGATION FIELDS==> 0      Rollup accting aggregation fields, 0-17
 16 COMPRESS SMF RECS ==> OFF    Compress trace records destined for SMF

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 27. Tracing panel: DSNTIPN

### Related concepts

[Db2 audit trace \(Managing Security\)](#)

## AUDIT TRACE field (AUDITST subsystem parameter)

The AUDITST parameter controls whether the audit trace is to start automatically when Db2 is started. You can specify the classes for which the audit trace is to start.

<b>Acceptable values:</b>	NO, YES, <i>list of classes</i> , * (asterisk)
<b>Default:</b>	NO
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP AUDITST
<b>Security parameter:</b>	<a href="#">Security-related</a>

The AUDIT TRACE field is scrollable. To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter.

### NO

Audit trace is not started automatically. If the audit trace is to be used, it must be started with the START TRACE command. NO is the default value.

**YES**

The trace for audit class 1 starts whenever Db2 is started.

***list of classes***

The audit trace for the specified classes starts whenever Db2 is started. To specify classes, list the numbers (any integer in the range 1–32) separated by commas. For a list of defined audit classes, see [Db2 audit trace \(Managing Security\)](#).

**\* (asterisk)**

The audit trace starts for all classes whenever Db2 is started.

**Note:** This is a security-related parameter. Audit traces should be enabled to collect information about Db2 security controls to ensure that data access is allowed only for authorized users.

**Recommendation:** Either AUDITST or audit policies should be enabled at Db2 startup.

**Related concepts**

[Db2 audit trace \(Managing Security\)](#)

**TRACE AUTO START field (TRACSTR subsystem parameter)**

The TRACSTR subsystem parameter specifies whether the global trace is to start automatically when Db2 is started. This parameter also specifies the classes for which the global trace is to automatically start.

**Deprecated subsystem parameter:** Non-default settings for TRACSTR are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value NO.

<b>Acceptable values:</b>	YES, NO, <i>list of classes</i> , an asterisk (*)
<b>Default:</b>	NO
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TRACSTR

The TRACE AUTO START field is scrollable. To scroll the field, position your cursor in the field and use the LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter.

**YES**

Starts the global trace for the default classes (classes 1, 2, and 3) whenever Db2 is started, and it performs additional data consistency checks whenever a data or index is modified.

**NO**

Specifies no automatic start of the global trace. If the global trace is to be used, it must be started with a special START TRACE command.

***list of classes***

Starts the global trace for the specified classes. Enter a list of class numbers (any integer 1–32) separated by commas. Only classes 1–9 are defined by Db2.

**asterisk (\*)**

Starts global trace for all classes.

The global trace is used to diagnose problems in Db2. Users with production systems that require high performance might consider turning off global trace. However, be aware that turning off global trace presents a serviceability exposure. In the event of a system failure, IBM Support might request that you turn on global trace and attempt to re-create the problem.

**Related concepts**

[Db2 audit trace \(Managing Security\)](#)

**Related tasks**

[Minimizing the processing cost of Db2 traces \(Db2 Performance\)](#)

## TRACE SIZE field (TRACTBL subsystem parameter)

The TRACTBL subsystem parameter specifies the size, in bytes, of the RES trace table. This table is the default destination for the global trace records in Db2. Most trace records require 32 byte entries. Events with more than three data items require 64 byte entries.

<b>Acceptable values:</b>	4K to 396K
<b>Default:</b>	64K
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP TRACTBL

You can use the abbreviation K for multiples of 1024 bytes. The actual value is rounded up to a multiple of 4. If you use 50K, for example, the actual table size is 52 KB.

In the subsystem parameter, use a multiple of 4. For example, to get a 64 KB table, code TRACTBL=16.

### Related concepts

[Db2 audit trace \(Managing Security\)](#)

## SMF ACCOUNTING field (SMFACCT subsystem parameter)

The SMFACCT subsystem parameter specifies whether Db2 sends accounting data to SMF automatically when Db2 is started. This parameter also specifies which classes are sent.

<b>Acceptable values:</b>	<i>list-of-classes</i> , NO, YES, * (asterisk)
<b>Default:</b>	1,2,3,7,8
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP SMFACCT

The SMF ACCOUNTING field is scrollable. To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter.

### 1,2,3,7,8

The specified classes are started. This *list-of-classes* value is the default value for SMFACCT subsystem parameter.

### *list-of-classes*

Starts the specified classes. Enter a list of class numbers (any integer in the range 1–32), separated by commas. For a list of accounting classes that are defined by Db2, see [Accounting trace \(Db2 Performance\)](#).

### NO

Specifies no automatic start of classes.

### YES

Specifies that the trace for accounting class 1 is started. You might also need to update the SMFPRMxx member of SYS1.PARMLIB to permit SMF to write the records.

### *list of classes*

Starts the specified classes. Enter a list of class numbers (any integer from 1–32), separated by commas. Only classes 1–5, 7, 8, and 10 are defined by Db2.

### \* (asterisk)

Starts all classes.

### Related tasks

[Installation step 9: Record Db2 data to SMF \(optional\)](#)



When you install Db2, you can specify whether Db2 statistical, accounting, and audit trace data is to be collected.

## SMF STATISTICS field (SMFSTAT subsystem parameter)

The SMFSTAT subsystem parameter specifies whether Db2 is to send statistical data to SMF automatically when Db2 is started. This parameter also specifies which classes are sent.

<b>Acceptable values:</b>	YES, NO, <i>list-of-classes</i> , an asterisk (*)
<b>Default:</b>	YES
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP SMFSTAT

The SMF STATISTICS field is scrollable. To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter.

### YES

Starts the trace for the classes 1, 3, 4, 5, and 6. You might also need to update the SMFPRMxx member of SYS1.PARMLIB to permit SMF to write the records. Yes is the default value for the SMFSTAT subsystem parameter. YES is the default value.

### NO

Specifies no automatic start.

### *list-of-classes*

Starts the specified classes. Enter a list of class numbers (any integer in the range 1–29), separated by commas. For a list of classes that are defined by Db2, see [Statistics trace \(Db2 Performance\)](#).

### asterisk (\*)

Starts all classes.

### Related tasks

[Installation step 9: Record Db2 data to SMF \(optional\)](#)

When you install Db2, you can specify whether Db2 statistical, accounting, and audit trace data is to be collected.

[Monitoring concurrency and locks \(Db2 Performance\)](#)

## MAIN STATS TIME field (STATIME\_MAIN subsystem parameter)

The STATIME\_MAIN subsystem parameter specifies the time interval in seconds, for collection of interval-driven statistics not collected at the interval specified by the STATIME or STATIME\_DDF subsystem parameters.

<b>Acceptable values:</b>	5–60 (multiples of 5) seconds
<b>Default:</b>	60
<b>Update:</b>	option 23 on panel DSNTIPB
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP STATIME_MAIN

### 5–60 (multiples of 5)

The interval in seconds for writing statistics records for the following IFCIDs:

- 1 (System statistics)
- 2 (Db2 statistics)

- 202 (Buffer Pool Attributes)
- 225 (Storage statistics)
- 230 (Group Buffer Pool Attributes)
- 254 (Coupling Facility Cache statistics)
- 369 (Wait and CPU time aggregated by connection type)

When STATIME\_DDF = 0, STATIME\_MAIN will also control:

- 411 (Remote application statistics based on CURRENT CLIENT\_APPLNAME)
- 412 (Remote user statistics based on CURRENT CLIENT\_USERID)

**Tip:** IFCID numbers are often presented in Db2 and its documentation with three or four digits and leading zeros. For example, you might find: "IFCID 1," "IFCID 001," or "IFCID 0001." However, you can assume that these references each have the same meaning.

The statistics records are written at approximately the end of the specified interval.

#### Related reference

[STATISTICS TIME field \(STATIME subsystem parameter\)](#)

The STATIME subsystem parameter specifies the time interval in minutes for collection of certain statistics trace records.

### DDF STATS TIME field (STATIME\_DDF subsystem parameter)

The STATIME\_DDF subsystem parameter specifies the time interval in seconds, for the collection of interval-driven DDF location statistics.

<b>Acceptable values:</b>	0–300 (multiples of 5) seconds
<b>Default:</b>	0
<b>Update:</b>	option 23 on panel DSNTIPB
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP STATIME_DDF

#### 0

The subsystem parameter is ignored and STATIME and STATIME\_MAIN are used for the following IFCIDs:

- 411 (Remote application statistics based on CURRENT CLIENT\_APPLNAME) and 412 (Remote user statistics based on CURRENT CLIENT\_USERID) use STATIME\_MAIN.
- 365 (Remote location statistics) uses STATIME\_MAIN when Db2ZAI is running and STATIME otherwise.

#### 5–300 (multiples of 5)

The interval in seconds for writing statistics records for the following IFCIDs:

- 365 (Remote location statistics)
- 411 (Remote application statistics based on CURRENT CLIENT\_APPLNAME)
- 412 (Remote user statistics based on CURRENT CLIENT\_USERID)

**Tip:** IFCID numbers are often presented in Db2 and its documentation with three or four digits and leading zeros. For example, you might find: "IFCID 1," "IFCID 001," or "IFCID 0001." However, you can assume that these references each have the same meaning.

The statistics records are written at approximately the end of the specified interval.

### Related reference

[STATISTICS TIME field \(STATIME subsystem parameter\)](#)

The STATIME subsystem parameter specifies the time interval in minutes for collection of certain statistics trace records.

## STATISTICS TIME field (STATIME subsystem parameter)

The STATIME subsystem parameter specifies the time interval in minutes for collection of certain statistics trace records.

<b>Acceptable values:</b>	1–60 (minutes)
<b>Default:</b>	1
<b>Update:</b>	option 23 on panel DSNTIPB
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP STATIME

### 1–60

The interval in minutes for writing statistics records for the following IFCIDs:

- 105 (Db2 performance trace)
- 106 (system parameters)
- 199 (data set statistics)
- 402 (monitor profile warnings or exceptions)

When STATIME\_DDF=0, STATIME will also control 365 (Remote location statistics) if Db2ZAI DCC is not running.

**Tip:** IFCID numbers are often presented in Db2 and its documentation with three or four digits and leading zeros. For example, you might find: "IFCID 1," "IFCID 001," or "IFCID 0001." However, you can assume that these references each have the same meaning.

The statistics records are written at approximately the end of the specified interval.

Other interval-driven statistics trace records are controlled by the STATIME\_MAIN subsystem parameter and the STATIME\_DDF subsystem parameter.

### Related reference

[MAIN STATS TIME field \(STATIME\\_MAIN subsystem parameter\)](#)

The STATIME\_MAIN subsystem parameter specifies the time interval in seconds, for collection of interval-driven statistics not collected at the interval specified by the STATIME or STATIME\_DDF subsystem parameters.

[DDF STATS TIME field \(STATIME\\_DDF subsystem parameter\)](#)

The STATIME\_DDF subsystem parameter specifies the time interval in seconds, for the collection of interval-driven DDF location statistics.

[STATISTICS SYNC field \(SYNCVAL subsystem parameter\)](#)

The SYNCVAL subsystem parameter specifies whether to synchronize recording of the Db2 statistics trace records that the STATIME subsystem parameter controls with a specific part of the hour, such as 15 minutes past the hour.

### STATISTICS SYNC field (SYNCVAL subsystem parameter)

The SYNCVAL subsystem parameter specifies whether to synchronize recording of the Db2 statistics trace records that the STATIME subsystem parameter controls with a specific part of the hour, such as 15 minutes past the hour.

<b>Acceptable values:</b>	NO, 0–59
<b>Default:</b>	NO
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP SYNCVAL

#### NO

Specifies that statistics recording is not synchronized. NO is the default.

#### 0–59

Db2 statistics recording interval is synchronized with the beginning of the hour (0 minutes past the hour) or with any number of minutes past the hour up to 59, for the following IFCIDs:

- 105 (Db2 performance trace)
- 106 (system parameters)
- 199 (data set statistics)
- 402 (monitor profile warnings or exceptions)

#### Example

You want the Db2 statistics recording interval to have a length of 15 minutes and to be synchronized with 15 minutes past the hour. Thus, Db2 statistics are recorded at 15, 30, 45, and 60 minutes past the hour. To establish this interval, you would specify the following:

```
STATIME=15
SYNCVAL=15
```

#### Related reference

[STATISTICS TIME field \(STATIME subsystem parameter\)](#)

The STATIME subsystem parameter specifies the time interval in minutes for collection of certain statistics trace records.

### DATASET STATS TIME field (DSSTIME subsystem parameter)

The DSSTIME subsystem parameter specifies the time interval, in minutes, that is to occur between the resetting of data set statistics for online performance monitors.

<b>Acceptable values:</b>	1–60
<b>Default:</b>	5
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP DSSTIME

Online performance monitors can request Db2 data set statistics for the current interval with an IFI READS request for IFCID 0199.

## MONITOR TRACE field (MON subsystem parameter)

The MON subsystem parameter specifies whether the monitor trace is to start automatically when Db2 is started. The trace can be started for all classes, a default class, or a specified list of classes.

<b>Acceptable values:</b>	NO, YES, <i>list of classes</i> , an asterisk (*)
<b>Default:</b>	NO
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP MON

The MONITOR TRACE field is scrollable. To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter.

### NO

Specifies no automatic start.

### YES

Starts the trace for the monitor class 1 whenever Db2 is started.

### *list-of-classes*

Start the trace automatically for the specified classes. Enter a list of class numbers in the range 1–32, separated by commas. For a list of monitor classes that are defined by Db2, see [Monitor trace \(Db2 Performance\)](#).

### asterisk (\*)

Starts the trace automatically for all classes.

### Related concepts

[Monitor trace \(Db2 Performance\)](#)

## MONITOR SIZE field (MONSIZE subsystem parameter)

The MONSIZE subsystem parameter determines the default buffer size that is to be used for monitor traces when data is sent to monitor destinations.

<b>Acceptable values:</b>	1048576–67108864
<b>Default:</b>	1048576
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP MONSIZE

You can enter the value in bytes (for example, 4194304) or use the abbreviation K for kilobytes (for example, 4096K) or M for megabytes (for example, 4M).

## UNICODE IFCIDS field (UIFCIDS subsystem parameter)

The UIFCIDS subsystem parameter specifies whether output from IFC records is to include Unicode information.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP UIFCIDS

Only a subset of the character fields are encoded in Unicode. These fields are identified in the IFCID record definition by a %U in the comment area to the right of the field declaration in the DSNDAQWxx copy files. The remaining fields maintain the same encoding of previous releases.

## DDF/RRSAF ACCUM field (ACCUMACC subsystem parameter)

The ACCUMACC parameter determines whether Db2 accounting data is to be accumulated by the user for DDF and RRSFAF threads.

<b>Acceptable values:</b>	NO, 2–65535
<b>Default:</b>	10
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP ACCUMACC

### NO

Db2 writes an accounting record when a DDF thread is made inactive or when sign-on processing occurs for an RRSFAF thread.

### *integer*

Db2 uses the same processing to collect and reset accounting information as when NO is specified. However, Db2 writes an accounting record after every *integer* transactions for a given user identifier. Records that are written after every *integer* transactions for a given user identifier are known as *rollup records*. For most fields in a rollup record, the field values are the sums of the corresponding values in the individual accounting records.

*integer* is in the range 2–65535.

A user identifier is a concatenation of one or more values, which can include the user ID, application name or transaction name, and workstation name. Those values are set by DDF threads, or by RRSFAF threads through the RRSFAF SIGNON, AUTH SIGNON, and CONTEXT SIGNON functions. The possible concatenations are described in [“AGGREGATION FIELDS field \(ACCUMUID subsystem parameter\)” on page 180](#).

An accounting record might be written prior to the completion of *integer* accounting intervals for a given user in the following cases:

- An internal storage threshold is reached for the accounting rollup blocks.
- Db2 has not rolled data into an internal block in approximately 10 minutes.

### Related concepts

[Accounting trace \(Db2 Performance\)](#)

### Related tasks

[Minimizing the volume of Db2 trace data \(Db2 Performance\)](#)

[Minimizing the processing cost of Db2 traces \(Db2 Performance\)](#)

[Monitoring for performance exceptions \(Db2 Performance\)](#)

### Related reference

[AGGREGATION FIELDS field \(ACCUMUID subsystem parameter\)](#)

The ACCUMUID subsystem parameter determines the aggregation fields that are to be used for DDF and RRSFAF accounting rollup.

## AGGREGATION FIELDS field (ACCUMUID subsystem parameter)

The ACCUMUID subsystem parameter determines the aggregation fields that are to be used for DDF and RRSFAF accounting rollup.

<b>Acceptable values:</b>	0–17
<b>Default:</b>	0

<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP ACCUMUID

The values are defined in the following table.

*Table 23. Values for the aggregation fields that are used for DDF and RRSAP accounting rollup*

<b>Value</b>	<b>Rollup criteria</b>	<b>String of X'00' or string of X'40' considered for rollup?</b>
0	User ID, application name or transaction name, and workstation name	Yes <sup>"1"</sup> on page 181
1	User ID	No
2	User application name or transaction name	No
3	User workstation name	No
4	User ID and application name or transaction name	Yes <sup>"1"</sup> on page 181
5	User ID and workstation name	Yes <sup>"1"</sup> on page 181
6	User application name or transaction name and workstation name	Yes <sup>"1"</sup> on page 181
7	User ID, application name or transaction name, and workstation name	No
8	User ID and application name or transaction name	No
9	User ID and workstation name	No
10	User application name or transaction name and workstation name	No
11	User ID, application name or transaction name, and workstation name	Yes
12	User ID	Yes
13	User application name or transaction name	Yes
14	User workstation name	Yes
15	User ID and application name or transaction name	Yes
16	User ID and workstation name	Yes
17	User application name or transaction name and workstation name	Yes

**Note:**

1. At least one value in the set of criteria must have a value other than a string of X'00's or a string of X'40's.

For example, if a thread has the user ID set to a string of X'00' and the workstation name set to myws, the thread qualifies for rollup if ACCUMUID is set to 5, but not if ACCUMUID is set to 9.

Assume that ACCUMUID is set to 5. The threads in the following table all qualify for rollup.

*Table 24. Values for user ID and workstation name*

<b>User ID</b>	<b>Workstation name</b>
myuser	myws

Table 24. Values for user ID and workstation name (continued)

User ID	Workstation name
myuser	A string of X'40'
A string of X'40'	myws
myuser	A string of X'00'
A string of X'00'	myws

The thread with user ID set to myuser and workstation name set to a string of X'40' and the thread with user ID set to myuser and workstation name set to a string of X'00' are included in the same rollup record. The thread with user ID set to a string of X'40' and workstation name set to myws and the thread with user ID set to a string of X'00' and workstation name set to myws are included in the same rollup record.

Db2 writes individual accounting threads for threads that do not meet the criteria for rollup.

The value of ACCUMUID is ignored if the value of ACCUMACC is set to NO.

### Related concepts

[Accounting trace \(Db2 Performance\)](#)

### Related tasks

[Minimizing the volume of Db2 trace data \(Db2 Performance\)](#)

[Minimizing the processing cost of Db2 traces \(Db2 Performance\)](#)

[Monitoring for performance exceptions \(Db2 Performance\)](#)

## COMPRESS SMF RECS field (SMFCOMP subsystem parameter)

The SMFCOMP subsystem parameter specifies whether Db2 is to compress trace records that are to be written to SMF.

<b>Acceptable values:</b>	OFF, ON
<b>Default:</b>	OFF
<b>Update:</b>	option 23 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP SMFCOMP

### OFF

SMF trace records are not compressed.

### ON

Trace records that are to be written to SMF are compressed. The z/OS compression service CSRCSRVC compresses everything after the SMF header (SM100END, SM101END, or SM102END). See SM100, SM101, and SM102 for compression flags and the uncompressed size of compressed data.



## DSNTIPO: Operator functions panel

The entries on the DSNTIPO panel affect various operator functions. These functions include write-to-operator route codes, automatic recall, and the maximum amount of CPU time that is to be allocated for a dynamic SQL statement.

```

DSNTIPO          INSTALL DB2 - OPERATOR FUNCTIONS
====>

Enter data below:

  1 WTO ROUTE CODES      ==> 1                               >
                               Routing codes for WTORs
  2 RECALL DATABASE     ==> YES                             Use DFHSM automatic recall. YES or NO
  3 RECALL DELAY        ==> 120                             Seconds to wait for automatic recall
  4 AUTO BIND           ==> YES                             Use automatic bind. YES, NO, or COEXIST
  5 EXPLAIN PROCESSING ==> YES                             Explain allowed on auto bind? YES or NO
  6 SITE TYPE           ==> LOCALSITE LOCALSITE OR RECOVERYSITE
  7 TRACKER SITE        ==> NO                               Tracker DB2 system. NO or YES
  8 READ COPY2 ARCHIVE ==> NO                               Read COPY2 archives first. NO or YES
  9 PROFILE AUTOSTART   ==> NO                               Auto start profile manager: NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 28. Operator functions panel: DSNTIPO

### WTO ROUTE CODES field (ROUTCDE subsystem parameter)

The ROUTCDE subsystem parameter specifies the z/OS console routing codes that are to be assigned to messages that are not solicited from a specific console.

<b>Acceptable values:</b>	1–16 route codes. Specify at least one code. Separate multiple codes by commas only, with no blanks; for example: 1,3,5,7,9,10,11.
<b>Default:</b>	1
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP ROUTCDE

#### Related reference

[Routing Codes \(MVS System Messages\)](#)

[Routing the Message \(z/OS MVS Assembler Services Guide\)](#)

### RECALL DATABASE field (RECALL subsystem parameter)

The RECALL subsystem parameter controls whether DFSMSshm automatic recall is to be performed for Db2 databases.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RECALL

#### YES

Indicates that DFSMSshm is invoked to automatically recall migrated table spaces.

#### NO

Indicates that a Db2 table space that has been migrated is considered to be an unavailable resource. It must be recalled explicitly before Db2 can use it.

## RECALL DELAY field (RECALLD subsystem parameter)

The RECALLD subsystem parameter specifies the maximum length of time, in seconds, that a program can be delayed for a DFSMSHsm recall.

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	120
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RECALLD

If the recall is not completed within the specified number of seconds, the program receives an error message indicating that the set is unavailable, but that a recall was initiated. If you use 0 and the RECALL DATABASE field is YES, the recall is performed asynchronously. This field is ignored if the RECALL DATABASE field is NO.

The RECALL DELAY option is not used when running a Db2 utility against a Db2-migrated data set.

## AUTO BIND field (ABIND subsystem parameter)

The ABIND subsystem parameter specifies whether Db2 automatically rebinds packages and plans in certain situations at run time.

<b>Acceptable values:</b>	YES, NO, COEXIST
<b>Default:</b>	YES
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ABIND

Automatic rebinds can improve the availability and administration of packages and plans, by reducing the need for explicit rebinds. However, automatic binds can also harm performance because they require access to the Db2 catalog and directory, resource contention might cause them to fail, and they might result in access path regressions.

**Tip:** For best results enable automatic binds by specifying COEXIST in data-sharing environments and YES in non-data-sharing environments, but also take action to avoid migration-related automatic binds. For details, see [“Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12”](#) on page 487.

**Important:** Apply APAR PI87675 to remove the possibility of repeating automatic remigration binds.

### COEXIST or YES

Db2 automatically rebinds packages or plans at run time in the following conditions:

- A package that is marked invalid runs (VALID='N' in the SYSIBM.SYSPACKAGE catalog table).
- A package that was last bound in a release earlier than DB2 10 runs in Db2 12.
- In release coexistence or fallback, a package or plan that was last bound on Db2 12 runs again on Db2 11. After the automatic bind, the package or plan continues to run without automatic binds, even if it runs again on Db2 12. Packages and plans continue to run on Db2 12 as bound on Db2 11. The plan or package does not use any new features that Db2 12 introduces.

### NO

Specifies that no automatic binds occur. If any of the following conditions are true when a package attempts to run, Db2 issues SQLCODE -908 SQLSTATE 23510, unless you explicitly rebind the package:

- A package is marked invalid (VALID='N' in the SYSIBM.SYSPACKAGE catalog table).
- A package that was last bound (explicitly or automatically) in Db2 12 attempts to run on Db2 11.

## Related concepts

Automatic binds in coexistence

Changes to package structures that are introduced in Db2 12 are not available to members of the group that have not migrated. You must plan accordingly when developing your migration plan.

[Changes that invalidate packages \(Db2 Application programming and SQL\)](#)

## EXPLAIN PROCESSING field (ABEXP subsystem parameter)

The ABEXP subsystem parameter controls whether EXPLAIN processing is to occur during an automatic rebind.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ABEXP

### YES

EXPLAIN processing occurs during the automatic rebind of a plan or package when the bind option EXPLAIN(YES) is specified. If the PLAN\_TABLE does not exist, the automatic rebind continues, but generates no EXPLAIN output. EXPLAIN processing does not occur during the automatic rebind of plans or packages with the bind option EXPLAIN(NO).

### NO

EXPLAIN processing does not occur during the automatic rebind of a plan or package.

## SITE TYPE field (SITETYP subsystem parameter)

The SITETYP subsystem parameter specifies whether the current system is at a local site or a recovery site.

<b>Acceptable values:</b>	LOCALSITE, RECOVERYSITE
<b>Default:</b>	LOCALSITE
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SITETYP

### LOCALSITE

Specifies that the current system is at the site where the multiple image copies are made and are operational.

### RECOVERYSITE

Specifies that the current system is at the site that is named as an alternative for recovery purposes.

The RECOVER utility uses this value to determine what site the current system is on. It then recovers everything from the copies of data that are registered at that site. The RECOVER and MERGECOPY utilities use this value to determine whether COPYDDN or RECOVERDDN is allowed with NEWCOPY NO.

## TRACKER SITE field (TRKRSITE subsystem parameter)

The value of the TRKRSITE subsystem parameter indicates whether the subsystem that is being installed is to be used as a remote tracker site. A remote tracker site is used by another Db2 subsystem in case of a disaster.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 24 on panel DSNTIPB

<b>DSNZPxxx:</b>	DSN6SPRM TRKRSITE
------------------	-------------------

**Related tasks**

[Recovering from disasters by using a tracker site \(Db2 Administration Guide\)](#)

**READ COPY2 ARCHIVE field (ARC2FRST subsystem parameter)**

The ARC2FRST subsystem parameter determines whether COPY2 archives are to be read first when the Db2 subsystem is started.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP ARC2FRST

**PROFILE AUTOSTART field (PROFILE\_AUTOSTART subsystem parameter)**

The PROFILE\_AUTOSTART subsystem parameter specifies whether START PROFILE command processing is automatically initiated as part of Db2 start processing.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Online changeable:</b>	no
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP PROFILE_AUTOSTART

**NO**

Profile remain inactive after Db2 is started until a START PROFILE command is issued. NO is the default value.

**YES**

A START PROFILE command is issued as part of Db2 start processing. The rules specified in profiles become effective immediately at the end of the start process.

This value is ignored for START DB2 commands that specify ACCESS(MAINT) or LIGHT(YES).

**Related tasks**

[Starting and stopping profiles \(Db2 Administration Guide\)](#)

[Monitoring and controlling Db2 by using profile tables \(Db2 Administration Guide\)](#)

**Related reference**

[-START PROFILE command \(Db2\) \(Db2 Commands\)](#)

[Profile tables \(Db2 Performance\)](#)

## DSNTIPO3: Default startup modules panel

The DSNTIPO3 panel enables you to specify the default member names of certain modules that are to be loaded at Db2 startup. These modules are the subsystem parameter module, the application defaults module, and the exit modules.

```
DSNTIPO3      INSTALL DB2 - DEFAULT STARTUP MODULES
====> _

Enter data below:

 1 PARAMETER MODULE      ==> DSNZPARM   DB2 subsystem parameter module name
 2 APPL DEFAULTS        ==> DSNHDECP   Application defaults module name
 3 ACCESS CONTROL       ==> DSNX@XAC   Access Control Exit module name
 4 IDENTIFY/AUTH        ==> DSN3@ATH   Identify/Authorization Exit module name
 5 SIGNON               ==> DSN3@SGN   Signon Exit module name

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 29. Default startup modules panel: DSNTIPO3

### PARAMETER MODULE field

The value of the PARAMETER MODULE field specifies the member name of the load module that is to be used for Db2 subsystem parameters.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSNZPARM
<b>Update:</b>	option 25 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The parameter module typically resides in library *prefix*.SDSNEXIT. To avoid conflict with members of *prefix*.SDSNLOAD, use DSNZPxxx, where xxx is any set of three alphanumeric characters. Db2 puts this name in the startup JCL procedure in SYS1.PROCLIB, but you can override this value by using the START DB2 command.

### APPL DEFAULTS field

The value of the APPL DEFAULTS field specifies the member name of the load module that is to be used for Db2 application default values.

<b>Acceptable values:</b>	for installation: 1–8 characters; for migration: DSNHDECP
<b>Default:</b>	DSNHDECP
<b>Update:</b>	option 25 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

This module typically resides in library *prefix*.SDSNEXIT. The application default values that are specified within this module are defined by panels DSNTIPK, DSNTIPM, DSNTIPF, and DSNTIP4. The value that is entered in this field will be assigned to the DECP parameter of the *ssnm*MSTR startup JCL procedure in SYS1.PROCLIB. The DECP parameter specifies the name of the applications defaults module that is to be loaded by default when Db2 is started. You can override this value by using the DECP option of the

START DB2 command. If you use a name that starts with DSN, use DSNHDExx, where xx is any set of two alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSNHDECP, the DSNTIJUZ jobs creates a module with that name, with an alias of DSNHDECP. If alias DSNHDECP already exists, it is replaced. If a module that is named DSNHDECP already exists, the link-edit request fails. In this case, you must delete the DSNHDECP module or remove the ALIAS directive for DSNHDECP from the link-edit in job step DSNTIZQ of DSNTIJUZ.

This parameter cannot be changed online.

### **ACCESS CONTROL field (ACCESS\_CNTL\_MODULE subsystem parameter)**

The value of this field specifies the member name of the load module that is to be used for the Db2 access control exit routine.

<b>Acceptable values:</b>	for installation: 1–8 characters; for migration: DSNX@XAC
<b>Default:</b>	DSNX@XAC
<b>Update:</b>	option 25 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP ACCESS_CNTL_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSNX@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSNX@XAC, the DSNTIJEX job creates a module with that name, with an alias of DSNX@XAC. If alias DSNX@XAC already exists, it is replaced. If a module that is named DSNX@XAC already exists, the link-edit request fails. In this case, you must delete the DSNX@XAC module or remove the ALIAS directive for DSNX@XAC from the link-edit in job step JEX0003 of DSNTIJEX.

This parameter cannot be changed online.

### **IDENTIFY/AUTH field (IDAUTH\_MODULE subsystem parameter)**

The value of this field specifies the member name of the load module that is to be used for the Db2 connection authorization exit routine.

<b>Acceptable values:</b>	for installation: 1–8 characters; for migration: DSN3@ATH
<b>Default:</b>	DSN3@ATH
<b>Update:</b>	option 25 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP IDAUTH_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSN3@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSN3@ATH, the DSNTIJEX job creates a module with that name, with an alias of DSN3@ATH. If alias DSN3@ATH already exists, it is replaced. If a module that is named DSN3@ATH already exists, the link-edit request fails. In this case, you must delete the DSN3@ATH module or remove the ALIAS directive for DSN3@ATH from the link-edit in job step JEX0002 of DSNTIJEX.

This parameter cannot be changed online.

## SIGNON field (SIGNON\_MODULE subsystem parameter)

The value of this field specifies the member name of the load module that is to be used for the Db2 sign-on exit routine.

<b>Acceptable values:</b>	for installation: 1–8 characters; for migration: DSN3@SGN
<b>Default:</b>	DSN3@SGN
<b>Update:</b>	option 25 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP SIGNON_MODULE

This module typically resides in library *prefix*.SDSNEXIT. If you specify a name that starts with DSN, use DSN3@xxx, where xxx is any unused set of three alphanumeric characters. This naming convention avoids conflict with members of *prefix*.SDSNLOAD.

If you specify a name other than DSN3@SGN, the DSNTIJEX job creates a module with that name, with an alias of DSN3@SGN. If alias DSN3@SGN already exists, it is replaced. If a module that is named DSN3@SGN already exists, the link-edit request fails. In this case, you must delete the DSN3@SGN module or remove the ALIAS directive for DSN3@SGN from the link-edit in job step JEX0001 of DSNTIJEX.

If you run the installation CLIST in MIGRATE mode, this field is always set to DSN3@SGN and cannot be modified.

This parameter cannot be changed online.

### Related concepts

[Connection routines and sign-on routines \(Managing Security\)](#)

### Related tasks

[Migration step 16: Define user authorization exit routines: DSNTIJEX \(optional\)](#)

You can use job DSNTIJEX to define user authorization exit routines. If you did not run job DSNTIJEX in the release from which you are migrating, you can skip this step.

## DSNTIPO4: Resource Limit Facility panel

The DSNTIPO4 panel enables you to specify options for the resource limit facility.

```
DSNTIPO4      INSTALL DB2 - RESOURCE LIMIT FACILITY
====> _

Enter data below:
 1 RLF AUTO START      ==> NO          Resource limit facility. NO or YES
 2 RLF SCOPE           ==> DYNAMIC    DYNAMIC only, STATIC only, or ALL
 3 RLST NAME SUFFIX   ==> 01         Resource Limit Spec. Table (RLST)

Enter actions for RLST access errors:
 4 DYNAMIC SQL         ==> NOLIMIT    NOLIMIT, NORUN, or 1-5000000
 5 STATIC SQL          ==> NOLIMIT    NOLIMIT, NORUN, or 1-5000000

Enter actions for RLST access errors for workload from a remote location:
 6 REMOTE DYNAMIC SQL ==> NOLIMIT    NOLIMIT, NORUN, or 1-5000000
 7 REMOTE STATIC SQL  ==> NOLIMIT    NOLIMIT, NORUN, or 1-5000000

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 30. Default startup modules panel: DSNTIPO4

### Related concepts

[The resource limit facility \(Introduction to Db2 for z/OS\)](#)

[Resource limit facility controls \(Db2 Performance\)](#)

## Related tasks

[Setting limits for system resource usage by using the resource limit facility \(Db2 Performance\)](#)

## RLF AUTO START field (RLF subsystem parameter)

The RLF subsystem parameter specifies whether the resource limit facility (governor) is to automatically start each time Db2 is started.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 26 on panel DSNTIPB
<b>Online changeable:</b>	No
<b>DSNZPxxx:</b>	DSN6SYSP RLF

## Related concepts

[Resource limit facility controls \(Db2 Performance\)](#)

## RLF SCOPE field (RLFENABLE subsystem parameter)

The RLFENABLE subsystem parameter specifies whether the resource limit facility limits resources that are used by dynamic SQL statements only, static SQL statement only, or all SQL statements.

<b>Acceptable values:</b>	DYNAMIC, STATIC, or ALL
<b>Default:</b>	DYNAMIC
<b>Data sharing scope:</b>	It is recommended that all members use the same setting.
<b>Update:</b>	option 26 on DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP.RLFENABLE

### DYNAMIC

Resource limits apply only to dynamic SQL statements.

### STATIC

Resource limits apply only to static SQL statements.

### ALL

Resource limits apply to dynamic and static SQL statements.

## Related concepts

[Resource limit facility controls \(Db2 Performance\)](#)

## Related tasks

[Setting limits for system resource usage by using the resource limit facility \(Db2 Performance\)](#)

## Related reference

[RLF SCOPE field \(RLFENABLE subsystem parameter\)](#)



The RLFENABLE subsystem parameter specifies whether the resource limit facility limits resources that are used by dynamic SQL statements only, static SQL statement only, or all SQL statements.

### **RLST NAME SUFFIX field (RLFTBL subsystem parameter)**

The RLFTBL subsystem parameter specifies the suffix that is to be used for the default resource limit specification table (RLST). The default RLST is used when the resource limit facility (governor) is automatically started or when the governor is started without a specified suffix.

<b>Acceptable values:</b>	any 2 alphanumeric characters; national characters are not allowed
<b>Default:</b>	01
<b>Update:</b>	option 2624 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP RLFTBL

### **DYNAMIC SQL field (RLFERR subsystem parameter)**

The RLFERR subsystem parameter specifies the action that Db2 takes for dynamic SQL statements that originate from the local server when it cannot find an applicable row in the resource limit specification table.

An applicable row is one that applies to the authorization ID, collection ID, package name, and name of the logical unit of work of the query user.

<b>Acceptable values:</b>	NOLIMIT, NORUN, 1–5000000
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 24 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP RLFERR

#### **NOLIMIT**

Allows all dynamic SQL statements to run without limit.

#### **NORUN**

Terminates all dynamic SQL statements immediately with an SQL error code.

#### **1–5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

#### **Related tasks**

[Setting limits for system resource usage by using the resource limit facility \(Db2 Performance\)](#)

#### **Related reference**

[DSNRLSTxx resource limit tables \(Db2 Performance\)](#)

### **STATIC SQL field (RLFERRSTC subsystem parameter)**

The RLFERRSTC subsystem parameter specifies the action that Db2 takes when a problem occurs with the resource limit specification table during execution of a local, static SQL statement.

The situations that this subsystem parameter applies to are:

- An error occurs that prevents the resource limit facility from accessing the resource limit specification table.
- Db2 cannot find an applicable row in the resource limit specification table.

<b>Acceptable values:</b>	NOLIMIT, NORUN, 1 to 5000000
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 26 on DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SYSP RLFERRSTC

#### **NOLIMIT**

No limit is applied to any static SQL statement that does not correspond to a row in the resource limit table.

#### **NORUN**

Any static SQL statement that does not correspond to a row in the resource limit table is prevented from running.

#### **1 to 5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

#### **Related concepts**

[Resource limit facility controls \(Db2 Performance\)](#)

#### **Related tasks**

[Setting limits for system resource usage by using the resource limit facility \(Db2 Performance\)](#)

## **REMOTE DYNAMIC SQL field (RLFERRD subsystem parameter)**

The RLFERRD subsystem parameter specifies the default action that Db2 takes for dynamic SQL statements from remote locations when a problem occurs with the resource limit specification table.

The situations that this subsystem parameter applies to are:

- An error occurs that prevents the resource limit facility from accessing the resource limit specification table.
- Db2 cannot find an applicable row in the resource limit specification table.

An applicable row is one that applies to the authorization ID, collection ID, or package name, and name of the logical unit of work of the query user. This parameter applies to the distributed data facility.

<b>Acceptable values:</b>	NOLIMIT, NORUN, 1–5000000
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 26 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6FAC RLFERRD

#### **NOLIMIT**

Allows all dynamic SQL statements to run without limit.

#### **NORUN**

Terminates all dynamic SQL statements immediately with an SQL error code.

#### **1–5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

#### **Related concepts**

[Resource limit facility controls \(Db2 Performance\)](#)

#### **Related reference**

[DSNRLSTxx resource limit tables \(Db2 Performance\)](#)

## REMOTE STATIC SQL field (RLFERRDSTC subsystem parameter)

The RLFERRDSTC subsystem parameter specifies the action that Db2 takes for static SQL statements from remote locations when a problem occurs with the resource limit specification table.

The situations that this subsystem parameter applies to are:

- An error occurs that prevents the resource limit facility from accessing the resource limit specification table.
- Db2 cannot find an applicable row in the resource limit specification table.

An applicable row is one that applies to the authorization ID, collection ID, or package name, and name of the logical unit of work of the query user.

<b>Acceptable values:</b>	NOLIMIT, NORUN, 1–5000000
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 26 on DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6FAC RLFERRDSTC

### **NOLIMIT**

Allows all static SQL statements from remote locations to run without limit.

### **NORUN**

Terminates all static SQL statements from remote locations immediately with an SQL error code.

### **1–5000000**

Specifies the number of service units to use as the default resource limit. If the limit is exceeded, the SQL statement is terminated.

## DSNTIPF: Application programming defaults panel 1

The entries on the DSNTIPF panel and the DSNTIP4 panel define application programming default values. These values are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler. These values can also be used as default values by other programs, such as QMF.

**Migrating or updating the parameters:** If you alter parameter values for which a change during migration or update is "not recommended," this change can invalidate the syntax of existing SQL statements or affect the way that application programs run. Update is allowed, but must be handled with caution.

Most of the values that are set here and on the DSNTIP4 panel are contained in the application defaults load module, *dsnhdecpl*. The load module is located in library *prefix.SDSNEXIT*, which can be loaded and accessed by application programs. When modifying the application defaults load module, do so only by changing and running the installation CLIST.

**Important:** You should always use the CLIST to modify installation parameters. Do not directly modify the data in the application defaults load module. If you modify any installation parameters by changing job DSNTIJUZ directly, these values are not recorded for later updates, new installations, or migrations. In addition, these values are not checked for validity. If you do not use the CLIST to modify these parameters, Db2 may not start.

Many of the fields on this panel involve the selection of coded character set identifiers (CCSIDs). Here is some information that can help you choose values for these fields:

- If you choose YES for the MIXED DATA field, you must specify a mixed data CCSID from [Table 140 on page 940](#) or [Table 141 on page 941](#). An error occurs if you do not specify a CCSID or if the CCSID you specify is not listed in the table.
- If you specify an incorrect CCSID, data can become corrupted. For example, assume that the coded character set used at your site is 37, but you specify 500 as the system CCSID. If Db2 receives data

with a CCSID of 500, the data can become corrupted because character conversion does not occur. Conversely, if Db2 receives data with a CCSID other than 500 and a conversion is made from that CCSID to 500, the data can become corrupted because character conversion occurs.

**Recommendation:** Never change CCSIDs on an existing Db2 system without specific guidance from IBM Support.

- If you need to convert to a CCSID that supports the euro symbol, you can correct it by altering the CCSID field for your default encoding scheme.
- During code conversion, Db2 first looks in the SYSSTRINGS table to see if a conversion is defined. If Db2 finds a conversion, it is used. If Db2 does not find a conversion, it uses z/OS Unicode Services. In some cases, z/OS Unicode Services is used instead of the value in SYSSTRINGS. If the conversion is not available, an error occurs.
- Converting statements to Unicode for parsing depends on having the correct input CCSID specified. The system CCSIDs must be set up correctly at installation time.

During connect processing, a requester and server provide default CCSIDs for character data sent on the connection.

The Db2 requester uses the application encoding scheme for its default CCSIDs. If an application provides character data that is not in the CCSID that the application encoding scheme identifies, Db2 overrides the default CCSID by tagging each field with the actual CCSID prior to sending to the server. For applications that use the Unicode encoding scheme, the Db2 requester overrides the application encoding scheme CCSIDs with the system EBCDIC CCSIDs and converts the Unicode data to EBCDIC if Db2 determines that the server does not support Unicode character data. If the server cannot accept character data in these CCSIDs, connect fails with a -332 SQLCODE.

The Db2 server uses the system default encoding scheme to determine the default CCSID values for character data that is to be returned to the requester. For servers using the encoding scheme of Unicode, the Db2 server overrides the Unicode encoding scheme CCSIDs with the system EBCDIC CCSIDs and converts the Unicode data to EBCDIC if Db2 determines that the requester does not support Unicode character data. If the requester cannot accept character data in these CCSIDs, connect fails with a -332 SQLCODE.

```

DSNTIPF          INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 1
====> _

Enter data below:

 1 LANGUAGE DEFAULT      ==> IBMCOB   ASM,C, CPP, IBMCOB, FORTRAN, PLI
 2 DECIMAL POINT IS     ==> .         . OR ,
 3 STRING DELIMITER     ==> DEFAULT  DEFAULT, " OR ' (COBOL OR COB2 ONLY)
 4 SQL STRING DELIMITER ==> DEFAULT  DEFAULT, " OR '
 5 DIST SQL STR DELIMTR ==> '         ' OR "
 6 MIXED DATA          ==> NO         NO OR YES FOR MIXED DBCS DATA
 7 EBCDIC CCSID         ==>          CCSID OF SBCS OR MIXED DATA. 1-65533.
 8 ASCII CCSID          ==>          CCSID OF SBCS OR MIXED DATA. 1-65533.
 9 UNICODE CCSID        ==> 1208      CCSID OF UNICODE UTF-8 DATA.
10 DEF ENCODING SCHEME ==> EBCDIC   EBCDIC, ASCII, OR UNICODE
11 APPLICATION ENCODING ==> EBCDIC   EBCDIC, ASCII, UNICODE, CCSID (1-65533)
12 LOCALE LC_CTYPE      ==>
13 DECFLOAT ROUNDING MODE==> ROUND_HALF_EVEN

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 31. Application programming defaults panel: DSNTIPF

## Related concepts

### Euro symbol support

Db2 enables users to migrate to CCSIDs that support the euro symbol. This support is limited to conversion from specific CCSIDs that do not define the euro symbol to specific CCSIDs that define the euro symbol.

## Related tasks

[Processing SQL statements for program preparation \(Db2 Application programming and SQL\)](#)

## Related reference

[DSNTIP4: Application programming defaults panel 2](#)

The DSNTIP4 panel is a continuation of the DSNTIPF panel, and it is used to set application programming default values. The values that you specify on this panel are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler.

[Code set converters supplied \(XL C/C++ Programming Guide\)](#)

## LANGUAGE DEFAULT field (DEFLANG DECP value)

The DEFLANG DECP value identifies the default programming language that is to be used for your site.

<b>Acceptable values:</b>	ASM, C, CPP, FORTRAN, IBMCOB, PLI
<b>Default:</b>	IBMCOB
<b>Update:</b>	not recommended
<b><i>dsnhdecp</i>:</b>	DEFLANG

### ASM

Specifies High Level Assembler/MVS as the default programming language.

### C

Specifies C as the default programming language. If you specify C, you can fold SQL identifiers to uppercase. However, this is not a default from any installation panel.

### CPP

Specifies C++ as the default programming language. If you specify CPP, you can fold SQL identifiers to uppercase. However, this is not a default from any installation panel.

### FORTRAN

Specifies Fortran as the default programming language.

### IBMCOB

Specifies Enterprise COBOL for z/OS as the default programming language.

### PLI

Specifies PL/I as the default programming language.

## Related concepts

[Precompiler option list format \(Db2 Application programming and SQL\)](#)

## DECIMAL POINT IS field (DECIMAL DECP value)

The DECIMAL DECP value determines whether the decimal point for numbers is to be a comma (,) or a period (.).

<b>Acceptable values:</b>	. (period) or , (comma)
<b>Default:</b>	. (period)
<b>Update:</b>	recommended only to recover an error
<b><i>dsnhdecp</i>:</b>	DECIMAL

For example, some nations customarily signify the number "one and one-half," as 1.5; other nations use 1,5 for the same value.

This parameter is used in the following cases:

- For running dynamic SQL statements with DYNAMICRULES:
  - Whether the value of field DECIMAL POINT IS is COMMA or PERIOD, Db2 recognizes the value as the decimal point for numbers.
- For binding, defining, or invoking dynamic SQL statements with DYNAMICRULES:

- If the value of field USE FOR DYNAMICRULES is NO, Db2 does not use the value in field DECIMAL POINT IS if you specify the option COMMA or PERIOD when you precompile the application that contains the dynamic SQL statements. Db2 uses the precompiler option to determine the decimal point for numbers.
- If the value of field USE FOR DYNAMICRULES is YES, and the value of field DECIMAL POINT IS is PERIOD or COMMA, Db2 recognizes the value as the decimal point for numbers.
- For static SQL statements in COBOL programs, DECIMAL POINT IS specifies the default precompiler option (PERIOD or COMMA).

This parameter is the default for binds at this Db2 site that are requested by a remote system that does not indicate whether the period or the comma is used to represent a decimal point. In most cases, however, requesting systems give Db2 this information.

### Related concepts

[Decimal point representation \(Db2 SQL\)](#)

### Related reference

[DYNAMICRULES bind option \(Db2 Commands\)](#)

## STRING DELIMITER field (DELIM DECP value)

The DELIM DECP value determines the string delimiter that is to be used for COBOL.

<b>Acceptable values:</b>	DEFAULT, " (quotation mark), ' (apostrophe)
<b>Default:</b>	DEFAULT
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	DELIM

This option is effective for all varieties of COBOL.

### DEFAULT

The string delimiter is the quotation mark.

"

The string delimiter is the quotation mark.

'

The string delimiter is the apostrophe.

See the [SQL STRING DELIMITER field](#) for a description of how to use this field to get the set of character string delimiters for COBOL and SQL.

## SQL STRING DELIMITER field (SQLDELI DECP value)

The SQLDELI DECP value specifies the character that is to be used as the SQL string delimiter to delimit character strings in dynamic SQL.

<b>Acceptable values:</b>	DEFAULT, " (quotation mark), ' (apostrophe)
<b>Default:</b>	DEFAULT
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	SQLDELI

This option is effective for all varieties of COBOL.

The value in this field also determines which character is the escape character for delimited identifiers in dynamic SQL. If you specify an apostrophe in this field, you get a quotation mark for your SQL escape character. If you specify a quotation mark in this field, you get an apostrophe for your SQL escape character.

For SQL statements that are embedded in COBOL programs, COBOL precompiler options specify which character is the SQL string delimiter and which character is the SQL escape character. If you specify DEFAULT in this field, a quotation mark is passed to the precompiler as the default SQL string delimiter.

Some applications might require a particular value for the SQL STRING DELIMITER. Determine the required values for those applications before installing Db2.

The following table shows the different combinations of character string delimiters that result from specifying different values in the STRING DELIMITER field and the SQL STRING DELIMITER field.

*Table 25. Effect of STRING DELIMITER field and SQL STRING DELIMITER field on SQL and COBOL string delimiters*

When you want this combination of character string delimiters...			Specify this in STRING DELIMITER field	Specify this in SQL STRING DELIMITER field
COBOL	Dynamic SQL	Embedded SQL		
"	'	"	DEFAULT	DEFAULT
'	'	'	'	'
"	"	"	"	"
"	'	'	"	'

The values that you specify in the STRING DELIMITER field and the SQL STRING DELIMITER field are also used by the program preparation panels, the DSNH CLIST, and the precompiler. The following table shows why you might specify different combinations of values in these fields.

*Table 26. Effect of the STRING DELIMITER field and the SQL STRING DELIMITER field on precompiler options*

Purpose	STRING DELIMITER field	SQL STRING DELIMITER field
Force APOST default (even in COBOL) and provide a default similar to APOST in Db2 Server for VSE & VM.	'	'
Change dynamic query string delimiter to the quotation mark. This is helpful if you use COBOL with the QUOTE option. It allows queries to be tested with dynamic SQL and moved into the program more easily.	"	"
Enables compatibility with the Db2 Server for VSE & VM option.	"	'

### **DIST SQL STR DELIMTR field (DSQLDELI DECP value)**

The DSQLDELI DECP value specifies whether an apostrophe or quotation mark is to be used as the SQL string delimiter for bind operations at this Db2 site. This delimiter is to be used when the requester does not give Db2 that information.

In most cases, requesters tell Db2 whether the apostrophe or the quotation mark is to be used as the SQL string delimiter.

<b>Acceptable values:</b>	' (apostrophe) or " (quotation mark)
<b>Default:</b>	' (apostrophe)
<b>Update:</b>	not recommended
<b>dsnhddec:</b>	DSQLDELI

## MIXED DATA field (MIXED DECP value)

The value of the MIXED DECP field indicates how the EBCDIC CCSID and ASCII CCSID fields are to be interpreted by Db2.

The MIXED DATA option has no effect on a Unicode string, including a Unicode column in an EBCDIC table. Regardless of the setting for MIXED DATA, UNICODE UTF-8 data is considered mixed data and is processed according to the rules for mixed data.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	MIXED

### YES

The CCSID that is specified in the EBCDIC CCSID and ASCII CCSID field must be the mixed CCSID for the encoding scheme. From this, Db2 determines the associated SBCS and DBCS CCSIDs for the encoding scheme. MIXED DATA YES allows EBCDIC and ASCII mixed-character data and graphic data to be defined.

**Important:** MIXED DATA applies to both the EBCDIC CCSID and ASCII CCSID. If you choose MIXED DATA YES, you must select mixed CCSIDs for EBCDIC and ASCII.

### NO

The CCSID specified in the EBCDIC CCSID or ASCII CCSID field must be the CCSID for the encoding scheme. MIXED DATA NO does not allow for EBCDIC or ASCII mixed character data or graphic data to be defined.

For EBCDIC data, the value specifies whether the code points X'0E' and X'0F' have special meaning as the shift-out and shift-in controls for character strings that include double-byte characters.

- NO indicates that these code points have no special meaning. Therefore, all character strings are single-byte character set (SBCS) data.
- YES indicates that these code points have the special meaning described above. Therefore, character strings can be either SBCS or MIXED data.

### Related reference

EBCDIC and ASCII support

Db2 supports both EBCDIC and ASCII encoding of data.

## EBCDIC CCSID field (SCCSID, MCCSID, and GCCSID DECP values)

The value of the EBCDIC CCSID field specifies the default CCSID for EBCDIC-encoded character data that is stored in your Db2 subsystem or data sharing system.

Db2 uses this value to perform conversion of character data that is received from external sources including other database management systems. Choose this value carefully to avoid loss of data integrity. The values that you choose for EBCDIC CCSID and ASCII CCSID are closely related.

<b>Acceptable values:</b>	1–65533
<b>Default:</b>	(none)
<b>Update:</b>	not recommended; data integrity may be compromised
<b><i>dsnhdcp:</i></b>	SCCSID (single-byte), MCCSID (mixed), GCCSID (graphic)

If you specify NO for the MIXED DATA field, the MCCSID and GCCSID values are 65534. If you specify YES for the MIXED DATA field, ensure that you use the correct single-byte CCSID and MCCSID.



**Recommendation:** Use this parameter to specify an MCCSID. By doing so, you also receive system CCSIDs for your SBCS and GRAPHIC data. If you edit DSNHDECP directly, you will not receive the system CCSIDs for your SBCS and GRAPHIC data.

Conversions are determined in the following order:

1. SYSIBM.SYSSTRINGS.
2. z/OS Unicode conversion services.

**Considerations for mixed data:**

- If the MIXED DATA field is set to YES, you must specify a MCCSID from [“EBCDIC and ASCII support” on page 938](#). An error occurs if you do not specify a CCSID or if the CCSID you specify is not listed in the table.
- If you specify 930, 1390, or 5026, Katakana characters are allowed in ordinary identifiers, and letters are not changed to uppercase.

If you specify a CCSID that is recognized by Db2 but is inappropriate for your site, data might be corrupted. For example, assume that the coded character set at your site is 37, but you specify 500 as the system CCSID. If Db2 receives data with a CCSID of 37, the data might be corrupted because character conversion does not occur. Conversely, if Db2 receives data with a CCSID other than 500 and a conversion is made from that CCSID to 500, the data may be corrupted because character conversion does occur.

Altering CCSIDs can be very disruptive to a system. Converting to a CCSID that supports the euro symbol is potentially less disruptive because specific pre-euro CCSIDs map to specific CCSIDs for the euro. Converting to a different CCSID for other reasons, particularly when a Db2 system has been operating with the wrong CCSID, could render data unusable and unrecoverable.

**Recommendation:** Never change CCSIDs on an existing Db2 system without specific guidance from IBM Software Support.

**Related concepts**

[Euro symbol support](#)

Db2 enables users to migrate to CCSIDs that support the euro symbol. This support is limited to conversion from specific CCSIDs that do not define the euro symbol to specific CCSIDs that define the euro symbol.

[Introduction to character conversion \(Db2 Internationalization Guide\)](#)

**Related reference**

[EBCDIC and ASCII support](#)

Db2 supports both EBCDIC and ASCII encoding of data.

## ASCII CCSID field (ASCCSID, AMCCSID, AGCCSID DECP values)

The ASCII CCSID field identifies the default coded character set identifier (CCSID) for ASCII-encoded character data that is to be stored in your Db2 subsystem or data sharing system.

Db2 uses the value of this field to convert character data that is received from external sources, including other database management systems. You must specify a value for this field, even if you do not have or plan to create ASCII-encoded objects. Choose this value carefully to prevent loss of data integrity.

<b>Acceptable values:</b>	1–65533
<b>Default:</b>	(none)
<b>Update:</b>	not recommended; data integrity may be compromised
<b>dsnhdcp:</b>	ASCCSID (single-byte), AMCCSID (mixed), AGCCSID (graphic)

**Recommendation:** Never change CCSIDs on an existing Db2 system without specific guidance from IBM Software Support.

## Related reference

EBCDIC and ASCII support

Db2 supports both EBCDIC and ASCII encoding of data.

EBCDIC CCSID field (SCCSID, MCCSID, and GCCSID DECP values)

The value of the EBCDIC CCSID field specifies the default CCSID for EBCDIC-encoded character data that is stored in your Db2 subsystem or data sharing system.

## UNICODE CCSID field (USCCSID, UMCCSID, and UGCCSID DECP values)

The value of the UNICODE CCSID field specifies the CCSID that is to be used for Unicode data.

<b>Acceptable values:</b>	1208
<b>Default:</b>	1208
<b>Update:</b>	not recommended; data integrity may be compromised
<b><i>dsnhdcp:</i></b>	USCCSID (367 for single-byte), UMCCSID (1208 for mixed), UGCCSID (1200 for graphic)

Accept the default CCSID for Unicode. Db2 currently allows specification of only CCSID 1208 for this value. Db2 automatically chooses the CCSIDs for double-byte and single-byte data. Do not change CCSID values after they have been specified. SQL results might be unpredictable if you do not accept the default.

## DEF ENCODING SCHEME field (ENSCHHEME DECP value)

The ENSCHHEME DECP value specifies the default format in which data is to be stored in Db2.

<b>Acceptable values:</b>	EBCDIC, ASCII, UNICODE
<b>Default:</b>	EBCDIC
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	ENSCHHEME

If you set DEF ENCODING SCHEME to ASCII or EBCDIC and MIXED DATA is set to YES, specify a mixed CCSID.

The DDL uses the default encoding scheme in the following cases:

- CREATE DATABASE
- CREATE DISTINCT TYPE
- CREATE FUNCTION
- CREATE GLOBAL TEMPORARY TABLE
- DECLARE GLOBAL TEMPORARY TABLE
- CREATE TABLESPACE (in DSNDB04 database)

## APPLICATION ENCODING field (APPENSCH DECP value)

The APPENSCH DECP value determines the system's default application encoding scheme, which affects how Db2 interprets data coming into Db2.

For example, if your default application encoding scheme is set to 37, and your EBCDIC coded character is set to 500, Db2 converts all data coming into the system to 500 from 37 before using it. This includes, but is not limited to, SQL statement text and host variables.

<b>Acceptable values:</b>	ASCII, EBCDIC, UNICODE, or CCSID (1–65533)
---------------------------	---

<b>Default:</b>	EBCDIC
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	APPENSCH

The following statements set the value of the host variable and do not require the package to be bound into the plan:

```
SET CURRENT PACKAGE SET = :HV ,
SET :HV = CURRENT PACKAGE SET ,
SET :HV = CURRENT PACKAGE PATH ,
SET CURRENT PACKAGE PATH = :HV
```

The host variable uses the system's default application encoding scheme, even when the application is bound with the ENCODING(EBCDIC/UNICODE) bind option.

The default value, EBCDIC, causes Db2 to retain the behavior of previous versions of Db2. (Assume that all data is in the EBCDIC system CCSID.)

### LOCALE LC\_CTYPE field (LC\_TYPE DECP value)

The LC\_TYPE DECP value specifies the system LOCALE LC\_CTYPE. A *locale* is the part of your system environment that depends on language and cultural conventions. An *LC\_CTYPE* is a subset of a locale that applies to character functions.

<b>Acceptable values:</b>	A valid locale of 0–50 characters.
<b>Default:</b>	Blank
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	LC_TYPE

The UPPER, LOWER, and TRANSLATE scalar functions use the CURRENT LOCALE LC\_CTYPE system default or special register. The results of these functions can vary, depending on the setting of the locale.

**Recommendation:** Use the default value for LOCALE LC\_CTYPE unless you need to execute the UPPER, LOWER, or TRANSLATE functions for data that must be interpreted by using the rules provided by specific locales. For example, specify En\_US for English in the United States or Fr\_CA for French in Canada.

#### Related reference

[SET CURRENT LOCALE LC\\_CTYPE statement \(Db2 SQL\)](#)

[LC\\_CTYPE category \(XL C/C++ Programming Guide\)](#)

### DECFLOAT ROUNDING MODE field (DEF\_DECFLOAT\_ROUND\_MODE DECP value)

The DEF\_DECFLOAT\_ROUND\_MODE DECP value specifies the system default action that is to be used for rounding decimal floating point values.

<b>Acceptable values:</b>	ROUND_CEILING, ROUND_DOWN, ROUND_FLOOR, ROUND_HALF_DOWN, ROUND_HALF_EVEN, ROUND_HALF_UP, ROUND_UP
<b>Default:</b>	ROUND_HALF_EVEN
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	DEF_DECFLOAT_ROUND_MODE

**ROUND\_CEILING**

Rounds towards +infinity. If all of the discarded digits are zero or if the sign is negative, Db2 removes the discarded digits and the rest of the result remains the same. In all other cases, Db2 increments the result coefficient by 1.

**ROUND\_DOWN**

Rounds towards 0. Db2 ignores the discarded digits.

**ROUND\_FLOOR**

Rounds towards -infinity. If all of the discarded digits are zero or if the sign is positive, Db2 removes the discarded digits and the rest of the result remains the same. In all other cases, Db2 increments the result coefficient by 1.

**ROUND\_HALF\_DOWN**

Rounds to the nearest number. If the discarded digits are greater than 0.5 of the value of a one in the next left position, Db2 increments the result coefficient by 1. If the discarded digits are equal or less than 0.5, Db2 ignores the discarded digits.

**ROUND\_HALF\_EVEN**

Rounds to the nearest number. If the discarded digits are greater than 0.5, the value of a one in the next left position, Db2 increments the result coefficient by 1. If the discarded digits are less than 0.5, Db2 ignores the discarded digits. If the discarded digits are 0.5 and the rightmost digit is even, Db2 does not alter the result coefficient. If the discarded digits are 0.5 and the rightmost digit is odd, Db2 increments the result coefficient by 1 to make it an even digit.

**ROUND\_HALF\_UP**

Rounds to the nearest number. If the discarded digits are greater than or equal to 0.5 of the value of a one in the next left position, Db2 increments the result coefficient by 1. In all other cases, Db2 ignores the discarded digits.

**ROUND\_UP**

Rounds away from 0. If all of the discarded digits are zero, Db2 removes the discarded digits and the rest of the result remains the same. In all other cases, Db2 increments the result coefficient by 1.

**Related reference**

[BIND and REBIND options for packages, plans, and services \(Db2 Commands\)](#)

[SET CURRENT DECFLOAT ROUNDING MODE statement \(Db2 SQL\)](#)

[Syntax and options of the UNLOAD control statement \(Db2 Utilities\)](#)

## DSNTIP4: Application programming defaults panel 2

The DSNTIP4 panel is a continuation of the DSNTIPF panel, and it is used to set application programming default values. The values that you specify on this panel are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler.

The values that you specify on this panel can also be used as default values by other programs, such as QMF.

```

DSNTIP4          INSTALL DB2 - APPLICATION PROGRAMMING DEFAULTS PANEL 2
====> _

Enter data below:

 1 MINIMUM DIVIDE SCALE ====> NO          NO or YES for a minimum of 3 digits
                                         to right of decimal after division
 2 DECIMAL ARITHMETIC   ====> DEC15       DEC15, DEC31, 15, 31 or DPP.S
 3 USE FOR DYNAMICRULES ====> YES        YES or NO
 4 DESCRIBE FOR STATIC  ====> YES        Allow DESCRIBE for STATIC SQL. NO or YES
 5 DATE FORMAT         ====> ISO         ISO, JIS, USA, EUR, LOCAL
 6 TIME FORMAT         ====> ISO         ISO, JIS, USA, EUR, LOCAL
 7 LOCAL DATE LENGTH   ====> 0          10-254 or 0 for no exit
 8 LOCAL TIME LENGTH   ====> 0          8-254 or 0 for no exit
 9 IMPLICIT TIME ZONE  ====> CURRENT     Implicit time zone for TIMESTAMP values
                                         (CURRENT, SESSION , or -12:59 to +14:00)
10 STD SQL LANGUAGE    ====> NO         NO or YES
11 PAD NUL-TERMINATED  ====> NO         NO or YES

```

PRESS: ENTER to continue RETURN to exit HELP for more information

Figure 32. Application programming defaults panel: DSNTIP4

### Related tasks

[Processing SQL statements for program preparation \(Db2 Application programming and SQL\)](#)

### Related reference

[DSNTIPF: Application programming defaults panel 1](#)

The entries on the DSNTIPF panel and the DSNTIP4 panel define application programming default values. These values are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler. These values can also be used as default values by other programs, such as QMF.

## MINIMUM DIVIDE SCALE field (DECDIV3 subsystem parameter)

The DECDIV3 subsystem parameter determines whether to retain at least three digits to the right of the decimal point after any decimal division.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 28 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DECDIV3

Certain accounting applications might need this option.

### YES

Retains at least three digits to the right of the decimal point after any decimal division.

### NO

Does not retain three digits to the right of the decimal point after decimal division. Use NO, the default, to accept the usual rules for decimal division in SQL.

### Related concepts

[Arithmetic operators in expressions \(Db2 SQL\)](#)

### Related reference

[MINDVSCL subsystem parameter in DSN6SPRM](#)

The MINDVSCL subsystem parameter specifies the minimum scale for the result of a decimal division. If set to a value other than NONE, MINDVSCL overrides the DECDIV3 subsystem parameter.

## DECIMAL ARITHMETIC field (DECARTH DECP value)

The DECARTH DECP value specifies the rules that are to be used when both operands in a decimal operation have precisions of 15 or less.

<b>Acceptable values:</b>	DEC15, DEC31, 15, 31, or DPP.S
<b>Default:</b>	DEC15
<b>Update:</b>	not recommended; cannot be changed during migration
<b><i>dsnhdcp:</i></b>	DECARTH

### DEC15 or 15

Specifies the rules that do not allow a precision greater than 15 digits.

### DEC31 or 31

Specifies the rules that allow a precision of up to 31 digits. The rules for DEC31 are always used if either operand has a precision greater than 15. If you chose DEC15 for your previous installation, choosing DEC31 can produce different results for operations on existing data.

### DPP.S

"PP" is either 15 or 31 and "S" is a number between 1 and 9. If the form "DPP.S" is used, "PP" represents the precision that is to be used with the rules that are used for DEC15 or DEC31, and "S" represents the minimum divide scale to use for division operations. The separator that is used in the form "DPP.S" can be either the "." or the "," character, regardless of the setting of the default decimal point. An error occurs if any other values are specified.

This installation option applies to dynamic SQL by becoming the initial value for the CURRENT PRECISION special register, and it provides the default for the DEC precompiler option. DEC15 is sufficient for most sites. Do not choose DEC31 unless you are certain that you need the extra precision. If you use DEC31, you are more likely to get a bind error, particularly in division operations.

### Related concepts

[Arithmetic operators in expressions \(Db2 SQL\)](#)

## USE FOR DYNAMICRULES field (DYNRULS DECP value)

The DYNRULS DECP value specifies whether Db2 is to use the application programming default values that are specified on this panel. The other option is to use the values of the Db2 precompiler options for dynamic SQL statements that are bound by using DYNAMICRULES bind, define, or invoke behavior.

<b>Acceptable values:</b>	YES or NO
<b>Default:</b>	YES
<b>Update:</b>	not recommended
<b><i>dsnhdcp:</i></b>	DYNRULS

### YES

Db2 uses the application programming defaults for these fields regardless of the DYNAMICRULES option:

- DECIMAL POINT IS
- STRING DELIMITER
- SQL STRING DELIMITER
- MIXED DATA
- DECIMAL ARITHMETIC

## NO

Db2 uses the Db2 precompiler values for dynamic SQL statements in plans or packages that are bound by using the DYNAMICRULES bind, define, or invoke behavior.

## DESCRIBE FOR STATIC field (DESCSTAT subsystem parameter)

The DESCSTAT subsystem parameter specifies whether Db2 builds a SQL descriptor area (SQLDA) when binding static SQL statements. This SQLDA is where Db2 returns names of result table columns for a DESCRIBE CURSOR statement.

The DESCSTAT subsystem parameter provides the default value for the DESCSTAT BIND or REBIND option. The DESCSTAT BIND or REBIND option value always overrides the DESCSTAT subsystem parameter value.

Normally, a DESCRIBE request cannot be issued against a static SQL statement, with the following exceptions:

- In a distributed environment, where Db2 for z/OS is the server, and the requester supports extended dynamic SQL. In this scenario, a DESCRIBE request that is executed on an SQL statement in the extended dynamic package appears to Db2 as a DESCRIBE on a static SQL statement in the Db2 package.
- When an application uses a stored procedure result set, and the application must allocate a cursor for that result set. The application can describe that cursor by using a DESCRIBE CURSOR statement. The SQL statement that is actually described is the one for which the cursor is declared in the stored procedure. If that statement is static, this requires that a static SQL statement must be described.

<b>Acceptable values:</b>	NO or YES
<b>Default:</b>	YES
<b>Update:</b>	option 28 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DESCSTAT

## NO

Db2 does not generate a DESCRIBE SQLDA at bind time for static SQL statements. If a DESCRIBE request is received at execution time, Db2 generates an error. However, if the describe request comes from a DESCRIBE CURSOR statement, Db2 satisfies the request but is able to provide only data type and length information. Column names are not provided.

## YES

Specifies that Db2 builds a SQL descriptor area (SQLDA) when binding static SQL statements, so that it can return names of result table columns for a DESCRIBE CURSOR statement. Specifying YES increases the size of some packages because the DESCRIBE SQLDA is now stored with each statically bound SQL SELECT statement.

YES is the default value.

If your Db2 for z/OS subsystem or Db2 for Linux®, UNIX, and Windows systems use the IBM Data Server Driver for JDBC and SQLJ, or if your Db2 for Linux, UNIX, and Windows systems use the CLI driver, you must set the DESCSTAT parameter to YES.

### Related reference

[DESCSTAT bind option \(Db2 Commands\)](#)

## DATE FORMAT field (DATE DECP value)

The DATE DECP value controls the default format that is to be used to represent dates in output.

<b>Acceptable values:</b>	ISO, USA, EUR, JIS, LOCAL
<b>Default:</b>	ISO

<b>Update:</b>	not recommended
<b>dsnhdcp:</b>	DATE

The date formats that are associated with the acceptable values for this field are shown in the following table.

Date formats

Format name	Abbreviation	Format	Example
International Standards Organization	ISO	yyyy-mm-dd	2003-12-23
IBM USA standard	USA	mm/dd/yyyy	12/23/2003
IBM European standard	EUR	dd.mm.yyyy	23.12.2003
Japanese Industrial Standard Christian Era	JIS	yyyy-mm-dd	2003-12-23
Locally defined (by an installation exit routine)	LOCAL	your choice	

Db2 accepts dates in any format as input. Db2 interprets the input date based on the punctuation, and then provides date output in the format that you specify for this parameter. If you use LOCAL, you must provide a date exit routine to perform date formatting.

#### Related concepts

[Date and time routines \(Db2 Administration Guide\)](#)

### TIME FORMAT field (TIME DECP value)

The value of the TIME FORMAT field specifies which format is to be used as a default output to represent times.

<b>Acceptable values:</b>	ISO, USA, EUR, JIS, LOCAL
<b>Default:</b>	ISO
<b>Update:</b>	not recommended
<b>dsnhdcp:</b>	TIME

<i>Table 27. Time formats</i>			
Format name	Abbreviation	Time format	Example
International Standards Organization <sup>1</sup>	ISO <sup>1</sup>	hh.mm.ss	13.30.05
IBM USA standard	USA	hh:mm AM or PM	1:30 PM
IBM European standard	EUR	hh.mm.ss	13.30.05
Japanese Industrial Standard Christian Era	JIS	hh:mm:ss	13:30:05
Installation-defined	LOCAL	Any installation-defined form	—
<b>Note:</b> 1. This is an earlier version of the ISO format. JIS can be used to get the current ISO format.			

In the USA format:



- The minutes can be omitted, thereby specifying 00 minutes. For example, 1 PM is equivalent to 1:00 PM.
- The letters A, M, and P can be lowercase.
- A single blank must precede the AM or PM.
- The hour must not be greater than 12 and cannot be 0 except for the special case of 00:00 AM.

Using the ISO format of the 24-hour clock, the correspondence between the USA format and the 24-hour clock is as follows:

- 12:01 AM through 12:59 AM correspond to 00.01.00 through 00.59.00.
- 01:00 AM through 11:59 AM correspond to 01.00.00 through 11.59.00.
- 12:00 PM (noon) through 11:59 PM correspond to 12.00.00 through 23.59.00.
- 12:00 AM (midnight) corresponds to 24.00.00.
- 00:00 AM (midnight) corresponds to 00.00.00.

Db2 can accept a time in any format as input. Db2 interprets the input time based on the punctuation and then provides time output in the format that you specify for this parameter. If you use LOCAL, you must provide a time exit routine to perform time formatting.

### Related concepts

[Date and time routines \(Db2 Administration Guide\)](#)

## LOCAL DATE LENGTH field (DATELEN DECP value)

If you use a locally defined date exit routine, the DATELEN DECP value defines the length of the longest field that is required to hold a date. To use your own default date format, you must also enter LOCAL for the DATE FORMAT field on panel DSNTIP4.

<b>Acceptable values:</b>	0, 10–254
<b>Default:</b>	0
<b>Update or migrate:</b>	not recommended
<b><i>dsnhdec</i>p:</b>	DATELEN

Accept the default value of 0 if you want to use one of the IBM-supplied date formats (ISO, JIS, USA, or EUR). This value indicates that no user-defined date format exists in your system.

## LOCAL TIME LENGTH field (TIMELEN DECP value)

Accept the default value of 0 if you want to use one of the IBM-supplied time formats (ISO, JIS, USA, or EUR).

<b>Acceptable values:</b>	0, 8–254
<b>Default:</b>	0
<b>Update or migrate:</b>	not recommended
<b><i>dsnhdec</i>p:</b>	TIMELEN

This indicates that no user-defined time format exists in your system. If you use a locally defined time exit routine, enter the length of the longest field that is required to hold a time. If you want your own time format to be the default, enter LOCAL for field 2 on this panel.

## IMPLICIT TIME ZONE field (IMPLICIT\_TIMEZONE DECP value)

The IMPLICIT\_TIMEZONE DECP value determines the implicit time zone that is to be used when a time zone is not provided. This parameter applies to Db2 table columns and routing parameters that are declared with TIMESTAMP WITH TIME ZONE data types.

<b>Acceptable values:</b>	CURRENT, SESSION, -12:59 to +14:00
<b>Default:</b>	CURRENT
<b>Update:</b>	not recommended <sup>1</sup> on page 208
<b>dsnhdccp:</b>	IMPLICIT_TIMEZONE

### Note:

1. Given the way that the implicit time zone is defined, a query might return different results before and after the IMPLICIT\_TIMEZONE setting is changed. Or, if IMPLICIT\_TIMEZONE is set to SESSION and an application changes the value of SESSION TIME ZONE through a SET SESSION TIME ZONE statement, a query might also return a different result. These situations apply to both static and dynamic applications.

### CURRENT

Uses the setting of the CURRENT TIME ZONE special register as the implicit time zone. This is the default setting.

### SESSION

Uses the setting of the SESSION TIME ZONE special register as the implicit time zone.

### -12:59 to +14:00

Uses the value of the string as the implicit time zone. The format of the value is *th:tm*, where *th* is the time zone hour (-12 to +14), and *tm* is the time zone minute (00–59). This value is an offset of hours and minutes from the coordinated universal time (UTC). If the string does not indicate '+' or '-', a '+' value is assumed

## STD SQL LANGUAGE field (STDSQL DECP value)

The STD SQL LANGUAGE field specifies the SQL standard that is to be used in writing application programs. Specifically, the parameter specifies whether the SQL language conforms to the portions of the 1992 ANSI SQL standard that are implemented by Db2.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	not recommended
<b>dsnhdccp:</b>	STDSQL

### YES

The SQL language that is used in application programs conforms to the portions of the 1992 ANSI SQL standard that are implemented by Db2.

### NO

Programs are written in accordance with the SQL language that is defined by Db2.

## PAD NUL-TERMINATED field (PADNTSTR DECP value)

The PADNTSTR subsystem parameter determines whether output host variables that are nul-terminated strings are to be padded with blanks and a nul-terminator.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO

<b>Update:</b>	not recommended
<b>dsnhdcep:</b>	PADNTSTR

**NO**

Nul-terminated output host variables have the nul-terminator placed at the end of actual data that is returned in the host variable.

**YES**

Nul-terminated output host variables have the nul-terminator placed at the end of the string, after the string has been padded with blanks from the end of the actual data to the length of the output host variable.

## DSNTIP8: Performance and optimization panel

The DSNTIP8 panel is a continuation of the DSNTIP4 panel. It is used to set application programming default values pertaining to performance and optimization.

```

DSNTIP8          INSTALL DB2 - PERFORMANCE AND OPTIMIZATION
====> _

Enter data below:

 1 CACHE DYNAMIC SQL      ==> YES      NO or YES
 2 CACHE DYN STABILITY   ==> BOTH     CAPTURE, LOAD, BOTH, or NONE
 3 OPTIMIZATION HINTS    ==> NO      Enable optimization hints. NO or YES
 4 EVALUATE UNCOMMITTED  ==> NO      Evaluate uncommitted data. NO or YES
 5 SKIP UNCOMM INSERTS   ==> NO      Skip uncommitted inserts. NO or YES
 6 IMMEDIATE WRITE       ==> NO      NO or YES

 7 PLAN MANAGEMENT       ==> EXTENDED OFF, BASIC, EXTENDED
 8 PLAN MANAGEMENT SCOPE ==> STATIC  STATIC
 9 PACKAGE RELEASE COMMIT==> YES      Permit BIND and REBIND at COMMIT time
                                     on packages bound as RELEASE(DEALLOCATE)
10 RANDOMIZE XML DOCID   ==> NO      NO or YES
11 REAL TIME STATS       ==> 30      RTS time interval in minutes. 1-144
12 DISABLE EDM RTS       ==> NO      Disable EDM real time stats. NO or YES
13 STATISTICS FEEDBACK   ==> ALL     Scope of statistics feedback: ALL,
                                     DYNAMIC, NONE, or STATIC
14 STATS PROFILE FEEDBACK ==> YES     Statistics profile feedback: NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 33. Performance and optimization panel: DSNTIP8

### CACHE DYNAMIC SQL field (CACHEDYN subsystem parameter)

The CACHEDYN subsystem parameter controls whether prepared, dynamic SQL statements are saved in dynamic statement cache for later use by eligible application processes.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM CACHEDYN
<b>Security parameter:</b>	Security-related

**YES**

Causes prepared, dynamic SQL statements to be cached in the dynamic statement cache. If you specify YES, consider this usage when you calculate your EDM pool size. If you specify YES, you must also specify YES for the USE PROTECTION field on panel DSNTIPP.

## NO

Causes prepared, dynamic SQL statements to not be cached.

**Note:** This is a security-related parameter. When RACF authorization is used and this parameter is set, the changes that are made in RACF profiles are not immediately reflected. This setting might result in a user (cached AUTHID) being able to issue the dynamic statements until the cache is refreshed.

### Related concepts

Dynamic SQL statements that Db2 can cache (Db2 Performance)

### Related reference

USE PROTECTION field (AUTH subsystem parameter)

The AUTH subsystem parameter controls whether Db2 is to check authorizations.

### Related information

Dynamic Statement Cache (white paper)

## CACHE DYN STABILITY field (CACHEDYN\_STABILIZATION subsystem parameter)

The CACHEDYN\_STABILIZATION subsystem parameter specifies whether dynamic SQL statements can be captured for stabilization and whether Db2 uses the captured run time structures to process stabilized dynamic SQL statements that are not present in the dynamic statement cache. Db2 avoids processing full prepares when it uses the captured run time structures.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	BOTH, CAPTURE, LOAD, NONE
<b>Default:</b>	BOTH
<b>Data sharing scope:</b>	Same setting recommended on all members
<b>Update:</b>	option 29 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SPRM.CACHEDYN_STABILIZATION

The following table summarizes the effects of the CACHEDYN\_STABILIZATION subsystem parameter on the processing of START DYNQUERYCAPTURE commands and dynamic SQL statements:

Effects of CACHEDYN\_STABILIZATION subsystem parameter values

CACHEDYN_STABILIZATION value	Db2 accepts START DYNQUERYCAPTURE commands and captures run time structures for in-progress MONITOR(YES) commands ?	Db2 dynamic SQL uses captured run time structures to avoid full prepares for dynamic SQL?
BOTH	Yes	Yes
CAPTURE	Yes	No
LOAD	No	Yes
NONE	No	No

### BOTH

Dynamic SQL statements are captured to the catalog, and Db2 uses captures access paths for stabilized statements.

## CAPTURE

Dynamic SQL statements can be captured to the catalog, but Db2 does not use any captured access paths.

## LOAD

Db2 uses captured access paths for dynamic SQL statements, but statements cannot be captured for stabilization.

## NONE

Dynamic statements cannot be captured and Db2 does not use any captured access paths.

### Related tasks

[Stabilizing access paths for dynamic SQL statements \(Db2 Performance\)](#)

### Related reference

[-START DYNQUERYCAPTURE command \(Db2\) \(Db2 Commands\)](#)

## OPTIMIZATION HINTS field (OPTHINTS subsystem parameter)

The OPTHINTS subsystem parameter specifies whether Db2 applies various methods for influencing access path selection when static SQL statements are bound or dynamic SQL statements are prepared.

Db2 applies matching various methods for influencing access path selection for SQL statements only when the value of the OPTHINTS subsystem parameter is set to YES.

Examples of these methods include:

- Statement-level predicate selectivity overrides.
- Statement-level access paths.
- Statement-level optimization parameters.
- PLAN\_TABLE access path hints.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM OPTHINTS

If you accept the default value, you the methods are not applied and the statements are optimized normally.

When the value is set to YES, Db2 applies hints in the following situations:

- For rows in a PLAN\_TABLE instance that contain a value in the OPTHINT column that matches the value of the OPTHINT bind option or the CURRENT OPTIMIZATION HINT special register.
- For any instance of a statement whose application environment and text matches rows in the SYSIBM.SYSQUERY catalog table.

### Related tasks

[Preparing to influence access paths \(Db2 Performance\)](#)

[Influencing access path selection \(Db2 Performance\)](#)

[Managing and preventing access path change \(Db2 Performance\)](#)

### Related reference

[PLAN\\_TABLE \(Db2 Performance\)](#)

[SYSQUERY catalog table \(Db2 SQL\)](#)

[CURRENT OPTIMIZATION HINT special register \(Db2 SQL\)](#)

[BIND and REBIND options for packages, plans, and services \(Db2 Commands\)](#)

## EVALUATE UNCOMMITTED field (EVALUNC subsystem parameter)

The EVALUNC subsystem parameter controls whether predicate evaluation is to be allowed on uncommitted data of other transactions. This parameter applies only to stage 1 predicate processing that uses table access for queries with isolation level RS or CS. Table access includes table space scan, index-to-data access, and RID-list processing.

The EVALUNC subsystem parameter applies to predicates in queries, searched UPDATE statements, and searched DELETE statements.

EVALUNC does not apply to the following cases:

- To predicates in SQL statements that access the Db2 catalog or directory
- To data definition statements, such as DROP TABLESPACE, for which internal processes query catalog or directory tables

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM EVALUNC

### NO

Predicate evaluation occurs only on committed data (or on the application's own uncommitted changes). NO ensures that all qualifying data is always included in the answer set.

This is the default value.

### YES

Predicate evaluation can occur on uncommitted data of other transactions. With YES, data might be excluded from the answer set. Data that does not satisfy the predicate during evaluation but then, because of undo processing (ROLLBACK or statement failure), reverts to a state that does satisfy the predicate is missing from the answer set. A value of YES enables Db2 to take fewer locks during query processing. The number of avoided locks depends on:

- The query's access path
- The number of evaluated rows that do not satisfy the predicate
- The number of those rows that are on overflow pages

**Recommendation:** Specify YES to improve concurrency if your applications can tolerate returned data that might falsely exclude any data that would be included as the result of undo processing (ROLLBACK or statement failure).

Although the option influences whether predicate evaluation can occur on uncommitted data, it does not influence whether uncommitted data is returned to an application. Queries with isolation level RS or CS return only committed data. They never return the uncommitted data of other transactions, even if predicate evaluation occurs. If data satisfies the predicate during evaluation, the data is locked as needed, and the predicate is re-evaluated as needed before the data is returned to the application.

## SKIP UNCOMM INSERTS field (SKIPUNCI subsystem parameter)

The SKIPUNCI subsystem parameter specifies whether statements ignore a row that was inserted by another transaction if the row has not yet been detected as committed. A newly inserted row can be detected as committed only after the lock held on the row has been released.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB

<b>DSNZPxxx:</b>	DSN6SPRM SKIPUNCI
------------------	-------------------

SKIP UNCOMM INSERTS applies only to statements running with row-level locking and read stability or cursor stability isolation level.

**NO**

Db2 waits for the inserted row to be committed or rolled back. It then processes the row if the insert commits, or it moves on to find another row if the insert is rolled back. If a transaction performs one or more inserts, and then spawns a second transaction, specify NO for SKIP UNCOMM INSERTS if the first transaction needs the second transaction to wait for the outcome of the inserts.

This is the default value.

**YES**

Until the lock held on a newly inserted row is released, Db2 behaves as though the newly inserted row has not yet arrived and the row is skipped. Specifying a value of YES offers greater concurrency than the default value of NO.

**Related tasks**

[Accessing currently committed data to avoid lock contention \(Db2 Performance\)](#)

[Choosing a CURRENTDATA option \(Db2 Performance\)](#)

[Choosing an ISOLATION option \(Db2 Performance\)](#)

[Improving concurrency for applications that tolerate incomplete results \(Db2 Performance\)](#)

**Related reference**

[CONCURRENTACCESSRESOLUTION bind option \(Db2 Commands\)](#)

**IMMEDIATE WRITE field (IMMEDWRI subsystem parameter)**

The IMMEDWRI subsystem parameter determines when updates to group buffer pool-dependent buffers are to be written to the coupling facility.

**Deprecated subsystem parameter:** Non-default settings for IMMEDWRI are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value NO.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6GRP IMMEDWRI

**YES**

Db2 immediately writes the page to the coupling facility after the update occurs.

**NO**

Db2 does not immediately write the change buffer to the coupling facility. Instead, Db2 waits until phase 1 of commit.

If either the IMMEDWRITE bind option or the IMMEDWRI subsystem parameter is set to YES, the value of the immediate write option at run time is also YES.

**PLAN MANAGEMENT field (PLANMGMT subsystem parameter)**

The PLANMGMT subsystem parameter specifies which default plan management policy to use for storing information about access paths information for SQL statements when the PLANMGMT bind option is not explicitly specified for the rebind of a package.

<b>Acceptable values:</b>	EXTENDED, OFF, BASIC,
<b>Default:</b>	EXTENDED

<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PLANMGMT

### EXTENDED

Db2 saves the active copy, and two older copies, which are known as the *previous* and *original* copies. Db2 replaces the previous copy with the former active copy and saves the newest copy as the active copy. Db2 saves the original copy at the first rebind that EXTENDED is specified and retains the original copy unchanged at subsequent rebinds.

FL 505 Multiple phased-out copies can also be saved for phase-in of package rebinds. For more information, see [Phase-in of package rebinds \(Db2 Application programming and SQL\)](#).

EXTENDED is the default value.

### BASIC

Db2 saves the active copy and one older copy, which is known as the *previous* copy. Db2 replaces the previous copy path with the former active copy and saves the newest copy the active copy.

### OFF

No copies are saved.

### Related tasks

[Saving and switching to previous access paths \(Db2 Performance\)](#)

### Related reference

[PLANMGMT bind option \(Db2 Commands\)](#)

## PLAN MANAGEMENT SCOPE field (PLANMGMTSCOPE subsystem parameter)

The PLANMGMTSCOPE subsystem parameter specifies the types of SQL statements for applying the PLANMGMT subsystem parameter setting. The only supported value is STATIC.

**Deprecated subsystem parameter:** The PLANMGMTSCOPE subsystem parameter is deprecated, meaning that it might be removed eventually.

<b>Acceptable values:</b>	STATIC
<b>Default:</b>	STATIC
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PLANMGMTSCOPE

### STATIC

Db2 stores access path information for only static SQL queries.

### Related tasks

[Saving and switching to previous access paths \(Db2 Performance\)](#)

### Related reference

[PLAN MANAGEMENT field \(PLANMGMT subsystem parameter\)](#)

The PLANMGMT subsystem parameter specifies which default plan management policy to use for storing information about access paths information for SQL statements when the PLANMGMT bind option is not explicitly specified for the rebind of a package.

## PACKAGE RELEASE COMMIT field (PKGREL\_COMMIT subsystem parameter)

The PKGREL\_COMMIT subsystem parameter specifies whether persistent Db2 threads release packages that are active on the thread at ROLLBACK or COMMIT, if certain Db2 operations are waiting for exclusive access to the package. This parameter is applicable to both local and distributed threads.

The value in this field is meaningful only for packages that are bound with the RELEASE(DEALLOCATE) bind option.



<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PKGREL_COMMIT

#### YES

For packages that are bound with the RELEASE(DEALLOCATE) option, the following operations can proceed at COMMIT or ROLLBACK while the package is active and allocated for a persistent Db2 thread:

- BIND REPLACE PACKAGE and REBIND PACKAGE requests, including automatic rebind for online schema changes (DDL statements) for tables and indexes that are statically referenced by the package
- Online REORG operations that materialize pending definition changes for objects that are statically referenced by the package

YES is the default value.

#### NO

Db2 does not implicitly release an active package at COMMIT or ROLLBACK when it is activate and allocated for a persistent Db2 thread.

#### Related reference

[RELEASE bind option \(Db2 Commands\)](#)

### RANDOMIZE XML DOCID field (XML\_RANDOMIZE\_DOCID subsystem parameter)

Specifies whether Db2 is to sequentially or randomly generate the DOCID values for XML columns.

This parameter does not affect existing tables that have XML columns. Those tables continue to generate DOCIDs in the order that was specified by XML\_RANDOMIZE\_DOCID when the table was created or in sequential order if the parameter was not specified.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP XML_RANDOMIZE_DOCID

#### NO

Db2 generates the DOCID values for XML columns sequentially.

#### YES

Db2 generates the DOCID values for XML columns randomly. Setting this parameter to YES can be beneficial for performance when concurrent inserts are expected.

Once a table starts to randomly generate DOCID values for XML columns, it cannot be changed to generate the value sequentially. Changing this parameter back to NO does not have any effect on tables that have had columns added with a randomized DOCID.

### DISABLE EDM RTS field (DISABLE\_EDMRTS subsystem parameter)

The DISABLE\_EDMRTS subsystem parameter specifies whether to disable the collection of real-time statistics by the environmental description manager (EDM). By default, EDM collects real-time statistics to track when packages were last used.

<b>Acceptable values:</b>	NO, YES
---------------------------	---------

<b>Default:</b>	NO
<b>Update:</b>	option 29 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DISABLE_EDMRTS

#### NO

EDM continues to collect real-time statistics about the last use of packages. This is the recommended value.

#### YES

EDM does not collect real-time statistics about the last use of packages. YES might be appropriate in the following situations:

- You have no need to collect information about the last use of packages.
- The SYSIBM.SYSPACKAGE table is persistently unavailable, which prevents the recording of EDM real-time statistics.
- Deferred externalization of these statistics to the SYSIBM.SYSPACKAGE table causes excessive Db2 shutdown time.
- Collection of these EDM statistics causes performance degradation.

In a data sharing environment, all members should use the same setting for this parameter.

### REAL TIME STATS field (STATSINT subsystem parameter)

The STATSINT subsystem parameter specifies the interval, in minutes, at which Db2 writes in-memory page set statistics to the real-time statistics tables. The value of the STATSINT subsystem parameter also controls the interval for writing statistics recommendations to the SYSIBM.SYSSTATSFEEDBACK catalog table. Db2 waits the specified number of minutes after the completion of the previous operation to begin the next operation.

<b>Acceptable values:</b>	1–1440
<b>Default:</b>	30
<b>Update:</b>	option 24 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STATSINT

#### Related concepts

When Db2 externalizes real-time statistics ([Db2 Performance](#))

#### Related tasks

[Controlling the collection of statistics feedback \(Db2 Performance\)](#)

#### Related reference

[SYSINDEXSPACESTATS catalog table \(Db2 SQL\)](#)

[SYSTABLESPACESTATS catalog table \(Db2 SQL\)](#)

[SYSSTATFEEDBACK catalog table \(Db2 SQL\)](#)

### STATISTICS FEEDBACK field (STATFDBK\_SCOPE subsystem parameter)

The STATFDBK\_SCOPE subsystem parameter specifies the scope of the SQL statements that Db2 collects statistics recommendations for in the SYSIBM.SYSSTATFEEDBACK catalog table.

<b>Acceptable values:</b>	ALL, DYNAMIC, NONE, or STATIC
<b>Default:</b>	ALL
<b>Update:</b>	option 24 on panel DSNTIPO
<b>DSNZPxxx:</b>	DSN6SPRM STATFDBK_SCOPE

**NONE**

No statistics recommendations are collected in the catalog table.

**DYNAMIC**

Statistics recommendations are collected in the catalog table for dynamic SQL statements only.

**STATIC**

Statistics recommendations are collected in the catalog table for static SQL statements only.

**ALL**

Statistics recommendations are collected in the catalog table for all SQL Statements.

**Related tasks**

[Controlling the collection of statistics feedback \(Db2 Performance\)](#)

**Related reference**

[SYSSTATFEEDBACK catalog table \(Db2 SQL\)](#)

## STATISTICS PROFILE FEEDBACK field (STATFDBK\_PROFILE subsystem parameter)

The STATFDBK\_PROFILE subsystem parameter specifies whether statistics recommendations identified during query optimization directly result in modifications to statistics profiles.

<b>Acceptable values:</b>	YES or NO
<b>Default:</b>	Yes
<b>Data sharing scope:</b>	Same setting recommended on all members
<b>Update:</b>	option 24 on panel DSNTIPO
<b>DSNZPxxx:</b>	DSN6SPRM.STATFDBK_PROFILE

**YES**

Db2 modifies or creates statistics profiles based on statistics recommendations during query optimization.

Whenever Db2 writes new statistics recommendations to the SYSIBM.SYSSTATFEEDBACK catalog table, it also updates existing statistics profiles based on the recommendations:

- If no profile exists, Db2 creates new profiles for some recommendations. The new profiles collect existing statistics (similar to the result of RUNSTATS SET PROFILE FROM EXISTING STATS) plus statistics for new and existing uncollected statistics recommendations.
- Existing profiles are modified depending on the type of statistics recommendation:

**TYPE='I'**

No profiles are changed, and no profiles are created for this recommendation type.

**TYPE='I'**

If the existing statistics profile does not include the index, the index is added with default collection. Any existing list of indexes without FREQVAL or HISTOGRAM specified is changed to INDEX(ALL).

No profiles are created for this recommendation type.

**TYPE='C' with NUMCOLS = 1**

If the existing profile does not include the column, the column is added.

No profiles are created for this recommendation type.

**TYPE='C' with NUMCOLS > 1**

If the existing statistics profile does not include the column group, the column group is added with COLGROUP syntax. KEYCARD recommendations add the corresponding index.

If no statistics profile exists for the table, a new profile that includes the column group and INDEX(ALL) is created.

### TYPE='F' or 'H'

If the existing statistics profile does not include the frequency or histogram statistic, it is added. Db2 automatically determines the number columns to collect. Histogram statistics are added without a NUMQUANTILES specification. The frequency or histogram statistics are added in COLGROUP syntax. However, if the recommendation is for an index on expression, INDEX syntax is used instead.

In no statistics profile exists for the table, a new profile that collects the frequency or histogram statistics and INDEX(ALL) is created.

- If Db2 detects certain statistics that provide no value for query optimization, such as certain multi-column frequency statistics, it modifies the profile to prevent the future collection of the useless statistics. Db2 also removes the statistics from the relevant catalog tables and issues a message to indicate the removal.
- If CREATE INDEX statement is issued, Db2 adds the index to the existing statistics profile for the related table.

### NO

Db2 does not modify statistics profiles based on statistics recommendations during query optimization. However, Db2 might still write the recommendations to the SYSIBM.SYSSTATFEEDBACK catalog table, depending on the value of subsystem parameter STATFDBK\_SCOPE.

### Related concepts

[Statistics profiles \(Db2 Performance\)](#)

### Related tasks

[Applying statistics recommendations to statistics profiles automatically \(Db2 Performance\)](#)

[Controlling the collection of statistics feedback \(Db2 Performance\)](#)

## DSNTIP81: Performance and optimization panel 2

The DSNTIP81 panel is a continuation of the DSNTIP8 panel. It is used to set application programming default values pertaining to performance and optimization panel.

```
DSNTIP81 INSTALL DB2 - PERFORMANCE AND OPTIMIZATION (PANEL 2)
====> _

Enter data below:

1 CURRENT DEGREE          ====> 1          1 or ANY
2 MAX DEGREE              ====> 0          Maximum degree of parallelism. 0-254
3 MAX DEGREE FOR DPSI     ====> 0          Maximum degree of parallelism for data
                                         partitioned secondary indexes. 0-254
                                         or DISABLE
4 PARALLELISM EFFICIENCY====> 50          Efficiency of parallelism. 0-100

5 STAR JOIN QUERIES       ====> DISABLE   DISABLE, ENABLE, 1-32768
6 MAX DATA CACHING       ====> 20          0-512

Enter default settings for maintained query special registers:
7 CURRENT REFRESH AGE     ====> 0          0 or ANY
8 CURRENT MAINT TYPES     ====> SYSTEM   NONE, SYSTEM, USER, ALL

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 34. Performance and optimization panel: DSNTIP81

## CURRENT DEGREE field (CDSSRDEF subsystem parameter)

The CDSSRDEF subsystem parameter determines the default value that is to be used for the CURRENT DEGREE special register. The default value is used when a degree is not explicitly set in the SQL statement SET CURRENT DEGREE.

<b>Acceptable values:</b>	1, ANY
<b>Default:</b>	1
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM CDSSRDEF

### 1

Specifies that when a query is dynamically prepared, the execution of that query will not use parallelism.

If this value is specified, Db2 does not use any optimization hints for parallelism.

### ANY

Specifies that when a query is dynamically prepared, the execution of that query can involve parallelism.

**Recommendation:** In almost all situations, accept the default value of 1. You should use parallelism selectively where it provides value, rather than globally. Although parallelism can provide a substantial reduction in elapsed time for some queries with only a modest overhead in processing time, parallelism does not always provide the intended benefit. For some queries and in many other situations, query parallelism does not provide an improvement, or it uses too many resources. If you are using nearly all of your CPU, I/O, or storage resources, parallelism is more likely to cause degradation of performance. Use parallelism only where it is most likely to provide benefits.

## MAX DEGREE field (PARAMDEG subsystem parameter)

The PARAMDEG subsystem parameter specifies the maximum degree of parallelism for a parallel group. When you specify a non-zero value for this parameter, you limit the degree of parallelism so that Db2 cannot create too many parallel tasks that use virtual storage.

<b>Acceptable values:</b>	0–254
<b>Default:</b>	0
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PARAMDEG

### 0

Specifies no limit to the maximum degree of parallelism that Db2 chooses based on the cost estimate for the query and the system configuration, in particular the number of processors online. Db2 counts both general purpose and zIIP processors equally, and applies further adjustment to determine the degree to use.

### 1–254

Specifies the maximum degree of parallelism that Db2 uses.

When optimization hints for parallelism are used, the value of the PARAMDEG subsystem parameter does not limit the degree of parallelism at bind time. However, the value of the PARAMDEG subsystem parameter is enforced at execution time. So, if the value of the PARAMDEG subsystem parameter is lower than the degree of parallelism that is specified at bind time, the degree of parallelism is reduced at execution time.

**Tip:** For systems with more than two zIIP processors configured, use the number of zIIP processors as the starting value, and then adjust as needed for your response time requirements.

## Related tasks

[Enabling parallel processing \(Db2 Performance\)](#)

[Disabling query parallelism \(Db2 Performance\)](#)

[Specifying optimization parameters at the statement level \(Db2 Performance\)](#)

## MAX DEGREE FOR DPSI (PARAMDEG\_DPSI subsystem parameter)

The PARAMDEG\_DPSI subsystem parameter specifies the maximum degree of parallelism that you can specify for a parallel group in which a data partitioned secondary index (DPSI) is used to drive parallelism.

A DPSI is a nonpartitioning index that is physically partitioned according to the partitioning scheme of the table. When you specify a value of greater than 0 for this parameter, you limit the degree of parallelism for DPSIs so that Db2 does not create too many parallel tasks that use virtual storage.

<b>Acceptable values:</b>	0-254, DISABLE
<b>Default:</b>	0
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PARAMDEG_DPSI
<b>Data sharing scope:</b>	All members use the same setting

### 0

Specifies that Db2 uses the value that is specified for the PARAMDEG subsystem parameter, instead of PARAMDEG\_DPSI, to control the degree of parallelism when DPSI is used to drive parallelism. This is the default value for the field.

### 1

Specifies that Db2 creates multiple child tasks but works on one task at a time when DPSI is used to drive parallelism.

### 2-254

Specifies that Db2 creates multiple child tasks and works concurrently on the tasks that are specified. The number of specified tasks may be larger or smaller than the number of tasks as specified in PARAMDEG. When PARAMDEG is set to 1, the rest of the query does not have any parallelism.

### DISABLE

Specifies that Db2 does not use DPSI to drive parallelism. Parallelism might still occur for the query if PARAMDEG is greater than 1.

## PARALLELISM EFFICIENCY field (PARA\_EFF subsystem parameter)

The PARA\_EFF subsystem parameter controls the efficiency that Db2 assumes for parallelism when Db2 chooses an access path. The integer value that is used for this parameter represents a percentage efficiency.

**Deprecated subsystem parameter:** Non-default settings for PARA\_EFF are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 50.

<b>Acceptable values:</b>	0-100
<b>Default:</b>	50
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PARA_EFF

## Related tasks

[Tuning parallel processing \(Db2 Performance\)](#)

## STAR JOIN QUERIES field (STARJOIN subsystem parameter)

The STARJOIN subsystem parameter specifies whether star join processing is to be enabled.

<b>Acceptable values:</b>	DISABLED, ENABLED, 1–32768
<b>Default:</b>	DISABLED
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STARJOIN

### DISABLED

Star schema processing is disabled.

### ENABLED

Star schema processing is enabled if the cardinality of the fact table is at least 25 times the cardinality of the largest dimension that is a base table that is joined to the fact table.

#### 1

Star schema processing is enabled. The single table with the largest cardinality is the fact table. However, if more than one table has this cardinality, star join is not enabled.

#### 2–32768

Star schema processing is enabled if the cardinality of the fact table is at least the specified number times the cardinality of the largest dimension that is a base table that is joined to the fact table.

### Related concepts

[Star schema access \(Db2 Performance\)](#)

### Related reference

[SJTABLES](#) in macro DSN6SPRM

Specifies whether Db2 enables star join processing.

## MAX DATA CACHING field (MXDTCACH subsystem parameter)

The MXDTCACH subsystem parameter specifies the maximum amount of memory, in MB, that is to be allocated for data caching for each thread.

<b>Acceptable values:</b>	0–512
<b>Default:</b>	20
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MXDTCACH

MXDTCACH controls memory allocation for queries that use sparse index access (PLAN\_TABLE column PRIMARY\_ACCESTYPE='T') or pair-wise join access (PLAN\_TABLE column JOIN\_TYPE='P').

If you specify 0, Db2 does not use data caching during query execution. If you specify a value in the range 1–512, Db2 allocates memory from above the 2 GB bar pool up to the specified size for data caching.

### Related concepts

[Nested loop join \(METHOD=1\) \(Db2 Performance\)](#)

[Index access \(ACCESTYPE is 'I', 'IN', 'I1', 'N', 'MX', or 'DX'\) \(Db2 Performance\)](#)

[Pair-wise join access \(JOIN\\_TYPE='P'\) \(Db2 Performance\)](#)

[Interpreting data access by using EXPLAIN \(Db2 Performance\)](#)

### Related tasks

[Calculating sort pool size](#)

The Db2 sort process uses two kinds of storage: local storage and buffer pool storage. Sort pool storage and buffer pools have storage above the 2 GB bar.

### **CURRENT REFRESH AGE field (REFSHAGE subsystem parameter)**

The REFSHAGE subsystem parameter specifies the default value for the CURRENT REFRESH AGE special register. The default value is used when no value is explicitly set by using the SET CURRENT REFRESH AGE statement.

<b>Acceptable values:</b>	0, ANY
<b>Default:</b>	0
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REFSHAGE

Accepting the default value of 0 disables query rewrite using deferred materialized query tables.

### **CURRENT MAINT TYPES field (MAINTYPE subsystem parameter)**

The MAINTYPE subsystem parameter specifies the default value for the CURRENT MAINTAINED TABLE TYPES FOR OPTIMIZATION special register. This value is to be used when no value is explicitly set by using the SQL statement SET CURRENT MAINTAINED TABLE TYPES FOR OPTIMIZATION.

<b>Acceptable values:</b>	NONE, SYSTEM, USER, ALL
<b>Default:</b>	SYSTEM
<b>Update:</b>	option 30 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAINTYPE

#### **NONE**

Does not allow query rewrite.

#### **SYSTEM**

Allows query rewrite by using system-maintained materialized query tables (SYSTEM) when CURRENT REFRESH AGE is set to ANY.

#### **USER**

Allows query rewrite by using user-maintained materialized query tables when CURRENT REFRESH AGE is set to ANY.

#### **ALL**

Allows query rewrite by using both system-maintained and user-maintained materialized query tables.



## DSNTIP82: Query accelerator preferences panel

The DSNTIP82 panel is used to set application programming default values pertaining to query accelerators.

```
DSNTIP82 INSTALL DB2 - QUERY ACCELERATOR PREFERENCES
====> _

Enter query accelerator options below:

1 ACCELERATOR STARTUP ===> NO          NO, COMMAND, or AUTO
2 GET ACCEL ARCHIVE   ===> NO          NO or YES
3 ACCELERATION OPTIONS ===> NONE       NONE or YES

Enter CURRENT QUERY ACCELERATION special register option:
4 CURRENT QUERY ACCEL ===> 1          1 = NONE
                                       2 = ENABLE
                                       3 = ENABLE_WITH_FAILBACK
                                       4 = ELIGIBLE
                                       5 = ALL

Enter CURRENT QUERY ACCELERATION WAITFORDATA special register option:
5 WAIT FOR DATA      ===> 0          0.0 - 3600.0

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 35. Query accelerator preferences panel: DSNTIP82

### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)

## ACCELERATION STARTUP field (ACCEL subsystem parameter)

Specifies whether accelerator servers can be used with a Db2 subsystem, and how the accelerator servers are to be enabled and started. An accelerator server cannot be started unless it is enabled.

<b>Acceptable values:</b>	NO, AUTO, COMMAND
<b>Default:</b>	NO
<b>Update:</b>	option 31 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.ACCEL

### NO

Specifies that accelerator servers cannot be used with the Db2 subsystem.

### AUTO

Specifies that accelerator servers are automatically enabled and started when the Db2 subsystem is started.

### COMMAND

Specifies that accelerator servers are automatically enabled when the Db2 subsystem is started. The accelerator servers can be started with the Db2 START ACCEL command.

### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)

## GET ACCEL ARCHIVE field (GET\_ACCEL\_ARCHIVE subsystem parameter)

The GET\_ACCEL\_ARCHIVE subsystem parameter determines the default value that is to be used for the CURRENT GET\_ACCEL\_ARCHIVE special register.

The GET\_ACCEL\_ARCHIVE subsystem parameter is used when no value is explicitly set for the CURRENT GET\_ACCEL\_ARCHIVE special register by the SQL statement SET CURRENT GET\_ACCEL\_ARCHIVE.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 31 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.GET_ACCEL_ARCHIVE

### NO

Specifies that if a table is archived in an accelerator server, and a query references that table, the query does not use the data that is archived.

### YES

Specifies that if a table is archived in an accelerator server, and a query references that table, the query uses the data that is archived.

### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)

## ACCELERATION OPTIONS field (QUERY\_ACCEL\_OPTIONS subsystem parameter)

The QUERY\_ACCEL\_OPTIONS subsystem parameter controls whether certain types of queries are allowed to execute on an accelerator server.

<b>Acceptable values:</b>	ACCELERATION OPTIONS field: NONE, YES QUERY_ACCEL_OPTIONS parameter: NONE, <i>options-list</i>
<b>Default:</b>	NONE
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS

### NONE

Specifies that you do not want to choose whether Db2 allows certain types of queries to run on an accelerator server. Db2 does not allow any of those types of queries to run on an accelerator server.

### YES

Panel DSNTIP8A opens after you complete DSNTIP82, and the *options-list* value for QUERY\_ACCEL\_OPTIONS is based on the options that you specify.

For example, if you specify YES for fields 1, 2, and 5 on panel DSNTIP8A, Db2 uses the following setting:

```
QUERY_ACCEL_OPTIONS=(1,2,5)
```

## Panel DSNTIP8A

On panel DSNTIP8A, you select the types of queries that Db2 allows to run on an accelerator server.

```

+----- ACCELERATION OPTIONS -----+
| DSN TIP8A           Acceleration Options Panel |
| ===> |
|
| Allow queries to run on an accelerator server that contain:
| 1 MBCS EBCDIC           ===> NO      NO or YES
| 2 INSERT FROM SELECT    ===> NO      NO or YES
| 3 BYTE-BASED STRING FUNCTIONS ===> NO      NO or YES
| 4 DD/MM/YYYY LOCAL DATE FORMAT ===> NO      NO or YES
| 5 SYSTEM_TIME TEMPORAL QUERIES ===> NO      NO or YES
| 6 TS COLS WITH PRECISION OF 12 ===> NO      NO or YES
| 7 YYYYMMDD LOCAL DATE FORMAT ===> NO      NO or YES
| 8 FAVOR NEW ACCELERATOR_TYPE ===> NO      NO or YES
| 9 ENABLE UNCERTAINTY COST ESTIMATION ===> NO      NO or YES
| 10 BALANCE WORKLOAD BETWEEN VERSIONS ===> NO      NO or YES
| 11 USE ONLY NEW ACCELERATOR_TYPE ===> NO      NO or YES
| 12 IN PREDICATE WITH MORE THAN 32K ELEMENTS ===> NO      NO or YES
| 13 ENABLE ACCELERATOR SPECIFIC RESULTS ===> NO      NO or YES
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 36. DSN TIP8A

## 1 MBCS EBCDIC

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 1)

### NO

Specifies that queries that include data that is encoded in a multi-byte-character-set EBCDIC encoding scheme are blocked from executing on an accelerator server.

### YES

Specifies that queries that include data that is encoded in a multi-byte-character-set EBCDIC encoding scheme are allowed to execute on an accelerator server.

If the accelerator server encodes data in another encoding scheme, such as Unicode UTF-8, the collating sequence for the data on the accelerator server is different from the collating sequence for the data in Db2. This difference affects data ordering and the results from range predicates. Therefore, if table columns include any mixture of uppercase characters, lowercase characters, numeric characters, or national language characters, and the SQL statements that query those tables include range predicates or ordering on those columns, the results of executing a query in Db2 might be different from the results of executing the same query on an accelerator server.

## 2 INSERT FROM SELECT

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 2)

### NO

Specifies that for queries that include an INSERT FROM SELECT statement, the SELECT operation does not run on an accelerator server.

### YES

Specifies that for queries that include an INSERT FROM SELECT statement, the SELECT operation can run on an accelerator server.

If the SELECT operation runs on the accelerator server, the data that is operated on by the SELECT operation might not be current in the accelerator server.

### 3 BYTE-BASED STRING FUNCTIONS

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 3)

#### NO

Specifies that queries that contain built-in functions for which Db2 processes each byte of the input string, rather than each character of the input string, do not run on an accelerator server.

#### YES

Specifies that queries that contain built-in functions for which Db2 processes each byte of the input string, rather than each character of the input string, can run on an accelerator server. The queries can run on an accelerator server even when the input string is encoded in a multi-byte-character encoding scheme. Unicode is an example of a multi-byte-character encoding scheme.

For an accelerator server that supports only functions that operate on the characters in an input string, if the input data on which the function operates contains only single-byte characters, the function returns the same result when it runs on the accelerator server and when it runs on Db2. However, if the input data contains multi-byte characters, the function returns different results when it runs on the accelerator server and when it runs on Db2.

### 4 DD/MM/YYYY LOCAL DATE FORMAT

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 4)

#### NO

Specifies that queries that reference an expression with a DATE data type that uses a LOCAL format are blocked from running on an accelerator server.

#### YES

Specifies that queries that reference an expression with a DATE data type that uses a LOCAL format are not blocked from running on an accelerator server. The accelerator server uses the format 'dd/mm/yyyy' to interpret the input and output date value.

Option 4 is not permitted when option 7 has been selected.

Specify option 4 only when one of the following conditions exists:

- The DATE FORMAT field of the DSNTIP4 panel specifies LOCAL.
- Application programs that process SQL on Db2 are precompiled with the DATE(LOCAL) option.

In both of these cases, the LOCAL date exit routine must define the specific 'dd/mm/yyyy' date format. If the LOCAL format is not defined as 'dd/mm/yyyy', the query might return unpredictable results.

### 5 SYSTEM\_TIME TEMPORAL QUERIES

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 5)

#### NO

Specifies that SYSTEM\_TIME temporal queries will not be offloaded to an accelerator.

**YES**

Specifies that SYSTEM\_TIME temporal queries will be offloaded to an accelerator.

**6 TS COLS WITH PRECISION OF 12**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 6)

**NO**

Specifies that queries will not be offloaded to an accelerator if the queries reference timestamp columns with precision of 12.

**YES**

Specifies that queries will be offloaded to an accelerator if the queries reference timestamp columns with precision of 12.

**7 YYYYMMDD LOCAL DATE FORMAT**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 7)

**NO**

Specifies that queries that reference an expression with a DATE data type that uses a LOCAL format are blocked from running on an accelerator server.

**YES**

Specifies that queries that reference an expression with a DATE data type that uses a LOCAL format are not blocked from running on an accelerator server. The accelerator server uses the format YYYYMMDD, padded with two blanks at the end, to interpret the input and output data value.

Option 7 is not permitted when option 4 has been selected.

Specify option 7 only when one of the following conditions exists:

- The DATE FORMAT field of the DSNTIP4 panel specifies LOCAL.
- Application programs that process SQL on Db2 are precompiled with the DATE(LOCAL) option.

In both cases, the LOCAL date exit routine must define the specific 'yyyymmdd' date format. If the LOCAL format is not defined as 'yyyymmdd', the query might return unpredictable results.

**8 FAVOR NEW ACCELERATOR\_TYPE**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 8)

**NO**

Specifies that in a Db2 environment that includes both a V5 accelerator server and a V7 accelerator server, statements that are eligible to be accelerated on either of the accelerator servers are sent to the V5 accelerator server.

**YES**

Specifies that in a Db2 environment that includes both a V5 accelerator server and a V7 accelerator server, statements that are eligible to be accelerated on either of the accelerator servers are sent to the V7 accelerator server.

**Important:** FAVOR NEW ACCELERATOR\_TYPE is ignored if option 11, USE ONLY NEW ACCELERATOR\_TYPE, is set to YES.

**9 ENABLE UNCERTAINTY COST ESTIMATION**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 9)

**NO**

Specifies that uncertainty cost consideration is disabled on the accelerator for offloaded queries.

**YES**

Specifies that uncertainty cost consideration is enabled on the accelerator for offloaded queries.

**10 BALANCE WORKLOAD BETWEEN VERSIONS**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 10)

**NO**

Specifies that Db2 will not attempt to balance query acceleration between different versions of accelerator servers based on the actual workload of each available server.

**YES**

Specifies that Db2 will attempt to balance query acceleration between different versions of accelerator servers based on the actual workload of each available server.

Workload balancing can also be influenced by the CURRENT ACCELERATOR register. For example, when option 10 = YES, if the CURRENT ACCELERATOR special register specifies a particular accelerator server, the workload will be offloaded only to that server if it is available, even if other accelerator servers with less workload are available.

**Important:** BALANCE WORKLOAD BETWEEN VERSIONS is ignored if option 11, USE ONLY NEW ACCELERATOR\_TYPE, is set to YES.

**11 USE ONLY NEW ACCELERATOR\_TYPE**

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 11)

**NO**

Specifies that in a Db2 environment that includes V5 accelerators and V7 or later accelerators, EXPLAIN processing, accelerator modeling, and query execution is supported for all accelerators regardless of version.

## YES

Specifies that in a Db2 environment that includes V5 accelerators and V7 or later accelerators, EXPLAIN processing, accelerator modeling, and query execution is supported only for V7 and later accelerators.

**Important:** When option 11 is set to YES, the following options, if specified, are ignored:

- 8: FAVOR NEW ACCELERATOR\_TYPE
- 10: BALANCE WORKLOAD BETWEEN VERSIONS

## 13 ENABLE ACCELERATOR SPECIFIC RESULTS

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCEL_OPTIONS (option 13)

## NO

Specifies that queries are blocked from running on an accelerator server if they reference expressions that might return different results when running on the accelerator server instead of Db2.

## YES

Specifies that queries are allowed to execute on an accelerator server if they reference expressions that might return different results when run on the accelerator instead of Db2.

### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)

## CURRENT QUERY ACCEL field (QUERY\_ACCELERATION subsystem parameter)

The QUERY\_ACCELERATION subsystem parameter determines the default value that is to be used for the CURRENT QUERY ACCELERATION special register.

The QUERY\_ACCELERATION subsystem parameter is used when no value is explicitly set for the CURRENT QUERY ACCELERATION special register by the SQL statement SET CURRENT QUERY ACCELERATION.

<b>Acceptable values:</b>	1, 2, 3, 4, 5
<b>Default:</b>	1
<b>Update:</b>	option 31 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCELERATION

### 1 (NONE)

Specifies that no query acceleration is done.

### 2 (ENABLE)

Specifies that queries are accelerated only if Db2 determines that it is advantageous to do so. If there is an accelerator failure while a query is running, or the accelerator returns an error, Db2 returns a negative SQLCODE to the application.

### 3 (ENABLE\_WITH\_FAILBACK)

Specifies that queries are accelerated only if Db2 determines that it is advantageous to do so. If the accelerator returns an error during the PREPARE or first OPEN for the query, Db2 executes the query without the accelerator. If the accelerator returns an error during a FETCH or a subsequent OPEN, Db2 returns the error to the user, and does not execute the query.

**Restriction:** FL 504 If the query contains a passthrough-only expression, Db2 returns an error and does not accelerate the query, even if a matching user-defined function exists. For more information about passthrough-only expressions, see [Accelerating queries with passthrough-only expressions](#).

#### 4 (ELIGIBLE)

Specifies that queries are accelerated if they are eligible for acceleration. Db2 does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are executed by Db2. If there is an accelerator failure while a query is running, or the accelerator returns an error, Db2 returns a negative SQLCODE to the application.

#### 5 (ALL)

Specifies that queries are accelerated if they are eligible for acceleration. Db2 does not use cost information to determine whether to accelerate the queries. Queries that are not eligible for acceleration are not executed by Db2, and an SQL error is returned. If there is an accelerator failure while a query is running, or the accelerator returns an error, Db2 returns a negative SQLCODE to the application.

#### Related concepts

[How Db2 determines whether to accelerate eligible queries \(Db2 Performance\)](#)

#### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)

### WAIT FOR DATA field (QUERY\_ACCEL\_WAITFORDATA subsystem parameter)

The QUERY\_ACCEL\_WAITFORDATA subsystem parameter determines the default value that is to be used for the CURRENT QUERY ACCELERATION WAITFORDATA special register.

The QUERY\_ACCEL\_WAITFORDATA subsystem parameter is used when no value is explicitly set for the CURRENT QUERY ACCELERATION WAITFORDATA special register by the SQL statement SET CURRENT QUERY ACCELERATION WAITFORDATA.

<b>Acceptable values:</b>	0.0–3600.0 or 0–3600
<b>Default:</b>	0.0
<b>Update:</b>	option 31 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.QUERY_ACCELERATION_WAITFORDATA

Valid values are a DECIMAL(5,1) numeric constant in the range of 0.0–3600.0 seconds. For example, a value of 20.0 represents 20.0 seconds (or 20000 milliseconds), and a value of 30.5 represents 30.5 seconds (or 30500 milliseconds). The maximum value of 3600.0 means that the query is delayed for 60 minutes.

The default value is 0.0, which means that the query is not delayed and is run immediately on the accelerator. Other WAITFORDATA behavior is not applied to the query.

The wait time value can also be specified as an INTEGER numeric constant value ranging from 0–3600 seconds, which Db2 will convert to a DECIMAL (5,1) value.

When a non-zero value is specified for QUERY\_ACCEL\_WAITFORDATA, Db2 and the accelerator will apply other WAITFORDATA delay behavior, restrictions, and requirements to *all* dynamic queries to be accelerated. These behaviors, restrictions, and requirements can validly stop or even fail the acceleration of some queries that formerly were accelerated successfully. If you specify a non-zero WAITFORDATA delay on the new Db2 subsystem parameter, *all* dynamic queries on the Db2 subsystem for which acceleration is requested will be affected. For more information about these behaviors, restrictions, and requirements, see [SET CURRENT QUERY ACCELERATION WAITFORDATA statement \(Db2 SQL\)](#).



**Attention:** It is recommended that you do not use the QUERY\_ACCEL\_WAITFORDATA subsystem parameter to provide an initial non-zero default value for CURRENT QUERY ACCELERATION WAITFORDATA special register unless you fully understand and can accept the possible impact of WAITFORDATA behavior, requirements, and restrictions on *all* dynamic queries to be accelerated on the Db2 subsystem.

#### Related tasks

[Enabling acceleration of SQL queries \(Db2 Performance\)](#)



## Related reference

[CURRENT QUERY ACCELERATION WAITFORDATA special register \(Db2 SQL\)](#)

[SET CURRENT QUERY ACCELERATION WAITFORDATA statement \(Db2 SQL\)](#)

[CURRENT QUERY ACCELERATION special register \(Db2 SQL\)](#)

## DSNTIPI: IRLM panel 1

The entries on the DSNTIPI panel affect the installation of the internal resource lock manager (IRLM).

You must use one IRLM for each Db2 subsystem.

```
DSNTIPI          INSTALL DB2 - IRLM PANEL 1
====>

Enter data below:

 1 INSTALL IRLM          ===> YES          IRLM is required for DB2. Should the
 2 SUBSYSTEM NAME       ===> IRLM          IRLM distributed with DB2 be installed?
 3 RESOURCE TIMEOUT     ===> 30           IRLM MVS subsystem name
 4 PROC NAME            ===> IRLMPROC      Seconds to wait for unavailable resource
 5 U LOCK FOR RR/RS     ===> YES          Name of start procedure for IRLM
                                           Lock mode for update cursor with
                                           RR or RS isolation. YES or NO
 6 X LOCK FOR SEARCHED U/D ===> NO        Use X lock for searched updates or
                                           deletes. NO, YES, or TARGET
 7 START IRLM CTRACE   ===> NO          Start IRLM component traces at startup
                                           Blank, NO, YES, or 10 - 255
 8 IMS BMP TIMEOUT      ===> 4           Timeout multiplier for BMP. 1-254
 9 DL/I BATCH TIMEOUT   ===> 6           Timeout multiplier for DL/I. 1-254
10 RETAINED LOCK TIMEOUT ===> 0         Retained lock timeout multiplier. 0-254
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 37. IRLM panel 1: DSNTIPI

## Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

[Performance monitoring and tuning for data sharing environments \(Db2 Data Sharing Planning and Administration\)](#)

## Related reference

[DSNTIPJ: IRLM panel 2](#)

The entries on the DSNTIPJ panel affect several characteristics of IRLM time-sharing fields and other locking options.

## INSTALL IRLM field

The INSTALL IRLM field determines whether IRLM subsystem entries are to be provided in job DSNTIJMV and whether an IRLM procedure is to be built.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.
<b>DSNZPxxx:</b>	none

### YES

The required entries are provided, and the IRLM procedure is built. .

### NO

No IRLM procedure is produced. On installation panel DSNTIPJ, all values are ignored except the LOCKS PER TABLE(SPACE) field and the LOCKS PER USER field.

If you do not have a new IRLM procedure created, ensure that your old IRLM procedure is updated with any new keywords that were added.

## SUBSYSTEM NAME field (IRLMSID subsystem parameter)

The IRLMSID subsystem parameter specifies the name by which z/OS is to know the IRLM subsystem.

<b>Acceptable values:</b>	1–4 characters. First character must be A–Z, #, \$, or @. Other characters must be A–Z, 1–9, #, \$, or @.
<b>Default:</b>	IRLM
<b>Update:</b>	option 32 on panel DSNTIPB. Also edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.
<b>DSNZPxxx:</b>	DSN6SPRM IRLMSID

The name is used for communication between Db2 and the IRLM. This name is included in the z/OS subsystem table IEFSSNxx, where xx is the value of the SUBSYSTEM MEMBER field on installation panel DSNTIPM.

If you installed the IRLM for IMS, The IRLM name for Db2 must be different. Two IRLMs that reside in the same z/OS system must have unique z/OS subsystem names. If you already have IRLM installed, use the z/OS subsystem name for that IRLM. Otherwise, accept the default value, IRLM.

The associated IRLM PROC parameter is IRLMNM.

### Related reference

[COMMAND PREFIX field](#)

The value of the COMMAND PREFIX field specifies the Db2 subsystem command prefix. When the prefix appears at the beginning of a command that is entered at a z/OS operator's console, z/OS passes the command to Db2 for processing. The command prefix is used in the Db2 entry of member IEFSSNxx of SYS1.PARMLIB.

## RESOURCE TIMEOUT field (IRLMRWT subsystem parameter)

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

<b>Acceptable values:</b>	1–3600
<b>Default:</b>	30
<b>Update:</b>	option 32 on panel DSNTIPB0.
<b>DSNZPxxx:</b>	DSN6SPRM IRLMRWT

*Timeout* means that a lock request has waited for a resource (or for claims on a resource for a particular claim class to be released) longer than the number of seconds specified on this option. The value that is specified for this option must be a multiple of the DEADLOCK TIME on installation panel DSNTIPJ because IRLM uses its deadlock timer to initiate timeout detection and deadlock detection. This value is rarely the actual time. For data sharing, the actual timeout period is longer than the timeout value.

### Related concepts

[Global timeout processing \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Specifying the amount of inactive time before a timeout \(Db2 Performance\)](#)

### Related reference

[DEADLOCK TIME field](#)

The DEADLOCK TIME field controls the amount of time for which local deadlock detection cycles are to run. A *deadlock* is a situation in which two or more requesters are waiting for resources that are held by another requester. *Deadlock detection* is the procedure that identifies deadlocks and its participants.

DATA DEF TIMEOUT field (DDLTOX subsystem parameter)

The DDLTOX subsystem parameter specifies how long a request for SQL data definition is to wait for a resource before timing out. This parameter is used for the processing of DDL statements and GRANT, REVOKE, and LOCK statements.

**PROC NAME field (IRLMPROC subsystem parameter)**

The IRLMPROC subsystem parameter specifies the name of the IRLM procedure that z/OS is to invoke if the AUTO START field is set to YES.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	IRLMPROC
<b>Update:</b>	option 32 on panel DSNTIPB. Also edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.
<b>DSNZPxxx:</b>	DSN6SPRM IRLMPROC

The name that is specified in the PROC NAME field **cannot** be the same as the subsystem name that is specified in the SUBSYSTEM NAME field.

The procedure is created during installation or migration by job DSNTIJMV and is placed in SYS1.PROCLIB. You can review the procedure by examining DSNTIJMV.

**U LOCK FOR RR/RS field (RRULOCK subsystem parameter)**

When operations use repeatable read (RR) or read stability (RS) isolation levels to access a table, a specified locking method is used. The RRULOCK subsystem parameter specifies whether Db2 is to use U (UPDATE) locks or S (SHARE) locks.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RRULOCK

**YES**

The lock mode for operations with RR or RS isolation levels is U. If your applications make frequent updates with repeatable-read isolation, the U-lock might provide greater concurrency than the S-lock. However, applications that require high concurrency are almost always more efficient if they use cursor stability (CS) isolation.

**NO**

The lock mode for operations with RR or RS isolation levels is S. If the cursor in your applications includes the FOR UPDATE OF clause, but updates are infrequent, S-locks generally provide better performance.

**Related concepts**

[How Db2 chooses lock types \(Db2 Performance\)](#)

[The ISOLATION \(CS\) option \(Db2 Performance\)](#)

[The ISOLATION \(RR\) option \(Db2 Performance\)](#)

[The ISOLATION \(RS\) option \(Db2 Performance\)](#)

**Related tasks**

[Improving concurrency for update and delete operations \(Db2 Performance\)](#)

## Related reference

[Locks acquired for SQL statements \(Db2 Performance\)](#)

## X LOCK FOR SEARCHED U/D field (XLKUPDLT subsystem parameter)

The XLKUPDLT subsystem parameter specifies the locking method that is to be used when Db2 executes a searched update or delete.

<b>Acceptable values:</b>	YES, NO, TARGET
<b>Default:</b>	NO
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM XLKUPDLT

### YES

Db2 uses an X-lock on qualifying rows or pages. For ISOLATION(CS), the lock is released if the rows or pages are not updated or deleted. For ISOLATION(RS) or ISOLATION(RR), an X-lock is retained until the next commit point. A value of YES is beneficial in a data sharing environment when most or all searched updates and deletes use an index. If YES is specified and searched updates or deletes result in a table space scan, the likelihood of timeouts and deadlocks greatly increases.

### NO

Db2 uses an S- or U-lock when scanning for qualifying rows. For any qualifying rows or pages, the lock is upgraded to an X-lock before performing the update or delete. For non-qualifying rows or pages the lock is released if ISOLATION(CS) is used. For ISOLATION(RS) or ISOLATION(RR), an S-lock is retained on the rows or pages until the next commit point. Use this option to achieve higher rates of concurrency.

### TARGET

Db2 combines YES and NO behavior. Db2 uses an X-lock on qualifying rows or pages of the specific table that is targeted by the update or delete statement. Db2 uses an S- or U-lock when scanning for rows or pages of other tables that are referenced by the query (for example, tables that are referenced only in the WHERE clause of the query). For non-qualifying rows or pages the lock is released if ISOLATION(CS) is used. For ISOLATION(RS) or ISOLATION(RR), an S-lock is retained on the rows or pages until the next commit point.

## Related tasks

[Disabling update locks for searched UPDATE and DELETE \(Db2 Data Sharing Planning and Administration\)](#)

[Improving concurrency for update and delete operations \(Db2 Performance\)](#)

## START IRLM CTRACE field

The value of the START IRLM CTRACE field specifies whether the IRLM component traces are to be activated when IRLM is started. The Db2-provided IRLM procedure in DSNTIJMV is tailored according to this value.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	Edit the associated parameter in job DSNTIJUZ, the IRLM start procedure, and the CLIST input member.
<b>DSNZPxxx:</b>	none

### NO

IRLM starts only the low-activity subtraces EXP, INT, and XIT.

## YES

IRLM starts with all its subtraces active. Starting all IRLM subtraces has a slight impact on performance demand for ECSA storage, but it improves serviceability.

## IMS BMP TIMEOUT field (BMPTOUT subsystem parameter)

The BMPTOUT subsystem parameter is used to determine the amount of time that an IMS BMP connection is to wait for a lock to be released. The value of this field is multiplied by the value specified in the RESOURCE TIMEOUT field to determine the wait time.

For example, if you use the default value, an IMS BMP connection can wait for a resource for four times as long as the resource timeout value. This option gives you flexibility in tuning your system to avoid timeouts.

<b>Acceptable values:</b>	1–254
<b>Default:</b>	4
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM BMPTOUT

### Related tasks

[Setting installation options for wait times \(Db2 Performance\)](#)

## DL/I BATCH TIMEOUT field (DLITOUT subsystem parameter)

The DLITOUT subsystem parameter controls the number of resource timeout values that a DL/I batch connection is to wait for a lock to be released. The resource timeout value is specified in the RESOURCE TIMEOUT field.

<b>Acceptable values:</b>	1–254
<b>Default:</b>	6
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DLITOUT

For example, if you use the default value of 6, a DL/I batch application can wait 6 times the resource timeout value for a resource. This option gives you flexibility in tuning your system to avoid timeouts.

### Related tasks

[Setting installation options for wait times \(Db2 Performance\)](#)

### Related reference

[RESOURCE TIMEOUT field \(IRLMRWT subsystem parameter\)](#)

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

## RETAINED LOCK TIMEOUT field (RETLWAIT subsystem parameter)

When another Db2 subsystem in a data sharing group has failed, it can hold an incompatible lock on a resource. Locks that are held by failed Db2 members are called *retained locks*. The RETLWAIT subsystem parameter is used to calculate how long a transaction is to wait for a retained lock.

<b>Acceptable values:</b>	0–254
<b>Default:</b>	0
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RETLWAIT

This value is of importance only in a data sharing environment.

The value that you use is a multiplier that is applied to the normal timeout value of the connection. For example, imagine that the retained lock multiplier is 2. The timeout period for a call attachment connection that is waiting for a retained lock is 1 \* 2 (1 for the normal CAF timeout period, 2 for the additional time that is specified for retained locks).

If you use the default value, 0, applications do not wait for incompatible retained locks. Instead, the lock request is immediately rejected, and the application receives a resource unavailable SQLCODE.

### Related tasks

[Identifying and resolving retained locks for Db2 failures \(Db2 Data Sharing Planning and Administration\)](#)

## DSNTIPJ: IRLM panel 2

The entries on the DSNTIPJ panel affect several characteristics of IRLM time-sharing fields and other locking options.

The default values are adequate for most sites under ordinary conditions. Db2 and IRLM group names must start with a letter.

```
DSNTIPJ          INSTALL DB2 - IRLM PANEL 2
====> _

Enter data below:

1 PAGE PROTECT          ==> YES      Page protect common modules (YES,NO)
2 MAX STORAGE FOR LOCKS ==> 2160     Cntl blk storage in MB (2048-102400)
3 LOCKS PER TABLE(SPACE) ==> 2000   Max before lock escalation (0-100M)
4 LOCKS PER USER        ==> 10000    Max before resource unavail (0-100M)
5 DEADLOCK TIME         ==> 1        Detection interval (1-5 seconds or
                                     100-5000 milliseconds)

For DB2 data sharing ONLY enter data below:

6 DEADLOCK CYCLE        ==> 1        Number of LOCAL cycles before GLOBAL
7 MEMBER IDENTIFIER     ==> 1        Member ID for this IRLM (1-255)
8 IRLM XCF GROUP NAME   ==> DXRGROUP Name of IRLM XCF group
9 LOCK ENTRY SIZE       ==> 2        Initial allocation in bytes (2,4,8)
10 NUMBER OF LOCK ENTRIES ==> 0      Lock table entries (0-2048)
11 DISCONNECT IRLM     ==> YES      Disconnect automatically (YES, NO)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 38. IRLM panel 2: DSNTIPJ

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

[Performance monitoring and tuning for data sharing environments \(Db2 Data Sharing Planning and Administration\)](#)

### Related reference

[DSNTIPI: IRLM panel 1](#)

The entries on the DSNTIPI panel affect the installation of the internal resource lock manager (IRLM).

## PAGE PROTECT field

The value of the PAGE PROTECT field specifies whether IRLM is to load its common storage modules into page-protected storage.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	YES

<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

**NO**

Indicates that common storage modules are to be loaded into CSA or ECSA without page protecting that memory.

**YES**

Indicates that modules located in common storage are to be loaded into page-protected storage to prevent programs from overlaying the instructions. YES is recommended because it requires no additional overhead after the modules are loaded, and the protection can prevent code-overlay failures.

This is the default value.

The associated IRLM PROC parameter is PGPROT.

**MAX STORAGE FOR LOCKS field**

The MAX STORAGE FOR LOCKS field specifies, in MB, the maximum amount of private storage above the 2 GB bar for the IRLM lock control block structure.

<b>Acceptable values:</b>	2048–102400
<b>Default:</b>	2160
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none
<b>Data sharing scope:</b>	Member

This value becomes the setting of the MLMT parameter for the IRLM address space procedure. The IRLM address space procedure sets the z/OS MEMLIMIT value for the address space.

Ensure that you set this value high enough so that IRLM does not reach the limit. The value that you choose should provide space for possible retained locks. IRLM only gets storage as it needs it, so choose a large value. You can also change the value dynamically by using the z/OS command MODIFY `irlmproc, SET, MLT`.

The associated IRLMPROC parameter is MLMT.

**Related concepts**

Common service area storage requirements

Some of the Db2 load modules and control blocks are in common storage. Most of the space is in the extended common service area (ECSA) and 64-bit common storage.

**LOCKS PER TABLE(SPACE) field (NUMLKTS subsystem parameter)**

The NUMLKTS subsystem parameter specifies the default maximum number of page, row, or LOB locks that an application can hold simultaneously in a table or table space. If a single application exceeds the maximum number of locks in a single table or table space, lock escalation occurs.

<b>Acceptable values:</b>	0–104857600
<b>Default:</b>	2000
<b>Update:</b>	option 33 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM NUMLKTS

You can enter the number of locks as an integer or you can enter a value with a suffix of K or M. If you enter a value with a suffix of K, the number of locks is that value multiplied by 1024. If you enter a value with a suffix of M, the number of locks is that value multiplied by 1024 × 1024, or 1,048,576.

The value that you specify for this field must be less than the value that is specified for the LOCKS PER USER field (NUMLKUS subsystem parameter), except when the NUMLKUS setting is 0.

**FL 507** The NUMLKTS subsystem parameter values specifies the initial default value used when you specify LOCKMAX SYSTEM in CREATE TABLESPACE and ALTER TABLESPACE statements in an application process. After the SYSIBMADM.MAX\_LOCKS\_PER\_TABLESPACE global variable is set, subsequent changes to NUMLKTS have no effect on the application.

A 0 value for the NUMLKTS setting specifies that there is no limit to the number of data and row locks that a program can acquire.

**Recommendation:** Do not set the value to 0, because it can cause the IRLM to experience storage shortages.

### Related tasks

[Specifying the default maximum number of locks per table space \(Db2 Performance\)](#)

### Related reference

[LOCKS PER USER field \(NUMLKUS subsystem parameter\)](#)

The NUMLKUS subsystem parameter specifies the maximum number of page, row, or LOB locks that a single application can hold concurrently for all table spaces. When a request for a page, row, LOB, or XML lock exceeds the specified limit, it receives SQLCODE -904: "resource unavailable" (SQLSTATE '57011'). The requested lock cannot be acquired until some of the existing locks are released.

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

[ALTER TABLESPACE statement \(Db2 SQL\)](#)

## LOCKS PER USER field (NUMLKUS subsystem parameter)

The NUMLKUS subsystem parameter specifies the maximum number of page, row, or LOB locks that a single application can hold concurrently for all table spaces. When a request for a page, row, LOB, or XML lock exceeds the specified limit, it receives SQLCODE -904: "resource unavailable" (SQLSTATE '57011'). The requested lock cannot be acquired until some of the existing locks are released.

<b>Acceptable values:</b>	0–104857600
<b>Default:</b>	10000
<b>Update:</b>	option 33 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM NUMLKUS

**FL 507** The NUMLKUS value is the initial default at the beginning of an application process, but after the SYSIBMADM.MAX\_LOCKS\_PER\_USER global variable is set, subsequent changes to NUMLKUS have no effect on the application.

### 0–104857600

The maximum number includes locks on data pages, LOBs, XMLs, and rows that the program acquires when it accesses table spaces. The limit applies to all table spaces that are defined with the LOCKSIZE PAGE, LOCKSIZE ROW, or LOCKSIZE ANY options. A value of 0 indicates that there is no limit to the number of data and row locks that a program can acquire.

You can enter the number of locks as an integer or you can enter a value with a suffix of K or M. If you enter a value with a suffix of K, the number of locks is that value multiplied by 1024. If you enter a value with a suffix of M, the number of locks is that value multiplied by 1,048,576.

Db2 assumes that each lock requires 540 bytes of storage. If you define referential constraints between values, you might want to select a higher value for this field.

To avoid exhausting the IRLM's storage for locks, follow these guidelines:



- Do not specify 0 or a very large value unless it is specifically required to run an application.
- Consider the design of your applications. Long-running applications, particularly those that perform row-level locking, have few or infrequent commit points, or use repeatable-read isolation may use substantial amounts of lock storage. You should perform frequent commits to release locks.

**Important:** These values are constraints for a single application. Each concurrent application can hold the maximum number of locks specified here.

Check panel DSNTIPC to ensure that the required storage for the IRLM does not exceed the available region size for the IRLM.

#### Related tasks

[Specifying the maximum number of locks that a single process can hold \(Db2 Performance\)](#)

### DEADLOCK TIME field

The DEADLOCK TIME field controls the amount of time for which local deadlock detection cycles are to run. A *deadlock* is a situation in which two or more requesters are waiting for resources that are held by another requester. *Deadlock detection* is the procedure that identifies deadlocks and its participants.

<b>Acceptable values:</b>	1–5, 100–5000
<b>Default:</b>	1
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

Db2 interprets values in the range 1–5 as seconds and values in the range 100–5000 as milliseconds. Depending on the value that you enter, IRLM might substitute a smaller maximum value.

The associated IRLM PROC parameter is DEADLOK.

#### Related concepts

[Lock contention, suspension, deadlock, and timeout \(Db2 Performance\)](#)

#### Related tasks

[Specifying the interval for detecting deadlocks \(Db2 Performance\)](#)

### DEADLOCK CYCLE field

The value of the DEADLOCK CYCLE field specifies the number of local deadlock cycles that must expire before the IRLM does global deadlock detection processing.

<b>Acceptable values:</b>	1
<b>Default:</b>	1
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

The DEADLOCK CYCLE field is used only for Db2 data sharing.

The associated IRLM PROC parameter is DEADLOK.

### MEMBER IDENTIFIER field

The value of the MEMBER IDENTIFIER field specifies an ID number that uniquely names this IRLM member within an IRLM data sharing group.

<b>Acceptable values:</b>	1–255
<b>Default:</b>	1

<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

**Recommendation:** Correlate the IRLM member ID with the Db2 member name. For example, for Db2 member DSN1, specify an IRLM member ID of 1.

The IRLM ID that you specify does not relate directly to the limit of IRLM members that can be in the data sharing group. That limit is determined by the current hardware limits (32). If you edit the IRLMPROC directly, you can specify a value from 1–255.

This option is used only for Db2 data sharing.

The associated IRLM PROC parameter is IRLMID.

### Related information

[About Db2 and related commands \(Db2 Commands\)](#)

## IRLM XCF GROUP NAME field

The value of the IRLM XCF GROUP NAME field is the name that is to be used for the IRLM group. This name must be different from the Db2 group name.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DXRGROUP
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

**Recommendation:** Begin this name with DXR. All members in the Db2 group must have the same IRLM XCF group name.

This option is used only for Db2 data sharing.

To avoid names that IBM uses for its cross-system coupling facility (XCF) groups, the first character must be an uppercase letter J–Z unless the name begins with DXR. Do not use SYS as the first three characters, and do not use UNDESIG as the group name.

The associated IRLM PROC parameter is IRLMGRP

## LOCK ENTRY SIZE field

The value of the LOCK ENTRY SIZE field specifies the initial size, in bytes, of individual lock entries in the lock table portion of the lock structure.

<b>Acceptable values:</b>	2, 4, 8
<b>Default:</b>	2
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

**Recommendation:** If you have seven or fewer members in your data sharing group, use the default value for the most efficient use of coupling lock structure space. If you have more than seven members, use a value of 4 to avoid an automatic rebuild for maximum connections.

Db2 assigns a value to the MAXUSRS parameter in the *irlmproc* procedure based on the LOCK ENTRY SIZE value. The following table shows the LOCK ENTRY SIZE values and the corresponding assigned MAXUSRS values.

Table 28. Lock entry sizes and corresponding MAXUSRS values

LOCK ENTRY SIZE	MAXUSRS value
2	7
4	23
8	32

**Important:** The lock entry size and the lock entry table (LTE) width do not change when the number of lock table entries changes.

The LTE width increases when you perform these steps:

1. Perform the following steps on each member of the data sharing group:

a. Increase the MAXUSRS value to a value in a higher MAXUSRS range.

The MAXUSRS value ranges are:

- 7 or less
- $\geq 8$  and  $< 24$
- $\geq 24$  and  $< 33$

For example, if MAXUSRS is changed from 7 to 8, the value is in a higher MAXUSRS range.

b. Restart the data sharing group member.

You can perform the steps above on all members at the same time, or serially, over a period of time.

2. Rebuild the lock structure for the data sharing group.

When MAXUSRS is changed to a value in a lower MAXUSRS range (for example, from 8 to 7), the LTE width does not change as long as the lock structure remains allocated. To reduce the LTE width, you need to perform these steps:

1. Shut down the data sharing group.

2. Deallocate the lock structure by issuing the z/OS SETXCF FORCE command. For more information, see [Deallocating structures by force \(Db2 Data Sharing Planning and Administration\)](#).

3. Restart the data sharing group.

### Related concepts

[Avoiding false contention \(Db2 Data Sharing Planning and Administration\)](#)

### Related reference

NUMBER OF LOCK ENTRIES field

The value of the NUMBER OF LOCK ENTRIES field specifies the number of lock table entries that are to be in the coupling facility lock structure.

## NUMBER OF LOCK ENTRIES field

The value of the NUMBER OF LOCK ENTRIES field specifies the number of lock table entries that are to be in the coupling facility lock structure.

<b>Acceptable values:</b>	0, 1–2048 (powers of two)
<b>Default:</b>	0
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

## 0

Specifies that IRLM determines the number of lock table entries, up to a maximum of 2048 M lock entries, based on the lock structure size that is specified in CFRM policy and the number of users (MAXUSRS). 0 is the default value.

### **value (1–2048)**

Specifies that the maximum number of lock table entries is *value* M (the value that you specify multiplied by 1,048,576). *value* must be a power of two. (Do not specify M in *value*.) Increasing the number of lock table entries might help reduce the amount of false contention in XES. However, allocating too many lock table entries might result in too few record list entries. You should monitor this number to find the optimum values for your installation.

The associated IRLM PROC parameter is LTE.

### **Related concepts**

[Avoiding false contention \(Db2 Data Sharing Planning and Administration\)](#)

### **Related reference**

[LOCK ENTRY SIZE field](#)

The value of the LOCK ENTRY SIZE field specifies the initial size, in bytes, of individual lock entries in the lock table portion of the lock structure.

## **DISCONNECT IRLM field**

The value of the DISCONNECT IRLM field determines whether IRLM is to automatically disconnect from the data sharing group when Db2 is not identified to it.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	edit IRLM start procedure
<b>DSNZPxxx:</b>	none

### **YES**

Causes IRLM to disconnect from the data sharing group when Db2 is stopped normally or it stops as the result of a Db2 failure.

If you specify YES for the DISCONNECT IRLM field and YES for the AUTO START field on panel DSNTIPI, stopping IRLM does not require manual intervention.

### **NO**

IRLM remains connected to the data sharing group even when Db2 is stopped. In this case, you must explicitly stop IRLM to bring it down.

This option has less impact on other systems when a Db2 fails because z/OS is not required to perform certain recovery actions that it normally performs when IRLM comes down. Specifying NO can also mean that Db2 restarts more quickly after a Db2 normal or abnormal termination because it does not have to wait for IRLM to rejoin the IRLM data sharing group.

The associated IRLM PROC parameter is SCOPE.

## DSNTIP6: Db2 utilities parameters panel 1

The fields on the DSNTIP6 panel configure the default behavior of enhancements to the BACKUP SYSTEM, RESTORE SYSTEM, RECOVER, and other utilities.

```

DSNTIP6          UPDATE DB2 - DB2 UTILITIES PARAMETERS 1
====>

Enter general options for DB2 Utilities:
 1 TEMP DS UNIT NAME   ==> SYSDA      Device for temporary utility data sets
 2 UTIL TEMP STORCLAS  ==>          For temporary shadow data sets
                                   by utilities
 3 STATISTICS HISTORY  ==> NONE      Default for collection of statistics
                                   history
 4 STATISTICS ROLLUP   ==> YES       Allow statistics aggregation: NO, YES
 5 UTILITY TIMEOUT     ==> 6        Utility wait time multiplier
 6 IGNORE SORTNUM STMT ==> NO       Ignore SORTNUM keyword in UT stmt
 7 TEMPLATE TIME       ==> UTC      For TEMPLATE TIME default: UTC, LOCAL
 8 MAX UTILS PARALLELISM ==> 99     Maximum degree of parallelism for
                                   Utilities : 0 - 32767
 9 STATISTICS COLGROUP ==> 10      Storage limit in MB for sorting single
   DATA SORT STG LIMIT                                     column COLGROUPs: 0 - 4096
10 PAGE-LEVEL SAMPLING ==> SYSTEM   Collect RUNSTATS using page-level
                                   sampling by default (YES, NO, SYSTEM)
11 UTILS BLOCK FOR CDC ==> NO      Block utilities for CDC tables or
                                   table spaces: NO, YES
12 LOAD RO OBJECTS     ==> NO      Allow LOAD into read-only obj: NO, YES
PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 39. Db2 utilities parameters panel 1: DSNTIP6

### TEMP DS UNIT NAME field (VOLTDEVT subsystem parameter)

The VOLTDEVT subsystem parameter specifies the device type or unit name that is to be used by the Db2 COPY CONCURRENT and CHECK utilities for dynamically allocating temporary data sets. Specifying a value for VOLTDEVT removes the need to specify the FILTERDDN DD in the utility job.

<b>Acceptable values:</b>	valid device type or unit name
<b>Default:</b>	SYSDA
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM VOLTDEVT

The temporary data sets are deleted when the utility execution is complete.

### UTIL TEMP STORCLAS field (UTIL\_TEMP\_STORCLAS subsystem parameter)

The UTIL\_TEMP\_STORCLAS subsystem parameter specifies the storage class that the CHECK INDEX, CHECK DATA, and CHECK LOB utilities are to use when allocating temporary shadow data sets. (These utilities allocate shadow data sets when you specify the SHRLEVEL CHANGE option.)

<b>Acceptable values:</b>	blank or a valid SMS management class name
<b>Default:</b>	blank
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTIL_TEMP_STORCLAS

The default value of blank indicates that the shadow data sets are to be defined in the same storage class as the production page set.

**Recommendation:** Specifying an explicit storage class for this subsystem parameter can improve performance, especially when the system uses paired disk volumes for peer to peer remote copy.

In a data sharing group, this parameter has group scope.

## STATISTICS HISTORY field (STATHIST subsystem parameter)

The STATHIST subsystem parameter specifies which inserts and updates are to be recorded in catalog history tables.

<b>Acceptable values:</b>	SPACE, NONE, ALL, ACCESSPATH
<b>Default:</b>	NONE
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STATHIST

### SPACE

All inserts and updates that Db2 makes to space-related catalog statistics are recorded.

### NONE

None of the changes that Db2 makes in the catalog are recorded. NONE is the default value.

### ALL

All inserts and updates that Db2 makes in the catalog are recorded.

### ACCESSPATH

All inserts and updates that Db2 makes to ACCESSPATH-related catalog statistics are recorded.

### Related tasks

[Collecting history statistics \(Db2 Performance\)](#)

[Collecting statistics history \(Db2 Utilities\)](#)

### Related reference

[History statistics \(Db2 Performance\)](#)

## STATISTICS ROLLUP field (STATROLL subsystem parameter)

The STATROLL subsystem parameter specifies whether the RUNSTATS utility is to aggregate the partition-level statistics, even though some parts might not contain data.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STATROLL

For Db2 subsystems that have large partitioned table spaces and indexes, it is recommended that you specify YES for STATISTICS ROLLUP. Specifying YES for STATISTICS ROLLUP enables the aggregation of partition-level statistics and helps the optimizer to choose a better access path.

## UTILITY TIMEOUT field (UTIMOUT subsystem parameter)

The UTIMOUT subsystem parameter specifies how long, in number of resource values, that a utility or utility command is to wait for a resource. The utility or utility command waits until a lock or all claims on a resource of a particular claim class is released.

<b>Acceptable values:</b>	1–254
<b>Default:</b>	6
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTIMOUT

For example, if you use the default value of six, a utility can wait six times longer than an SQL application for a resource. This option allows utilities to wait longer than SQL applications to access a resource.

For more information about setting the resource timeout for SQL applications, see the discussion of the RESOURCE TIMEOUT field on DSNTIPI.

The value of UTILITY TIMEOUT is used as the default value for the RETRY parameter of Db2 Utilities such as CHECK INDEX and online REBUILD INDEX.

#### **Related tasks**

[Specifying the amount of inactive time before a timeout \(Db2 Performance\)](#)

#### **Related reference**

[RESOURCE TIMEOUT field \(IRLMRWT subsystem parameter\)](#)

The IRLMRWT subsystem parameter controls the number of seconds that are to elapse before a resource timeout is detected.

### **IGNORE SORTNUM STMT field (IGNSORTN subsystem parameter)**

The IGNSORTN subsystem parameter determines whether occurrences of the SORTNUM clause in utility control statements are to be ignored.

<b>Acceptable values:</b>	YES or NO
<b>Default:</b>	NO
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM IGNSORTN

#### **YES**

Db2 ignores any SORTNUM specifications in utility control statements, and utilities attempt to allocate the sort work data sets.

#### **NO**

Any SORTNUM specifications in utility control statements are passed to the sort program. The SORTNUM specification is used to determine the number of sort work data sets to dynamically allocate.

### **TEMPLATE TIME field (TEMPLATE\_TIME subsystem parameter)**

The TEMPLATE\_TIME subsystem parameter specifies the default setting for the TIME option of the TEMPLATE statement.

**Tip:** Set all Db2 data sharing members to the same value.

<b>Acceptable values:</b>	UTC, LOCAL
<b>Default:</b>	UTC
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM TEMPLATE_TIME

#### **UTC**

Coordinated Universal Time.

#### **LOCAL**

Local time at the Db2 database manager.

#### **Related reference**

[Syntax and options of the TEMPLATE control statement \(Db2 Utilities\)](#)

## MAX UTILS PARALLELISM field (PARAMDEG\_UTIL subsystem parameter)

The PARAMDEG\_UTIL subsystem parameter specifies the maximum number of parallel subtasks for some utilities.

PARAMDEG\_UTIL affects the following utilities:

- REORG TABLESPACE
- REBUILD INDEX
- CHECK INDEX
- UNLOAD
- LOAD
- COPY
- RECOVER

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	99
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM PARAMDEG_UTIL

**0**

No additional constraint is placed on the maximum degree of parallelism in a utility.

**1–32767**

Specifies the maximum number of parallel subtasks for all affected utilities.

## STATISTICS COLGROUP DATA SORT STG LIMIT field (STATCLGSRT subsystem parameter)

The STATCLGSRT subsystem parameter specifies how the sort program is to be used by the RUNSTATS utility or by an inline statistics job when collecting statistics on a single column that is defined with the COLGROUP option.

<b>Acceptable values:</b>	0–4096 MB
<b>Default:</b>	10
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STATCLGSRT
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

When you specify FREQVAL to collect statistics on single-column COLGROUPs, consider adjusting the value of the STATCLGSRT subsystem parameter to avoid sort, if both of the following conditions exist:

- The specified COUNT value is less than or equal to 1000.
- The LEAST and BOTH options are not specified.

If either of these conditions does not exist or if STATCLGSRT specifies 0, Db2 does a data sort, which can negatively affect the performance of statistics collection. A non-zero value for STATCLGSRT indicates the amount of memory space, specified in MB, that the utility can use to avoid the data sort. Specifying a non-zero value is likely to improve performance and reduce costs for collecting statistics in these circumstances, but storage costs might increase.

**0**

An indication that a data sort is always performed.



## 1-4096

The amount of memory space for the utility to use to avoid the data sort. Values are specified in megabytes (for example, 4096, which is the maximum allowable value). Increasing the value might be necessary when utility jobs specify a large number of single-column COLGROUPs, and message DSNU1388I is issued.

Although histogram statistics can be collected in the same RUNSTATS or inline statistics job, any COLGROUPs for which histogram statistics are being collected are not eligible for the sort-avoidance performance improvement.

You can override the STATCLGSRT value for a particular utility job by specifying the STATCLGMEMSRT option on the utility statement.

### Related tasks

[Reducing the cost of collecting statistics \(Db2 Performance\)](#)

### Related reference

[RUNSTATS TABLESPACE syntax and options \(Db2 Utilities\)](#)

## PAGE-LEVEL SAMPLING field (STATPGSAMP subsystem parameter)

The STATPGSAMP subsystem parameter specifies whether the RUNSTATS utility uses page-level sampling by default for universal table spaces (UTS).

STATPGSAMP applies only for UTS, and has no effect on other table space types.

Also, STATPGSAMP applies only when the TABLE option is specified in the RUNSTATS statement.

<b>Acceptable values:</b>	YES, NO, SYSTEM
<b>Default:</b>	SYSTEM
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM STATPGSAMP
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

### SYSTEM

Db2 determines the default sampling method for statistics collection.

[FL 505 SYSTEM](#) has the same meaning as YES.

### YES

The utility always executes as if the TABLESAMPLE SYSTEM AUTO utility option is specified. (TABLESAMPLE SYSTEM AUTO specifies that the utility uses page sampling, and determines the sampling rate.)

If the RUNSTATS statement contains TABLESAMPLE SYSTEM and a value other than AUTO, RUNSTATS uses that value instead of AUTO.

If the utility statement specifies SAMPLE to request row sampling, Db2 ignores that option and uses page sampling instead.

### NO

The utility does not use page sampling by default. Any sampling is determined by the options that are specified in the utility statement.

### Related tasks

[Maintaining Db2 database statistics \(Db2 Performance\)](#)

### Related reference

[RUNSTATS TABLESPACE syntax and options \(Db2 Utilities\)](#)

## UTILS BLOCK FOR CDC field (UTILS\_BLOCK\_FOR\_CDC subsystem parameter)

The UTILS\_BLOCK\_FOR\_CDC subsystem parameter specifies whether to block certain Db2 Utilities for tables with replication enabled (with the DATA CAPTURE CHANGES attribute) or table spaces that contain such tables.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTILS_BLOCK_FOR_CDC
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

### NO

Specifies that Db2 utilities can update replicated tables or table spaces with replication enabled.

### YES

Specifies that the following Db2 utilities are blocked from updating replicated tables or table spaces with replication enabled:

- CHECK DATA with DELETE YES LOG NO
- LOAD with SHRLEVEL NONE or REFERENCE
- RECOVER with TOLOGPOINT, TORBA, TOCOPY, TOLASTCOPY, or TOLASTFULLCOPY
- REORG TABLESPACE with DISCARD
- REPAIR with LOCATE DELETE

## LOAD RO OBJECTS field (LOAD\_RO\_OBJECTS subsystem parameter)

The LOAD\_RO\_OBJECTS subsystem parameter specifies whether Db2 utilities allow LOAD on all SHRLEVELS including the data loading and inserting cases to load into read-only (RO) objects

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 34 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM LOAD_RO_OBJECTS
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

### NO

Db2 utilities disallow LOAD with any SHRLEVEL option to load into read-only objects.

### YES

Db2 utilities allow LOAD with any SHRLEVEL option to load into read-only objects.

### Related reference

[LOAD \(Db2 Utilities\)](#)

## DSNTIP61: Db2 utilities parameters panel 2

The fields on the DSNTIP61 panel are used to configure the default behavior of various Db2 utilities.

```
DSNTIP61    INSTALL DB2 - DB2 UTILITIES PARAMETERS PANEL 2
====>

Enter default settings for the DB2 Utilities FLASHCOPY options:
 1 FAST RESTORE          ===> PREFERRED For RECOVERY: NONE, PREFERRED, REQUIRED
 2 COPY FAST REPLICATION===> PREFERRED For COPY: NONE, PREFERRED, REQUIRED
 3 FLASHCOPY PPRC       ===> REQUIRED   FLASHCOPY peer to peer remote copy:
                                     blank, NONE, PREFERRED, or REQUIRED
 4 FLASHCOPY XRCP       ===> YES      Allow FLASHCOPY to a primary volume
                                     in a XRC relationship: NO or YES
 5 DEFAULT TEMPLATE     ===> HLQ.&DB..&SN..N&DSNUM..&UQ.

 6 COPY                  ===> NO      Use FLASHCOPY defaults for COPY
 7 LOAD                  ===> NO      Use FLASHCOPY defaults for LOAD
 8 REORG TABLESPACE    ===> NO      Use FLASHCOPY defaults for REORG TS
 9 REBUILD INDEX        ===> NO      Use FLASHCOPY defaults for REBUILD IX
10 REORG INDEX          ===> NO      Use FLASHCOPY defaults for REORG IX
PRESS: ENTER to continue RETURN to exit HELP for more information
```

Figure 40. DB2 utilities parameters panel 2: DSNTIP61

### COPY FAST REPLICATION field (COPY\_FASTREPLICATION subsystem parameter)

Specify for the COPY utility whether FlashCopy fast replication is preferred, required, or not used for the creation of the FlashCopy image copy.

Db2 12 introduces this subsystem parameter. It takes effect in function level 100.

<b>Acceptable values:</b>	PREFERRED, REQUIRED, NONE
<b>Default:</b>	PREFERRED
<b>Data sharing scope:</b>	Same setting recommended on all members
<b>Update:</b>	option 35 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SPRM.COPY_FASTREPLICATION

#### PREFERRED

The COPY utility directs DSS COPY to use fast replication if possible. If FlashCopy® cannot be used, then DSS uses traditional data movement methods.

#### REQUIRED

The COPY utility directs DSS COPY to only use fast replication, ensuring that object copies occur as quickly as possible. This option causes the COPY utility to fail if FlashCopy cannot be used. This option might reduce the opportunity for resource contention and unavailability for SHRLEVEL REFERENCE copies.

#### NONE

The COPY utility directs DSS COPY not to use fast replication. Traditional data movement methods are be used.

#### Related concepts

[Subsystem parameters for refining DFSMSdss COPY operation with utilities \(Db2 Utilities\)](#)

## FAST RESTORE field (REC\_FASTREPLICATION subsystem parameter)

The REC\_FASTREPLICATION parameter specifies whether the RECOVER utility should use FlashCopy to recover from a FlashCopy image copy.

<b>Acceptable values:</b>	NONE, PREFERRED, REQUIRED
<b>Default:</b>	PREFERRED
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.REC_FASTREPLICATION

### NONE

The RECOVER utility uses standard I/O to restore a FlashCopy image copy.

### PREFERRED

The RECOVER utility uses FlashCopy to recover from a FlashCopy image copy if FlashCopy support is available.

### REQUIRED

The RECOVER utility forces the use of FlashCopy to recover from a FlashCopy image copy to ensure that recovery occurs as quickly as possible. This option causes RECOVERY to fail if FlashCopy cannot be used.

If you use BACKUP SYSTEM to create system-level backups, using FlashCopy for a restore might cause BACKUP SYSTEM to fail because bi-directional FlashCopy is not supported.

### Related concepts

[Subsystem parameters for refining DFSMSdss COPY operation with utilities \(Db2 Utilities\)](#)

## FLASHCOPY PPRC field (FLASHCOPY\_PPRC subsystem parameter)

The FLASHCOPY\_PPRC subsystem parameter specifies the behavior for DFSMSdss FlashCopy requests when the target disk storage volume is the primary device in a peer-to-peer remote copy (Metro Mirror) relationship.

Specifically, FLASHCOPY\_PPRC determines the following:

- Whether DFSMSdss preserves mirroring while processing a Db2 utilities request
- Whether the target device pair is allowed to go to duplex pending state

**Important:** Set this field to blank if PPRC is not available on the subsystem.

<b>Acceptable values:</b>	NONE, PREFERRED, REQUIRED, blank
<b>Default:</b>	REQUIRED
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.FLASHCOPY_PPRC

### NONE

DFSMSdss does not preserve mirroring while processing a Db2 utilities request, even if all the configuration requirements for preserving the mirror operation are met.

### PREFERRED

DFSMSdss allows a volume pair to go into the duplex pending state while processing a Db2 utilities request only if it is required.

The IBM DS8880 series and newer IBM storage systems do not support the Preserve Mirror Preferred option for PPRC. If you are using one of those storage systems, and you want to preserve your disk mirror or copy, specify REQUIRED.

## REQUIRED

DFSMSdss does not permit a PPRC volume pair to go into duplex pending state while processing a Db2 utilities request.

## blank

No preserve mirror command is passed to DFSMSdss.

## Related concepts

[Subsystem parameters for refining DFSMSdss COPY operation with utilities \(Db2 Utilities\)](#)

## FLASHCOPY XRCP field (FLASHCOPY\_XRCP subsystem parameter)

The FLASHCOPY\_XRCP subsystem parameter specifies whether a data set level FlashCopy operation is allowed to a primary volume in an XRC relationship when the z/OS DFSMSdss support for RPF for XRC is installed and enabled.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_XRCP

## YES

If z/OS DFSMSdss support for RPF in XRC is installed and enabled, supported utilities specify the FCTOXRCPprimary option when they issue DFSMSdss COPY commands.

YES is ignored in the following situations:

- For CHECK utilities, if the CHECK\_FASTREPLICATION subsystem parameter value is NONE.
- For the RECOVER utility, if the REC\_FASTREPLICATION subsystem parameter value is NONE.
- For the COPY utility, if the COPY\_FASTREPLICATION subsystem parameter value is NONE.

## NO

The utilities do not specify the FCTOXRCPprimary option when they issue DFSMSdss COPY commands.

## Related concepts

[Subsystem parameters for refining DFSMSdss COPY operation with utilities \(Db2 Utilities\)](#)

[Db2 online utilities \(Db2 Utilities\)](#)

## Related information

[COPY Command for DFSMSdss \(z/OS DFSMSdss Storage Administration\)](#)

## DEFAULT TEMPLATE field (FCCOPYDDN subsystem parameter)

The FCCOPYDDN subsystem parameter defines the default value that is to be used for the FCCOPYDDN parameter of the FLASHCOPY option of Db2 utilities control statements. This parameter applies to the COPY, LOAD, REBUILD INDEX, REORG INDEX, and REORG TABLESPACE utilities.

FCCOPYDDN specifies the template for deriving the data set name for the FlashCopy image copy.

FlashCopy technology can be used to create VSAM copies of objects almost instantaneously. It creates a separate data set for each piece of the object that is being copied. FlashCopy technology can also be used to recover the object if necessary, which reduces recovery time and therefore provides greater availability.

**Important:** You must replace "HLQ" in the default value with a high-level qualifier that is appropriate for your subsystem.

<b>Acceptable values:</b>	valid Db2 utilities template
<b>Default:</b>	HLQ.&DB..&SN..N&DSNUM..&UQ.
<b>Update:</b>	option 35 on panel DSNTIPB

<b>DSNZPxxx:</b>	DSN6SPRM FCCOPYDDN
------------------	--------------------

If you assign the FCCOPYDDN setting directly in DSNTIJJUZ, you need to repeat each ampersand (&) character to conform with IBM High-Level Assembler rules. For example, you would need to assign the default value above as FCCOPYDDN=HLQ.&&DB.&&SN..N&&DSNUM..&&UQ. (notice the trailing period).

### **COPY field (FLASHCOPY\_COPY subsystem parameter)**

The value of the FLASHCOPY\_COPY parameter specifies whether the FLASHCOPY option of the COPY utility is to be used by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_COPY

#### **NO**

Specifies that the FLASHCOPY option of the COPY utility is not used by default.

#### **YES**

Specifies that the COPY utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the Db2 data sets are on FlashCopy Version 2 DASD.

### **LOAD field (FLASHCOPY\_LOAD subsystem parameter)**

The value of the FLASHCOPY\_LOAD subsystem parameter specifies whether the FLASHCOPY option of the LOAD utility is to be used by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_LOAD

#### **NO**

Specifies that the FLASHCOPY option of the LOAD utility is not used by default.

#### **YES**

Specifies that the LOAD utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the Db2 data sets are on FlashCopy Version 2 DASD.

### **REORG TABLESPACE field (FLASHCOPY\_REORG\_TS subsystem parameter)**

The value of the FLASHCOPY\_REORG\_TS subsystem parameter specifies whether the FLASHCOPY option of the REORG TABLESPACE utility is to be used by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_REORG_TS

#### **NO**

Specifies that the FLASHCOPY option of the REORG TABLESPACE utility is not used by default.

**YES**

Specifies that the REORG TABLESPACE utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the Db2 data sets are on FlashCopy Version 2 DASD.

**REBUILD INDEX field (FLASHCOPY\_REBUILD\_INDEX subsystem parameter)**

The value of the FLASHCOPY\_REBUILD\_INDEX subsystem parameter specifies whether the FLASHCOPY option of the REBUILD INDEX utility is to be used by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_REBUILD_INDEX

**NO**

Specifies that the FLASHCOPY option of the REBUILD INDEX utility is not used by default.

**YES**

Specifies that the REBUILD INDEX utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the Db2 data sets are on FlashCopy Version 2 DASD.

**REORG INDEX field (FLASHCOPY\_REORG\_INDEX subsystem parameter)**

The value of the FLASHCOPY\_REORG\_INDEX subsystem parameter specifies whether the FLASHCOPY option of the REORG INDEX utility is to be used by default.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 35 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM FLASHCOPY_REORG_INDEX

**NO**

Specifies that the FLASHCOPY option of the REORG INDEX utility is not used by default.

**YES**

Specifies that the REORG INDEX utility uses FlashCopy technology when the FLASHCOPY option is not specified in the control statement. Specify YES only if the Db2 data sets are on FlashCopy Version 2 DASD.

## DSNTIP62: Db2 utilities parameters panel 3

The fields on the DSNTIP62 panel are used to configure the default behavior of various Db2 utilities.

```

DSNTIP62      INSTALL DB2 - DB2 UTILITIES PARAMETERS PANEL 3
====>

Enter system-level backup options for RESTORE SYSTEM and RECOVER:
 1 SYSTEM-LEVEL BACKUPS  ===> NO           As a recovery base: NO or YES
 2 RESTORE/RECOVER       ===> NO           From dump: NO or YES
 3 DUMP CLASS NAME       ===>             For RESTORE/RECOVER from dump
 4 MAXIMUM TAPE UNITS    ===> NOLIMIT      For RESTORE SYSTEM: NOLIMIT or 1-255

Enter DB2 BACKUP SYSTEM utility options below:
 5 ALTERNATE COPY POOL   ===>
 6 DB BACKUP STG GROUP   ===> _____ For the alternate copy pool
 7 LOG BACKUP STG GRP    ===> _____ For the alternate copy pool

Enter options for the DB2 BACKUP SYSTEM and RESTORE SYSTEM utilities:
 8 HSM MESSAGE DS HLQ    ===> _____ For receiving HSM and DFSS messages
    
```

Figure 41. DB2 utilities parameters panel 3: DSNTIP62

### SYSTEM-LEVEL BACKUPS field (SYSTEM\_LEVEL\_BACKUPS subsystem parameter)

The RECOVER utility uses image copies and concurrent copies for object-level recoveries. The SYSTEM\_LEVEL\_BACKUPS subsystem parameter specifies whether the RECOVER utility is to also use system-level backups as a recovery base for object-level recoveries.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SYSTEM_LEVEL_BACKUPS

Specify the default of NO if you do not take system-level backups with the BACKUP SYSTEM utility. Specify YES if you take system-level backups with the BACKUP SYSTEM utility.

#### Related reference

[RECOVER \(Db2 Utilities\)](#)

### RESTORE/RECOVER field (RESTORE\_RECOVER\_FROMDUMP subsystem parameter)

The RESTORE\_RECOVER\_FROMDUMP subsystem parameter controls whether the system-level backup for the RESTORE SYSTEM and the RECOVER utilities is to occur from the dump on tape.

<b>Acceptable values:</b>	YES or NO
<b>Default:</b>	NO
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RESTORE_RECOVER_FROMDUMP

#### YES

System-level backup for the RESTORE SYSTEM and the RECOVER utilities occurs from the dump on tape.

#### NO

System-level backup for the RESTORE SYSTEM and the RECOVER utilities occurs from the disk copy of the system-level backup.



You can override the setting of RESTORE/RECOVER by executing the RESTORE SYSTEM utility statement or the RECOVER utility statement with the FROMDUMP keyword.

### **DUMP CLASS NAME field (UTILS\_DUMP\_CLASS\_NAME subsystem parameter)**

A system-level backup can occur from a dump on tape or from a disk copy. For backups that occur from the dump on tape, the UTILS\_DUMP\_CLASS\_NAME subsystem parameter specifies the name of the DFSMSHsm dump class that is to be used.

<b>Acceptable values:</b>	blank or a valid DFSMSHsm dump class name not exceeding 8 characters in length
<b>Default:</b>	blank
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTILS_DUMP_CLASS_NAME

This dump class is to be used by the RECOVER utility and the RESTORE SYSTEM utility to restore objects from a system-level backup that has been dumped to tape. The setting for this field is applicable only when you specify YES in the RESTORE/RECOVER field on panel DSNTIP6. You can override the setting for DUMP CLASS NAME by executing the RESTORE SYSTEM utility statement or the RECOVER utility statement with the DUMPCLASS keyword.

#### **Related concepts**

[Dump Tasks \(z/OS DFSMSHsm Storage Administration\)](#)

### **MAXIMUM TAPE UNITS field (RESTORE\_TAPEUNITS subsystem parameter)**

When the RESTORE SYSTEM utility restores a system-level backup that has been dumped to tape, it allocates a number of tape units or tape drives. The RESTORE\_TAPEUNITS subsystem parameter specifies the maximum number of tape units or tape drives that the RESTORE SYSTEM utility can allocate.

<b>Acceptable values:</b>	NOLIMIT or 1–255
<b>Default:</b>	NOLIMIT
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RESTORE_TAPEUNITS

The default value, NOLIMIT, means that the RESTORE SYSTEM utility will allocate as many tape units as necessary to restore the system-level backup. You can override the setting for MAXIMUM TAPE UNITS by executing the RESTORE SYSTEM utility statement with the TAPEUNITS keyword.

### **ALTERNATE COPY POOL field (ALTERNATE\_CP subsystem parameter)**

The ALTERNATE\_CP subsystem parameter specifies the name of an alternate SMS copy pool for the BACKUP SYSTEM utility. If a copy pool is specified, BACKUP SYSTEM alternates between using that copy pool and the standard copy pool when the utility creates system-level backups.

<b>Acceptable values:</b>	blank or 1–14 alphanumeric characters, including @, #, and \$. The first character must be non-numeric. Db2 uses this value to build the name according to the Db2 naming convention for copy pools.
<b>Default:</b>	blank
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ALTERNATE_CP
<b>Data sharing scope:</b>	Same setting recommended on all members

The value of the ALTERNATE\_CP subsystem parameter applies only if the ALTERNATE\_CP option is not specified in the BACKUP SYSTEM utility control statement. If the ALTERNATE\_CP option is specified in the BACKUP SYSTEM statement, that value overrides the subsystem parameter value. In that case, the copy pool that is specified in the BACKUP SYSTEM statement is used as the alternate copy pool for that utility invocation only.

The value of the ALTERNATE\_CP subsystem parameter has the following meanings:

**blank**

BACKUP SYSTEM uses the standard copy pool only.

**Not blank**

BACKUP SYSTEM uses the specified copy pool as the alternate copy pool for system-level backups. BACKUP SYSTEM alternates between using the standard copy pool and the alternate copy pool for system-level backups. BACKUP SYSTEM checks the BSDS to determine whether the standard copy pool or alternate copy pool was used for the most recent system-level backup. If no system-level backups are recorded in the BSDS, BACKUP SYSTEM uses the standard copy pool. If system-level backups are recorded in the BSDS, BACKUP SYSTEM uses the copy pool that was not used for the most recent system-level backup. .

BACKUP SYSTEM, RESTORE SYSTEM, and RECOVER can create and use system-level backups for the standard copy pool and more than one alternate copy pool. However, only the standard copy pool and the alternate copy pool that is specified in the ALTERNATE\_CP subsystem parameter are used for automatically alternating the copy pool for system-level backups. Other copy pool names are ignored.

The ALTERNATE\_CP value applies to both the database copy pool and the log copy pool, if one is specified.

**Related concepts**

[Copy pools \(Db2 Utilities\)](#)

**Related reference**

[Syntax and options of the BACKUP SYSTEM control statement \(Db2 Utilities\)](#)

## DB BACKUP STG GROUP field (UTIL\_DBBSG subsystem parameter)

The UTIL\_DBBSG subsystem parameter specifies the name of a backup SMS storage group to be used by the BACKUP SYSTEM utility for the database copy pool. This field is optional. You can set this field to a non-blank value only if the value of the ALTERNATE COPY POOL field is also non-blank.

<b>Acceptable values:</b>	blank or a valid SMS storage group name
<b>Default:</b>	blank
<b>Update:</b>	option 32 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTIL_DBBSG
<b>Data sharing scope:</b>	Same setting recommended on all members

**blank**

BACKUP SYSTEM is to request that DFSMSshm use the copy pool backup storage group that is associated with each storage group in the copy pool.

**Valid SMS storage group name**

BACKUP SYSTEM is to request that DFSMSshm use the specified backup storage group. The specified backup storage group must be defined with the COPY POOL BACKUP attribute.

**Related concepts**

[Copy pools \(Db2 Utilities\)](#)

**Related reference**

[ALTERNATE COPY POOL field \(ALTERNATE\\_CP subsystem parameter\)](#)

The ALTERNATE\_CP subsystem parameter specifies the name of an alternate SMS copy pool for the BACKUP SYSTEM utility. If a copy pool is specified, BACKUP SYSTEM alternates between using that copy pool and the standard copy pool when the utility creates system-level backups.

[Syntax and options of the BACKUP SYSTEM control statement \(Db2 Utilities\)](#)

## LOG BACKUP STG GRP field (UTIL\_LGBSG subsystem parameter)

The UTIL\_LGBSG subsystem parameter specifies the name of a backup SMS storage group to be used by the BACKUP SYSTEM utility for the log copy pool. This field is optional. You can set this field to a non-blank value only if the value of the ALTERNATE COPY POOL field is also non-blank.

<b>Acceptable values:</b>	blank or a valid SMS storage group name
<b>Default:</b>	blank
<b>Update:</b>	option 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTIL_LGBSG
<b>Data sharing scope:</b>	Same setting recommended on all members

### blank

BACKUP SYSTEM is to request that DFSMSshm use the copy pool backup storage group that is associated with each storage group in the copy pool.

### Valid SMS storage group name

BACKUP SYSTEM is to request that DFSMSshm use the specified backup storage group. The specified backup storage group must be defined with the COPY POOL BACKUP attribute.

### Related concepts

[Copy pools \(Db2 Utilities\)](#)

### Related reference

[ALTERNATE COPY POOL field \(ALTERNATE\\_CP subsystem parameter\)](#)

The ALTERNATE\_CP subsystem parameter specifies the name of an alternate SMS copy pool for the BACKUP SYSTEM utility. If a copy pool is specified, BACKUP SYSTEM alternates between using that copy pool and the standard copy pool when the utility creates system-level backups.

[Syntax and options of the BACKUP SYSTEM control statement \(Db2 Utilities\)](#)

## HSM MESSAGE DS HLQ field (UTILS\_HSM\_MSGDS\_HLQ subsystem parameter)

Specifies the high-level qualifier for data sets to be allocated by the Db2 BACKUP SYSTEM and RESTORE SYSTEM utilities in order to receive messages from IBM Hierarchical Storage Management (HSM) and IBM Data Facility Data Set Services (DFDSS). These messages will be included for diagnostic purposes in Db2 utility SYSPRINT DD output.

<b>Acceptable values:</b>	Valid data set qualifier of 1–6 characters
<b>Default:</b>	blank
<b>Update:</b>	option 36 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SPRM.UTILS_HSM_MSGDS_HLQ
<b>Data sharing scope:</b>	Same setting recommended on all members

This high-level qualifier must also be registered in HSM via a SETSYS command. Data sets that use this high-level qualifier are defined and populated by HSM and DFDSS during BACKUP SYSTEM and RECOVER SYSTEM processing, then allocated by Db2 and the content written to utility's SYSPRINT DD. Db2 does

not delete the data set. These data sets do not include messages from DUMP processing because control is returned to Db2 before dump processing is complete.

## DSNTIP63: Db2 utilities parameters panel 4

The fields on the DSNTIP63 panel are used to configure the default behavior of various Db2 utilities.

```

DSNTIP63    INSTALL DB2 - DB2 UTILITIES PARAMETERS PANEL 4
====>

Enter DB2 REORG utility options below:
 1 REORG PART SORT NPSI  ===> AUTO      AUTO/NO/YES online REORG NPSI sort
 2 REORG LIST PROCESSING ===> PARALLEL  PARALLEL/SERIAL REORG list processing
 3 REORG MAPPING DB      ===>          Default database for mapping table for
                                         REORG TABLESPACE SHRLEVEL CHANGE
 4 REORG DROP PBG PARTS  ===> DISABLE   DISABLE/ENABLE deletion of trailing
                                         empty PBG partitions for REORG TS
 5 REORG TS NOPAD DEFAULT===> YES      NO/YES Default NOPAD setting
 6 REORG INDEX NOSYSUT1  ===>          NO/YES REORG INDEX bypasses using the
                                         SYSUT1/work data set
 7 REORG IC LIMIT DASD   ===> 0        0-32767 Number of DASD image copies
 8 REORG IC LIMIT TAPE   ===> 0        0-32767 Number of TAPE image copies

Enter other DB2 Utilities options below:
 9 UTILS USE ZSORT       ===> NO       NO/YES Use accelerated Z
10 LOAD FORMAT DELIMITED ===> NO       NO/YES Implicit LOAD FORMAT DELIMITED
    IMPLICIT DEC SCALE    decimal point

```

Figure 42. DB2 utilities parameters panel 3: DSNTIP63

### REORG PART SORT NPSI field (REORG\_PART\_SORT\_NPSI subsystem parameter)

The REORG\_PART\_SORT\_NPSI subsystem parameter specifies whether the REORG TABLESPACE PART utility decides to sort all of the keys of a non-partitioned secondary index. The setting is ignored for a REORG that is not part-level or without non-partitioned secondary indexes.

<b>Acceptable values:</b>	AUTO, NO, YES
<b>Default:</b>	AUTO
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_PART_SORT_NPSI

#### AUTO

The utility determines whether to sort all NPSI keys or only keys in the scope of the REORG operation.

The decision is based on many factors, including a projection of the estimated elapsed time and CPU performance savings of sorting all NPSI keys being processed. However, the actual performance varies depending on the specific scenario, and CPU and elapsed time reductions are not always guaranteed.

#### YES

Specifies that all keys of the non-partitioned secondary indexes are sorted.

#### NO

Specifies that only keys of the non-partitioned secondary indexes that are in the scope of the REORG are sorted.

## REORG LIST PROCESSING field (REORG\_LIST\_PROCESSING subsystem parameter)

The REORG\_LIST\_PROCESSING subsystem parameter specifies the default setting for the PARALLEL option of the Db2 REORG TABLESPACE utility.

<b>Acceptable values:</b>	PARALLEL, SERIAL
<b>Default:</b>	PARALLEL
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_LIST_PROCESSING

### PARALLEL

The default value PARALLEL specifies that the REORG TABLESPACE utility is to use a default PARALLEL YES option when the PARALLEL keyword is not specified in the utility control statement. The PARALLEL YES option specifies that the REORG TABLESPACE utility is to process all partitions that are specified in the input LISTDEF statement in a single execution of the utility.

### SERIAL

SERIAL specifies that the REORG TABLESPACE utility is to use a default PARALLEL NO option when the PARALLEL keyword is not specified in the utility control statement. The PARALLEL NO option specifies that each partition that is specified in the input LISTDEF statement is to be processed in a separate execution of the utility.

## REORG MAPPING DB field (REORG\_MAPPING\_DATABASE subsystem parameter)

The REORG\_MAPPING\_DATABASE subsystem parameter specifies the default database that REORG TABLESPACE SHRLEVEL CHANGE uses to implicitly create the mapping table.

<b>Acceptable values:</b>	<i>database-name</i>
<b>Default:</b>	blank
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.REORG_MAPPING_DATABASE
<b>Online changeable:</b>	Yes
<b>Data sharing scope:</b>	Member

### *database-name*

The name of the default database that REORG TABLESPACE SHRLEVEL CHANGE uses to implicitly create the mapping table. The name must be a character string with a maximum length of 8 bytes.

### blank

An implicitly defined database is used.

When processing a REORG TABLESPACE SHRLEVEL CHANGE request, the REORG utility has the option to create its own mapping table and mapping index, instead of relying on user's input. Specifying this subsystem parameter with a valid database name directs REORG to allocate the mapping table in the database that is specified. By default, REORG uses an implicitly defined database for the mapping table allocation.

## REORG DROP PBG PARTS field (REORG\_DROP\_PBG\_PARTS subsystem parameter)

The REORG\_DROP\_PBG\_PARTS subsystem parameter specifies whether the REORG utility removes trailing empty partitions when operating on an entire partition-by-growth table space. An empty trailing

partition occurs when the REORG utility moves all data records from a partition into lower numbered partitions.

<b>Acceptable values:</b>	DISABLE, ENABLE
<b>Default:</b>	DISABLE
<b>Update:</b>	option 37 36 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_DROP_PBG_PARTS

This parameter is meaningful only when the REORG utility is run against an entire partition-by-growth table space. It is ignored for:

- LOB table spaces
- Table spaces that are not defined as partition-by-growth
- Partition-by-growth table spaces that are defined with a MAXPARTITONS value of 1
- Partition-by-growth table spaces that contain tables that are defined with DATA CAPTURE CHANGES
- Hash partition-by-growth table spaces

#### **ENABLE**

Specifies that any trailing empty partitions that are present at the successful completion of the REORG are always removed. LOB table spaces and auxiliary indexes that are associated with these empty partition-by-growth partitions are also removed.

#### **DISABLE**

Specifies that the number of partition-by-growth partitions at the successful completion of the REORG are always equal or greater than the number of partitions before the REORG utility was run. Even if the REORG is able to relocate all data records into the lowest numbered partitions, trailing empty partition-by-growth partitions are retained.

### **REORG IC LIMIT DASD field (REORG\_IC\_LIMIT\_DASD subsystem parameter)**

The REORG\_IC\_LIMIT\_DASD subsystem parameter specifies the maximum number of sequential DASD image copies that the REORG TABLESPACE utility can allocate.

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	0
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_IC_LIMIT_DASD
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

The following values are supported:

#### **0**

The REORG TABLESPACE utility allocates the number of DASD image copies based on the number of objects being reorganized, without a user-imposed limit.

#### **1–32767**

the maximum number of sequential DASD image copies that the REORG TABLESPACE utility can allocate.

#### **Related reference**

[Syntax and options of the REORG TABLESPACE control statement \(Db2 Utilities\)](#)

## REORG IC LIMIT TAPE field (REORG\_IC\_LIMIT\_TAPE subsystem parameter)

The REORG\_IC\_LIMIT\_TAPE subsystem parameter specifies the maximum number of sequential TAPE image copies that the REORG TABLESPACE utility can allocate.

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	0
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_IC_LIMIT_TAPE
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

The following values are supported:

### 0

The REORG TABLESPACE utility allocates the number of tape image copies based on the number of objects being reorganized, without a user-imposed limit.

### 1–32767

The maximum number of sequential tape image copies that the REORG TABLESPACE utility can allocate.

### Related reference

[Syntax and options of the REORG TABLESPACE control statement \(Db2 Utilities\)](#)

## REORG TS NOPAD DEFAULT (REORG\_TS\_NOPAD\_DEFAULT subsystem parameter)

Specifies the default setting for the NOPAD option of the UNLOAD EXTERNAL specification or the DISCARD specification of the REORG TABLESPACE utility. In other words, the setting to use for a REORG TABLESPACE statement that does not explicitly specify a NOPAD option.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_TS_NOPAD_DEFAULT

When the REORG TABLESPACE utility is run with DISCARD or UNLOAD EXTERNAL, the NOPAD option specifies whether variable-length columns in unloaded or discarded records occupy the actual data length without additional padding. The unloaded records can have varying lengths. The REORG\_TS\_NOPAD\_DEFAULT subsystem parameter indicates whether the NOPAD option is NO or YES by default when it is omitted from the utility control statement. Valid options for the REORG\_TS\_NOPAD\_DEFAULT subsystem parameter are:

### YES

Specifies that, by default, the variable-length columns in the unloaded or discarded records occupy the actual data length without additional padding.

### NO

Specifies that, by default, REORG processing pads variable-length columns in the unloaded or discarded records to their maximum length; the unloaded or discarded records have equal lengths for each table.

### Related reference

[Syntax and options of the REORG TABLESPACE control statement \(Db2 Utilities\)](#)

## REORG INDEX NOSYSUT1 (REORG\_INDEX\_NOSYSUT1 subsystem parameter)

Specifies the default setting for the NOSYSUT1 option of the REORG INDEX utility when run with SHRLEVEL REFERENCE or CHANGE. In other words, the setting to use for a REORG INDEX statement that does not explicitly specify a NOSYSUT1 option.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REORG_INDEX_NOSYSUT1
<b>Data sharing scope:</b>	Member
<b>Online changeable:</b>	Yes

The REORG\_INDEX\_NOSYSUT1 subsystem parameter specifies whether the REORG INDEX SHRLEVEL REFERENCE or CHANGE utility should avoid using the SYSUT1 or work data set to hold the unloaded index keys. The utility passes the unloaded keys in memory as input to the index build for this process. Enablement of this option also allow REORG INDEX to utilize parallel sub-tasking to unload and to build the index keys in its internal processing.

The following values are supported:

### YES

The REORG INDEX utility avoids using the SYSUT1 or specified work data set to hold the unloaded index keys, and also uses parallel sub-tasking to unload and to build the index keys.

### NO

The REORG INDEX utility uses the SYSUT1 or specified work data set to hold the unloaded index keys.

### Related reference

[Syntax and options of the REORG INDEX control statement \(Db2 Utilities\)](#)

## UTILS USE ZSORT (UTILS\_USE\_ZSORT subsystem parameter)

The UTILS\_USE\_ZSORT subsystem parameter specifies whether Db2 utilities use the IBM Integrated Accelerator for Z Sort interface when invoking DFSORT for utility processing. However, the use of the integrated sort acceleration depends on other run-time variables and hardware.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM UTILS_USE_ZSORT

The following values are supported:

### NO

Db2 utilities do not use integrated sort acceleration when invoking DFSORT.

### YES

Db2 utilities attempt to use the integrated sort acceleration if possible when invoking DFSORT.



## LOAD FORMAT DELIMITED IMPLICIT DECIMAL SCALE (LOAD\_DEL\_IMPLICIT\_SCALE subsystem parameter)

The LOAD\_DEL\_IMPLICIT\_SCALE subsystem parameter specifies how LOAD FORMAT DELIMITED processes decimal data when a decimal point is not specified.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 37 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM LOAD_DEL_IMPLICIT_SCALE

The following values are supported:

### NO

LOAD FORMAT DELIMITED interprets decimal data, without a decimal point specified, with an implied decimal point after the rightmost digit of the number. NO is the default value.

### YES

LOAD FORMAT DELIMITED interprets decimal data, without a decimal point specified, with an implied decimal point based on the scale specified in the field specification of the LOAD utility

### Example

Assume that you run following LOAD utility statement with input string 1234567890.

```
LOAD FORMAT DELIMITED ... (DEC1 POSITION(*) DECIMAL EXTERNAL(10,2) )
```

The following table shows how the LOAD utility interprets the example input value based on the LOAD\_DEL\_IMPLICIT\_SCALE subsystem parameter setting.

LOAD_DEL_IMPLICIT_SCALE setting	How LOAD interprets the input value
<b>YES</b>	LOAD uses the scale of 2 from the field specification and interprets the number to load as 12345678.90. The resulting decimal value fits in the target column, and the LOAD succeeds.
<b>NO</b>	LOAD uses an implied decimal point at the end of the number and a scale of 2 and tries to load 1234567890.00. The resulting decimal value is too large for the target column, so LOAD issues message DSNU333I because the input value is out of range.

### Related concepts

[Loading delimited files \(Db2 Utilities\)](#)

### Related reference

[Syntax and options of the LOAD control statement \(Db2 Utilities\)](#)

[Data types in delimited files \(Db2 Utilities\)](#)

## DSNTIPP: Protection panel

The entries on the DSNTIPP panel are related to security matters.

```
DSNTIPP          INSTALL DB2 - PROTECTION
===> _

Enter data below:

 1 ARCHIVE LOG RACF   ===> NO           RACF protect archive log data sets
 2 USE PROTECTION    ===> YES          DB2 authorization enabled. YES or NO
 3 PLAN AUTH CACHE   ===> 3072        Size in bytes per plan (0 - 4096)
 4 AUTH EXIT LIMIT   ===> 10          Access control exit shutdown threshold
 5 AUTH EXIT CHECK    ===> PRIMARY     ID for access control exit auth checks
                                       (PRIMARY or DB2)
 6 AUTH EXIT CACHE REFR===>NONE       Refresh DB2 auth caches when user profile
                                       or resource access changes (ALL or NONE)
 7 MFA AUTH UNUSED TIME===> 0        How long cached MFA credentials can
                                       remain unused before new credentials are
                                       required (0, 120 - 7200 seconds)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 43. Protection panel: DSNTIPP

### ARCHIVE LOG RACF field (PROTECT subsystem parameter)

The PROTECT subsystem parameter specifies whether archive log data sets are to be protected with individual profiles with RACF when they are created.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	see “DSNTIPP: Protection panel ” on page 264; not during migration
<b>DSNZPxxx:</b>	DSN6ARVP PROTECT

If you specify YES, RACF protection must be active for Db2. However, a value of YES also means that you cannot use RACF generic profiles for archive log data sets. In addition, RACF class TAPEVOL must be active if your archive log is on tape. Otherwise, the offload fails.

#### Related concepts

[Managing access through RACF \(Managing Security\)](#)

### USE PROTECTION field (AUTH subsystem parameter)

The AUTH subsystem parameter controls whether Db2 is to check authorizations.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 38 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM AUTH
<b>Security parameter:</b>	<a href="#">Security-related</a>

#### YES

Enables authorization checking in Db2.

If you specified YES for the value of CACHE DYNAMIC SQL on panel DSNTIP8, you must also specify YES for this value.

**Recommendation:** Specify YES.

## NO

Disables all authorization checking in Db2 and disables the GRANT statement. In this case, every privilege is granted to PUBLIC.

**Note:** This is a security-related parameter. If it is set to NO, individual grants cannot be performed and all privileges are granted to PUBLIC, which allows any user to access user data.

## PLAN AUTH CACHE field (AUTHCACH subsystem parameter)

The AUTHCACH subsystem parameter specifies the size (in bytes per plan) of the authorization cache that is to be used if no CACHESIZE is specified on the BIND PLAN subcommand.

**Deprecated subsystem parameter:** The AUTHCACH subsystem parameter is deprecated, meaning that it is likely to be removed eventually.

<b>Acceptable values:</b>	0–4096 in multiples of 256
<b>Default:</b>	3072
<b>Update:</b>	option 38 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM AUTHCACH
<b>Security parameter:</b>	<u>Security-related</u>

## 0

Specifies that no authorization cache is to be used.

### 256–4096 (integers in multiples of 256)

For an authorization cache, you need 32 bytes of overhead plus (8 bytes of storage times the number of concurrent users).

**Note:** This is a security-related parameter.

### Related tasks

[Caching authorization IDs for plans \(Managing Security\)](#)

### Related reference

[BIND PLAN subcommand \(DSN\) \(Db2 Commands\)](#)

## AUTH EXIT LIMIT field (AEXITLIM subsystem parameter)

The AEXITLIM subsystem parameter controls the number of abends of the Db2 access control authorization exit routine that are to be tolerated before it is shut down.

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	10
<b>Update:</b>	option 38 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM AEXITLIM

After the exit routine shuts down, it can be reactivated only by restarting Db2. A very low setting for the AUTH EXIT LIMIT field might cause the exit routine to shut down in response to routine abends such as timeouts. A very high setting, on the other hand, may mask a problem with the exit routine environment that can result in degraded Db2 or system performance.

## AUTH EXIT CHECK (AUTHEXIT\_CHECK subsystem parameter)

The AUTHEXIT\_CHECK subsystem parameter specifies whether the owner or the primary authorization ID is used for authorization checks when the access control authorization exit (DSNX@XAC) is active.

<b>Acceptable values:</b>	PRIMARY, DB2
---------------------------	--------------

<b>Default:</b>	PRIMARY
<b>Update:</b>	No
<b>DSNZPxxx:</b>	DSN6SPRM.AUTHEXIT_CHECK
<b>Data sharing scope:</b>	Group
<b>Security parameter:</b>	<u>Security-related</u>

### PRIMARY

Specifies that Db2 provides the ACEE of the primary authorization ID to perform all authorization checks. The primary authorization ID must be permitted access to the resources in RACF. This is the default value for the field.

### DB2

Specifies that Db2 provides the ACEE of the package or plan owner to perform authorization checking when processing the autobind, BIND and REBIND commands and, if needed, during the execution of the package or plan. Db2 also provides the ACEE of the authorization ID as determined by the DYNAMICRULES option to perform dynamic SQL authorization checking at run time. The access control authorization exit uses the ACEE for XAPLUCHK for authorization checking. The XAPLUCHK authorization ID can be a user or a group in RACF.

To ensure successful authorization checks with the owner ACEE, the owner authorization ID in XAPLUCHK must be permitted access to the resources in RACF. If the owner is a group in RACF, you need to permit the group access to the resource associated with the connection in the RACF DSNR class. You can issue the PERMIT command to grant a group access to *subsystem.BATCH* in the DSNR class, as follows:

```
PERMIT DSN.BATCH CLASS(DSNR) ID(DB2GRP) ACCESS(READ)
```

### Related reference

[Automatic rebind authorization \(Managing Security\)](#)

[DYNAMICRULES\(BIND\) option authorization \(Managing Security\)](#)

[Considerations for the access control authorization routine \(Managing Security\)](#)

[DYNAMICRULES bind option \(Db2 Commands\)](#)

## AUTH EXIT CACHE REFR (AUTHEXIT\_CACHEREFRESH subsystem parameter)

The AUTHEXIT\_CACHEREFRESH subsystem parameter specifies whether the cache entries of the package authorization, the routine authorization, the DDF user authentication, and the dynamic statement are refreshed and whether the dependent packages are invalidated when a user profile or resource access is changed in RACF.

<b>Acceptable values:</b>	ALL, NONE
<b>Default:</b>	NONE
<b>Update:</b>	No
<b>DSNZPxxx:</b>	DSN6SPRM.AUTHEXIT_CACHEREFRESH
<b>Data sharing scope:</b>	Group
<b>Security parameter:</b>	<u>Security-related</u>

### ALL

Specifies that:

- Db2 refreshes the entries in the package authorization cache, the routine authorization cache, and the dynamic statement cache when the user profile or resource access is changed in RACF, and the access control authorization exit (DSNX@XAC) is active.

- Db2 invalidates dependent packages when the user profile or resource access is changed in RACF, and the access control authorization exit (DSNX@XAC) is active.
- Db2 refreshes the entries in the DDF user authentication cache when the user profile is changed in RACF. The DDF user authentication cache is refreshed regardless of whether security is managed with Db2 facilities or with the access control authorization exit.

**Tip:** If you are enabling sysplex group authentication, ALL must be specified for every member of the data sharing group. For more information, see [Enabling caching of MFA-based authentication credentials for clients with sysplex workload balancing \(Managing Security\)](#).

#### NONE

Specifies that Db2 does not refresh the cache entries of the package authorization, the routine authorization, and the dynamic statement or invalidate dependent packages when the user profile or resource access is changed in RACF. This is the default value for the field.

When the AUTHEXIT\_CACHEREFRESH subsystem parameter is set to ALL and the access control authorization exit is active, Db2 listens to type 62, type 71, and type 79 ENF signals from RACF for user profile or resource access changes and refreshes the Db2 cache entries accordingly. If you define RACF classes for Db2 objects and administrative authorities without using IBM-supplied RACF resource classes, you need to enable the SIGNAL=YES option for these classes in the RACF Class Descriptor Table.

#### Related tasks

[Enabling caching of MFA-based authentication credentials for clients with sysplex workload balancing \(Managing Security\)](#)

#### Related reference

[Invalid and inoperative packages \(Managing Security\)](#)

[Db2 processing of ENF signals \(Managing Security\)](#)

[Global authentication cache \(Managing Security\)](#)

### MFA AUTH UNUSED TIME field (MFA\_AUTHCACHE\_UNUSED\_TIME subsystem parameter)

The MFA\_AUTHCACHE\_UNUSED\_TIME subsystem parameter specifies how long in seconds that multi-factor authentication (MFA) security credentials from a distributed client (DRDA or REST) can remain unused in the Db2 global authentication cache before new security credentials must be provided.

An authentication cache entry is considered unused until its related MFA-based security credentials are reused by the same client IP address in a subsequent authentication request. The unused time is reset each time that the credentials are used. The authorization cache entry does not contain the text of the security credentials.

<b>Acceptable values:</b>	0, 120–7200 <a href="#">“1” on page 267</a>
<b>Default:</b>	0
<b>Update:</b>	Yes <a href="#">“2” on page 267</a>
<b>DSNZPxxx:</b>	DSN6SPRM.MFA_AUTHCACHE_UNUSED_TIME
<b>Data sharing scope:</b>	Group
<b>Security parameter:</b>	<a href="#">Yes</a>

#### Notes:

1. A non-zero value can only be specified if the AUTHEXIT\_CACHEREFRESH is set to ALL.
2. Online update is supported only if the AUTHEXIT\_CACHEREFRESH setting was ALL when Db2 was started. Otherwise, Db2 issues message DSNZ014I with DSNZCMD1 for *load-csect-name* for any online attempt to update the MFA\_AUTHCACHE\_UNUSED\_TIME value.

0

Specifies that no security credentials authenticated with MFA are cached in global authentication cache of this Db2 subsystem. In data sharing, this member does not query the authorization caches of other members for a matching authentication cache entry, and other members cannot query the authorization cache for this member.

This is the default value.

## 120–7200

Specifies that Db2 caches security credentials authenticated with MFA, and the time in seconds that a cache entry can remain unused. An entry is unused until the client attempts to use the same credentials for authentication on a new connection from the same IP address. The unused time is reset each time that the entry is used. A non-zero value can only be specified if the `AUTHEXIT_CACHEREFRESH` is set to ALL.

However, users must provide new valid MFA credentials for a RACF user profile access change that affects the authorization ID.

## Data sharing

In data sharing, if the authorization cache of the current member does not have a match, the other members are queried. If a successful match is found in the cache of another member, a corresponding entry is made in the authorization cache of the current member.

The intra-group authentication cache lookup requires that all members be started if the ICSF load library, `sCSFMOD0`, is in the LINKLIST of the LPAR where Db2 runs.

If the members of a data sharing group are started with different `MFA_AUTHCACHE_UNUSED_TIME` settings, the entire group uses the value the largest value specified for any member. For example, if member DB2A is started with a value of 120 and member DB2B is started with 7200, member DB2A requests the matching cached credentials in DB2B every 120 seconds until the cache in DB2B times out. The request for matching credentials in other members occurs only when either the cached credentials are not found in the current member or the cached credentials in the current member exceed its unused time and a new replay of the credentials has been received on a new connection request from the same IP address. For best results, set the parameter for all members of the group to the same “maximum” value.

### Related tasks

[Enabling caching of MFA and RACF PassTickets credentials for clients without sysplex workload balancing \(Managing Security\)](#)

### Related reference

[AUTH EXIT CACHE REFR \(AUTHEXIT\\_CACHEREFRESH subsystem parameter\)](#)

The `AUTHEXIT_CACHEREFRESH` subsystem parameter specifies whether the cache entries of the package authorization, the routine authorization, the DDF user authentication, and the dynamic statement are refreshed and whether the dependent packages are invalidated when a user profile or resource access is changed in RACF.

[Global authentication cache \(Managing Security\)](#)

## DSNTIPP1: Protection panel 2

Use the DSNTIPP1 panel to specify security options, including the authorization IDs that are required for system administrators and system operators, and the authorization IDs or roles that are required for security administrators. You can also specify the authorization IDs that are to be used to install, configure, and validate Db2-supplied routines.

### Scrollable fields

The limited space on this panel means that some input fields are not wide enough to display the entire contents of the field at one time. These fields are defined as ISPF scrollable fields, which lets you see the field contents. A **>** indicates a field that can be scrolled to the right, and a **<** indicates a field that can be scrolled to the left.

To scroll the field, position your cursor in the field and use the for LEFT or RIGHT scroll commands. To see the entire contents of the field at one time, type EXPAND in the command field, position your cursor in the scrollable field, and press Enter. (You can also assign your PF keys to be the LEFT, RIGHT, and EXPAND commands.)

```

DSNTIPP1          INSTALL DB2 - PROTECTION PANEL 2
====>

Enter data below:

 1 SYSTEM ADMIN 1   ==> SYSADM   Authid of system administrator
 2 SYSTEM ADMIN 2   ==> SYSADM   Authid of system administrator
 3 SYSTEM OPERATOR 1 ==> SYSOPR   Authid of system operator
 4 SYSTEM OPERATOR 2 ==> SYSOPR   Authid of system operator
 5 SECURITY ADMIN 1  ==> SECADM   > Authid or role of security administrator
 6 SEC ADMIN 1 TYPE ==> AUTHID   Security administrator type. AUTHID, ROLE
 7 SECURITY ADMIN 2 ==> SECADM   > Authid or role of security administrator
 8 SEC ADMIN 2 TYPE ==> AUTHID   Security administrator type. AUTHID,ROLE
 9 SEPARATE SECURITY ==> NO      SYSADM/SYSCTRL can perform GRANT/REVOKE
10 UNKNOWN AUTHID  ==> IBMUSER   Authid of default (unknown) user
11 RESOURCE AUTHID ==> SYSIBM   Authid of Resource Limit Table creator
12 BIND NEW PACKAGE ==> BINDADD  Authority required: BINDADD or BIND
13 DBADM CREATE AUTH ==> NO     DBA can create views/aliases for others
14 REVOKE DEP PRIV ==> SQLSTMT   Include dependent privileges on REVOKE
                                (NO, YES, or SQLSTMT)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 44. Protection panel 2: DSNTIPP1

## SYSTEM ADMIN 1 field (SYSADM subsystem parameter)

The SYSADM subsystem parameter specifies the first of two authorization IDs that are to have installation SYSADM authority.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSADM
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SYSADM
<b>Security parameter:</b>	<a href="#">Yes</a>

The two users with installation SYSADM authority are permitted access to Db2 in all cases.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can manage the Db2 subsystem even when the Db2 catalog is unavailable. This authorization ID can access all user data and can run any application.

### Related reference

[Installation SYSADM \(Managing Security\)](#)

## SYSTEM ADMIN 2 field (SYSADM2 subsystem parameter)

The SYSADM2 subsystem parameter specifies the second of two authorization IDs that are to have installation SYSADM authority.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSADM
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SYSADM2

<b>Security parameter:</b>	<a href="#">Yes</a>
----------------------------	---------------------

If you leave this field blank, the value is set to the value of the SYSTEM ADMIN 1 field.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can manage the Db2 subsystem even when the Db2 catalog is unavailable. This authorization ID can access all user data and can run any application.

## SYSTEM OPERATOR 1 field (SYSOPR1 subsystem parameter)

The SYSOPR1 subsystem parameter specifies the first of two authorization IDs that are to have installation SYSOPR authority.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSOPR
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SYSOPR1
<b>Security parameter:</b>	<a href="#">Yes</a>

The two users with installation SYSOPR authority are permitted access to Db2 even if the Db2 catalog is unavailable.

The value of the SYSTEM OPERATOR 1 field or the SYSTEM OPERATOR 2 field is used for authorization during installation or migration if you install or migrate your Db2 subsystem without SYSADM authority.

If you leave this field blank, the value is set to the value of the SYSTEM ADMIN 1 field.

**Recommendation:** Set the value of this field or the value of the SYSTEM OPERATOR 2 field to SYSOPR. Doing so ensures that Db2 commands that are issued from the console can be processed correctly when the Db2 catalog is unavailable.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can issue most of the Db2 commands such as BIND QUERY, CANCEL THREAD, and STOP DB2. This ability might provide the authorization ID with information about user data. Also, the authorization ID can run the DSN1SDMP utility and terminate any utility job.

### Related reference

[Installation SYSOPR \(Managing Security\)](#)

## SYSTEM OPERATOR 2 field (SYSOPR2 subsystem parameter)

The SYSOPR2 subsystem parameter specifies the second of two system operators that are to have installation SYSOPR authority.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	SYSOPR
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SYSOPR2
<b>Security parameter:</b>	<a href="#">Yes</a>

The value of the SYSTEM OPERATOR 1 field or the SYSTEM OPERATOR 2 field is used for authorization during installation or migration if you install or migrate your Db2 subsystem without SYSADM authority.

If you leave this field blank, the value is set to the value of the SYSTEM OPERATOR 1 field.



**Recommendation:** Set the value of this field or the value of the SYSTEM OPERATOR 1 field to SYSOPR. Doing so ensures that Db2 commands that are issued from the console can be processed correctly when the Db2 catalog is unavailable.

**Note:** This is a security-related parameter. The authorization ID that is specified for this parameter can issue most of the Db2 commands such as BIND QUERY, CANCEL THREAD, and STOP DB2. This ability might provide the authorization ID with information about user data. Also, the authorization ID can run the DSN1SDMP utility and terminate any utility job.

## SECURITY ADMIN 1 field (SECADM1 subsystem parameter)

The SECADM1 subsystem parameter specifies the first of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 1 TYPE field, specify whether this entry is an authorization ID or a role.

<b>Acceptable values:</b>	Depends on the SEC ADMIN 1 TYPE value:  For AUTHID, 1–8 characters, starting with an alphabetic character.  For ROLE, an ordinary SQL identifier (up to 128 bytes) that designates a role. The role identifier cannot begin with "SYS" and cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, or SQLADM.
<b>Default:</b>	SECADM
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx</b>	DSN6SPRM SECADM1
<b>Security parameter:</b>	<u>Yes</u>

If you want to separate Db2 security administrator duties from system administrator duties for this subsystem, set at least one SECADM subsystem parameter to an authorization ID, or create the necessary trusted contexts and roles before setting the SEPARATE SECURITY field to YES. If you specify YES for SEPARATE SECURITY, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM subsystem parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects..

If the access control authorization exit routine (DSNX@XAC) is active, then the exit routine is called to check for SECADM authorization and this subsystem parameter is not checked.

**Note:** This is a security-related parameter. A user that has SECADM authority can manage security-related objects such as trusted contexts, roles, and column masks. The user can also grant privileges and revoke privileges that are granted by others.

### Related concepts

[Access control authorization exit routine \(Managing Security\)](#)

### Related tasks

[Installation step 10: Establish subsystem security \(optional\)](#)

Db2 can control access to data within a Db2 subsystem. Db2 also works with outside security systems, such as RACF, that control access to the Db2 subsystem.

### Related reference

[SEPARATE SECURITY field \(SEPARATE\\_SECURITY subsystem parameter\)](#)

The SEPARATE\_SECURITY subsystem parameter specifies whether Db2 security administrator duties are to be separated from system administrator duties for this subsystem.

[SEC ADMIN 1 TYPE field \(SECADM1\\_TYPE subsystem parameter\)](#)

The SECADM1\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 1 field is an authorization ID or a role.

SECADM1\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM1 setting is a character string or a hexadecimal string.

**Related information**

Authorization IDs and roles (Managing Security)

**SEC ADMIN 1 TYPE field (SECADM1\_TYPE subsystem parameter)**

The SECADM1\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 1 field is an authorization ID or a role.

<b>Acceptable values:</b>	AUTHID, ROLE
<b>Default:</b>	AUTHID
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SECADM1_TYPE
<b>Security parameter:</b>	<u>Yes</u>

**AUTHID**

The SECADM1 value is an authorization ID.

**ROLE**

The SECADM1 value is a role.

**Note:** This is a security-related parameter. The value specifies whether the SECADM1 parameter is an authorization ID or a role. Changing the value of this field changes the SECADM1 parameter from an authorization ID to a role, or from a role to an authorization ID.

**Related reference**

SECURITY ADMIN 1 field (SECADM1 subsystem parameter)

The SECADM1 subsystem parameter specifies the first of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 1 TYPE field, specify whether this entry is an authorization ID or a role.

SECADM1\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM1 setting is a character string or a hexadecimal string.

**Related information**

Authorization IDs and roles (Managing Security)

Managing access through trusted contexts (Managing Security)

**SECURITY ADMIN 2 field (SECADM2 subsystem parameter)**

The SECADM2 subsystem parameter specifies the second of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 2 TYPE field, specify whether this entry is an authorization ID or a role.

<b>Acceptable values:</b>	If SEC ADMIN 2 TYPE is AUTHID: 1–8 characters, starting with an alphabetic character.  If SEC ADMIN 2 TYPE is ROLE: an ordinary SQL identifier (up to 128 characters) that designates a role. The role identifier cannot begin with "SYS" and cannot be ACCESSCTRL, DATAACCESS, DBADM, DBCTRL, DBMAINT, NONE, NULL, PACKADM, PUBLIC, SECADM, or SQLADM.
<b>Default:</b>	SECADM

<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SECADM2
<b>Security parameter:</b>	<u>Yes</u>

If you leave this field blank, the value is set to the value of the SECURITY ADMIN 1 field.

If you want to separate Db2 security administrator duties from system administrator duties for this subsystem, set at least one SECADM subsystem parameter to an authorization ID, or create the necessary trusted contexts and roles before setting the SEPARATE SECURITY field to YES. If you specify YES for SEPARATE SECURITY, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM subsystem parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects.

If the access control authorization exit (DSNX@XAC) is active, then the exit is called to check for SECADM authorization and this parameter is not checked.

**Note:** This is a security-related parameter. A user that has SECADM authority can manage security-related objects such as trusted contexts, roles, and column masks. The user can also grant privileges and revoke privileges that are granted by others.

### Related concepts

[Access control authorization exit routine \(Managing Security\)](#)

### Related tasks

[Installation step 10: Establish subsystem security \(optional\)](#)

Db2 can control access to data within a Db2 subsystem. Db2 also works with outside security systems, such as RACF, that control access to the Db2 subsystem.

### Related information

[Authorization IDs and roles \(Managing Security\)](#)

## SEC ADMIN 2 TYPE field (SECADM2\_TYPE subsystem parameter)

The SECADM2\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 2 field is an authorization ID or a role.

<b>Acceptable values:</b>	AUTHID, ROLE
<b>Default:</b>	AUTHID
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SECADM2_TYPE
<b>Security parameter:</b>	<u>Yes</u>

### AUTHID

The SECADM2 value is an authorization ID.

### ROLE

The SECADM2 value is a role.

**Note:** This is a security-related parameter. The value specifies whether the SECADM2 parameter is an authorization ID or a role. Changing the value of this field changes the SECADM2 parameter from an authorization ID to a role, or from a role to an authorization ID.

### Related reference

[SECURITY ADMIN 2 field \(SECADM2 subsystem parameter\)](#)

The SECADM2 subsystem parameter specifies the second of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 2 TYPE field, specify whether this entry is an authorization ID or a role.

SECADM2\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM2 setting is a character string or a hexadecimal string.

### Related information

[Authorization IDs and roles \(Managing Security\)](#)

[Managing access through trusted contexts \(Managing Security\)](#)

## SEPARATE SECURITY field (SEPARATE\_SECURITY subsystem parameter)

The SEPARATE\_SECURITY subsystem parameter specifies whether Db2 security administrator duties are to be separated from system administrator duties for this subsystem.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SEPARATE_SECURITY
<b>Security parameter:</b>	<a href="#">Yes</a>

### NO

Overlaps many existing Db2 security administrator duties and system administrator duties. If you are migrating and want SYSADM and SYSCTRL authorities to remain unchanged, use this setting.

When SEPARATE\_SECURITY is set to NO, users with SYSADM authority can manage most security objects, perform grants, and revoke privileges that are granted by others, and users with SYSCTRL authority can manage roles, perform most grants, and revoke privileges that are granted by others.

However, the following newer security capabilities always require explicit SECADM authority, even if SEPARATE\_SECURITY is set to NO:

- [TRANSFER OWNERSHIP statements](#)
- [Stopping secure audit policies](#)

### YES

Separates Db2 security administrator duties from system administrator duties. Users with SYSADM authority cannot manage security objects (such as roles and trusted contexts), perform grants, or revoke privileges granted by others. Users with SYSCTRL authority cannot manage roles, perform grants, or revoke privileges granted by others. However, existing grants made by users with SYSADM or SYSCTRL authority are unchanged. SECADM or ACCESSCTRL authority is required for security administration. The SEPARATE\_SECURITY subsystem parameter does not apply to or affect users with installation SYSADM authority.

Before setting SEPARATE SECURITY to YES, set at least one SECADM subsystem parameter to an authorization ID, or create the necessary trusted contexts and roles. If you specify YES, system administrator authority can no longer be used to perform security tasks, and the SECADM authority is required to manage security objects such as trusted contexts and roles. If both SECADM system parameters are set to roles and those roles have not been created, no one will have the authority to manage security objects.

**Note:** This is a security-related parameter.

### Related tasks

[Installation step 10: Establish subsystem security \(optional\)](#)

Db2 can control access to data within a Db2 subsystem. Db2 also works with outside security systems, such as RACF, that control access to the Db2 subsystem.

[Separating the SYSADM authority \(Managing Security\)](#)

**Related reference**

[SECADM \(Managing Security\)](#)

[SYSADM \(Managing Security\)](#)

[SYSCTRL \(Managing Security\)](#)

### **UNKNOWN AUTHID field (DEFLTID subsystem parameter)**

The DEFLTID subsystem parameter specifies the authorization ID that is to be used if RACF is not available for batch access and USER= is not specified in the JOB statement.

<b>Acceptable values:</b>	1–8 characters, the first of which must be an alphabetic character
<b>Default:</b>	IBMUSER
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DEFLTID

### **RESOURCE AUTHID field (RLFAUTH subsystem parameter)**

The RLFAUTH subsystem parameter specifies the authorization ID that is to be used if you plan to use the resource limit facility (governor).

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	SYSIBM
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP RLFAUTH

### **BIND NEW PACKAGE field (BINDNV subsystem parameter)**

The BINDNV subsystem parameter controls whether BIND or BINDADD authority is to be required for a user to bind a new version of an existing package.

<b>Acceptable values:</b>	BINDADD, BIND
<b>Default:</b>	BINDADD
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM BINDNV
<b>Security parameter:</b>	<u>Yes</u>

If you accept the default, BINDADD, only users with the BINDADD system privilege are allowed to create a new package. If you specify BIND, users with the BIND privilege on a package or collection are allowed to create a new version of an existing package when they bind it. Users with PACKADM authority are also allowed to add a new package or a new version of a package to a collection.

**Note:** This is a security-related parameter. When this parameter is set to BIND, the BINDADD privilege check is bypassed, and a user with PACKADM authority can create new packages.

**Related reference**

[Privileges required for handling plans and packages \(Managing Security\)](#)

## DBADM CREATE AUTH field (DBACRVW subsystem parameter)

The DBACRVW subsystem parameter controls whether an authorization ID with DBADM authority on a database is to be allowed to complete certain tasks.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM DBACRVW
<b>Security parameter:</b>	<u>Yes</u>

### NO

Does not allow authorization IDs with DBADM authority on a database to complete the following tasks:

- Create a view for another authorization ID on tables in that database.
- Create a materialized query table or alter a table to become a materialized query table for another authorization ID.
- Create an alias for itself or another authorization ID for a table in that database.

### YES

Allows authorization IDs with DBADM authority on a database to complete the following tasks:

- Create a view for another authorization ID on tables in that database.
- Create a materialized query table or alter a table to become a materialized query table for another authorization ID. This action requires that DBADM authority is held on the database in which the tables of the fullselect reside and that the authorization ID has DBADM authority on the database in which the materialized query table is to reside.
- Create an alias for itself or another authorization ID for a table in that database.

If you specify YES, an authorization ID with DBCTRL authority on a database can also create an alias for itself or for another authorization ID for a table in any database.

Specifying YES results in less need for SYSADM authority on a database. However, users that need full authority may still need to have SYSADM authority. Specifying YES does not allow an authorization ID with DBADM authority to grant authority on that view.

**Note:** This is a security-related parameter. It controls whether an authorization ID or role with DBADM authority on a database is to be allowed to create views, aliases, and materialized query tables for another authorization ID or role. If it is set to YES, authorization IDs and roles with DBADM authority on a database can give others access to user data.

## REVOKE DEP PRIV field (REVOKE\_DEP\_PRIVILEGES subsystem parameter)

The REVOKE\_DEP\_PRIVILEGES subsystem parameter controls whether revoking a privilege from a user is to cause dependent privileges to be revoked. If dependent privileges are to be revoked, revoking a privilege from a user also revokes the privilege from anyone that the user has granted that privilege to.

<b>Acceptable values:</b>	NO, YES, SQLSTMT
<b>Default:</b>	SQLSTMT
<b>Update:</b>	option 39 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM REVOKE_DEP_PRIVILEGES
<b>Security parameter:</b>	<u>Yes</u>

## NO

REVOKE statements do not include dependent privileges. An error occurs if a REVOKE statement contains the INCLUDING DEPENDENT PRIVILEGES clause.

## YES

REVOKE statements include dependent privileges, except when ACCESSCTRL, DATAACCESS, and system DBADM authorities are revoked. An error occurs if a REVOKE statement contains the NOT INCLUDING DEPENDENT PRIVILEGES clause, except when ACCESSCTRL, DATAACCESS, and system DBADM authorities are revoked.

## SQLSTMT

Allows revoking of dependent privileges to be controlled at the SQL level, as specified in REVOKE statements. Db2 recognizes the dependent privileges clause (INCLUDING DEPENDENT PRIVILEGES or NOT INCLUDING DEPENDENT PRIVILEGES) of the REVOKE statement

**Note:** This is a security-related parameter. If it is set to NO, privileges that were granted by a user are retained even if that user loses the authority that allowed the user to perform the grant.

## DSNTIPM: MVS PARMLIB updates panel

The entries on the DSNTIPM panel produce the DSNTIJMV job, which defines Db2 to z/OS and updates several PARMLIB members.

DSNTIJMV updates the following PARMLIB members:

- IEFSSNxx, to define Db2 and IRLM as formal z/OS subsystems
- IEAAPFxx, to authorize the *prefix*.SDSNLOAD, *prefix*.SDSNLINK, and *prefix*.SDSNEXIT libraries
- LNKLSTxx, to include the *prefix*.SDSNLINK library.

## Updating the parameters

Different sites have different requirements for identifying Db2 to z/OS; as a result, the updates that DSNTIJMV makes to z/OSPARMLIB members might be incomplete. To ensure that the updates are complete, it is recommended that you edit the z/OS PARMLIB members directly when you install or migrate Db2. This is substantially easier than editing DSNTIJMV.

```
DSNTIPM          INSTALL DB2 - MVS PARMLIB UPDATES
====>

Check data and reenter to change:

 1 SUBSYSTEM NAME      ==> DSN1      Name for connecting to DB2
 2 COMMAND PREFIX     ==> -DSN1     DB2 subsystem command prefix
 3 SUBSYSTEM MEMBER   ==> 00       xx in IEFSSNxx
 4 SUBSYSTEM SEQUENCE ==> 88888888 Sequence number for insertion
 5 AUTH MEMBER        ==> 00       xx in IEAAPFxx APF member name
 6 AUTH SEQUENCE      ==> 88888888 Sequence number for insertion
 7 LINK LIST ENTRY    ==> 00       xx in LNKLSTxx for DSNLINK
 8 LINK LIST SEQUENCE ==> 88888888 Sequence number for insertion
 9 COMMAND SCOPE      ==> STARTED  SYSTEM, SYSPLEX, or STARTED
10 SUPPRESS SOFT ERRORS ==> YES    Suppress logrec recording. Yes or No

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 45. MVS PARMLIB updates panel: DSNTIPM

## SUBSYSTEM NAME field (SSID DECP value)

The SUBSYSTEM NAME field specifies the z/OS subsystem name for Db2.

<b>Acceptable values:</b>	1–4 characters, the first of which must be a letter (A–Z), #, \$, or @. Others must be letters A–Z, integers 0–9, #, \$, or @.
<b>Default:</b>	DSN1
<b>Update:</b>	see below
<b>dsnhdcp:</b>	SSID

The name is used in member IEFSSNxx of SYS1.PARMLIB.

If you specified a group attachment name in the GROUP ATTACH field on panel DSNTIPK, the SSID DECP value is set to that value.

**Updating the parameters:** Different sites have different requirements for identifying Db2 to z/OS; as a result, the updates that DSNTIJMV makes to z/OS PARMLIB members might be incomplete. To ensure that the updates are complete, you should edit the z/OS PARMLIB members directly when you install or migrate Db2. This is substantially easier than editing DSNTIJMV.

## COMMAND PREFIX field

The value of the COMMAND PREFIX field specifies the Db2 subsystem command prefix. When the prefix appears at the beginning of a command that is entered at a z/OS operator's console, z/OS passes the command to Db2 for processing. The command prefix is used in the Db2 entry of member IEFSSNxx of SYS1.PARMLIB.

<b>Acceptable values:</b>	1–8 characters; the first character must be a non-alphanumeric character.
<b>Default:</b>	-DSN1 (hyphen, concatenated with subsystem name)
<b>Update:</b>	see <a href="#">“DSNTIPM: MVS PARMLIB updates panel”</a> on page 277
<b>DSNZPxxx:</b>	none

The first character of the command prefix must be a character from the table below. The remaining characters of the command prefix must be from the table below, letters A–Z, or numbers 0–9.

Table 29. Allowable special characters for the command prefix

Name	Character	Hexadecimal representation
cent sign	¢	X'4A'
period	.	X'4B'
less-than sign	<	X'4C'
plus sign	+	X'4E'
vertical bar		X'4F'
ampersand <sup>“1” on page 279</sup>	&	X'50'
exclamation point	!	X'5A'
dollar sign	\$	X'5B'
asterisk	*	X'5C'
right parenthesis	)	X'5D'



Table 29. Allowable special characters for the command prefix (continued)

Name	Character	Hexadecimal representation
semi-colon	;	X'5E'
hyphen	-	X'60'
slash	/	X'61'
percent sign	%	X'6C'
underscore	_	X'6D'
question mark	?	X'6F'
colon	:	X'7A'
number sign	#	X'7B'
at sign	@	X'7C'
apostrophe <a href="#">“2” on page 279</a>	'	X'7D'
equal sign	=	X'7E'
quotation marks	"	X'7F'

1. To use the ampersand (&), accept the default in this field, and then edit job DSNTIJMV to specify the ampersand as the command prefix.
2. To use the apostrophe ('), you must code two consecutive apostrophes in your IEFSSNxx member. For example, the entry for subsystem DB2A with a command prefix of ' DB2A and a scope of started looks like this:

```
DB2A,DSN3INI,'DSN3EPX','DB2A,'
```

Do not use the JES2 backspace character as a command prefix character. Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign - to one subsystem and -DB2A to another. Similarly, you cannot assign ?DB2 to one subsystem and ?DB2A to another. However, you can assign -DB2A and -DB2B to different Db2 subsystems.

To use multiple-character command prefixes, have the system programmer update the IEFSSNxx subsystem definition statements in SYS1.PARMLIB.

### Related concepts

[Advantages of database access threads in INACTIVE mode \(Db2 Performance\)](#)

## SUBSYSTEM MEMBER field

The value of the SUBSYSTEM MEMBER field specifies the last two characters (xx) of the name of member IEFSSNxx of SYS1.PARMLIB.

<b>Acceptable values:</b>	2 alphanumeric characters
<b>Default:</b>	00
<b>Update:</b>	see <a href="#">“DSNTIPM: MVS PARMLIB updates panel” on page 277</a>
<b>DSNZPxxx:</b>	none

The subsystem member name indicates the available z/OS subsystems, including Db2 and IRLM.

## SUBSYSTEM SEQUENCE field

The SUBSYSTEM SEQUENCE field specifies a sequence number that is to be used for insertion. Use any number that is greater than the highest sequence number that is already used in the IEFSSNxx PARMLIB member.

<b>Acceptable values:</b>	1–99999993
<b>Default:</b>	88888888
<b>Update:</b>	see “ <a href="#">DSNTIPM: MVS PARMLIB updates panel</a> ” on page 277
<b>DSNZPxxx:</b>	none

## AUTH MEMBER field

The value of the AUTH MEMBER field specifies the last two characters (xx) of the name of member IEAAPFxx of SYS1.PARMLIB. This member is to be used for authorized program facility (APF) authorization of the *prefix.SDSNLOAD*, *prefix.SDSNLINK*, and *prefix.SDSNEXIT* libraries.

<b>Acceptable values:</b>	2 alphanumeric characters
<b>Default:</b>	00
<b>Update:</b>	see “ <a href="#">DSNTIPM: MVS PARMLIB updates panel</a> ” on page 277
<b>DSNZPxxx:</b>	none

The specified data set must be APF-authorized. The member name must currently exist for the z/OS update job DSNTIJMV to work correctly.

You can use the PROGxx member instead of the IEAAPFxx member. In this case, you must manually name the PROGxx member because job DSNTIJMV does not do it for you.

## AUTH SEQUENCE field

The value of the AUTH SEQUENCE field is to be used as the sequence number for insertion in the IEAAPFxx PARMLIB member. Specify any number that is greater than the highest sequence number that is already used in the IEAAPFxx PARMLIB member.

<b>Acceptable values:</b>	1–99999995
<b>Default:</b>	88888888
<b>Update:</b>	see “ <a href="#">DSNTIPM: MVS PARMLIB updates panel</a> ” on page 277
<b>DSNZPxxx:</b>	none

## LINK LIST ENTRY field

The value of the LINK LIST ENTRY field specifies the last two characters of LNKLSTxx as needed to include the *prefix.SDSNLINK* library.

<b>Acceptable values:</b>	2 alphanumeric characters
<b>Default:</b>	00
<b>Update:</b>	see “ <a href="#">DSNTIPM: MVS PARMLIB updates panel</a> ” on page 277
<b>DSNZPxxx:</b>	none

## LINK LIST SEQUENCE field

The LINK LIST SEQUENCE field specifies the sequence number that is to be used for insertion. Use any number that is greater than the highest sequence number that is already used in the LNKLISTxx PARMLIB member.

<b>Acceptable values:</b>	1–99999999
<b>Default:</b>	88888888
<b>Update:</b>	see “DSNTIPM: MVS PARMLIB updates panel” on page 277
<b>DSNZPxxx:</b>	none

## COMMAND SCOPE field

The value of the COMMAND SCOPE field controls whether the scope of the command prefix is to be one z/OS system or the entire Sysplex.

<b>Acceptable values:</b>	SYSTEM, SYSPLEX, STARTED
<b>Default:</b>	STARTED
<b>Update:</b>	see “DSNTIPM: MVS PARMLIB updates panel” on page 277
<b>DSNZPxxx:</b>	none

### SYSTEM

Sets the scope of commands to one z/OS system. The command prefix is registered at z/OS IPL.

### SYSPLEX

Sets the scope of commands to the entire sysplex. The command prefix is registered at z/OS IPL.

### STARTED

Sets the scope of commands to the entire sysplex. The command prefix is registered at Db2 startup and unregistered when Db2 stops.

Although STARTED specifies a sysplex scope, you can also use it for a Db2 subsystem in a non-data-sharing environment. Use STARTED if you intend to use the z/OS automatic restart manager, or if you might move this Db2 into a data sharing group.

## SUPPRESS SOFT ERRORS field (SUPERRS subsystem parameter)

The SUPERRS subsystem parameter specifies whether Db2 is to record errors such as invalid decimal data and arithmetic exceptions and issue SQLCODEs for them. This option enables or disables the recording of these errors in the operating system data set, SYS1.LOGREC.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 40 on panel DSNTIPB
<b>DSNZPxxx:</b>	SUPERRS

## DSNTIPL: Active log data set parameters

The entries on the DSNTIPL panel define characteristics of active log data sets.

**Performance note:** Several fields on this panel affect the Db2 use of logging. Be careful when you determine the values that are associated with fields on this panel. These values can greatly affect the performance of your Db2 subsystem.

```

DSNTIPL          INSTALL DB2 - ACTIVE LOG DATA SET PARAMETERS
====> -

Enter data below:

1  NUMBER OF LOGS      ===> 3          Number data sets per active log copy (2-31)
2  OUTPUT BUFFER       ===> 4000K       Size in bytes (400K-400000K)
3  ARCHIVE LOG FREQ    ===> 24         Hours per archive run
4  UPDATE RATE         ===> 3600        Updates, inserts, and deletes per hour
5  REMOTE COPY SW ACCEL===> DISABLE    For log writes on PPRC (DISABLE, ENABLE)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 46. Log data sets panel: DSNTIPL

### Related concepts

[How the initial Db2 logging environment is established \(Db2 Administration Guide\)](#)

## NUMBER OF LOGS field

The NUMBER OF LOGS field specifies the number of data sets that are to be established for each copy of the active log during installation.

<b>Acceptable values:</b>	2–93
<b>Default:</b>	3
<b>Update:</b>	cannot change during update or migration
<b>DSNZPxxx:</b>	none

You can later use the DSNJU003 utility to change the number of log data sets. If you use the DSNJU003 utility to modify the number of logs, your modified value is not reflected on this panel.

### Related tasks

[Updating subsystem parameters that cannot be updated by using DSNTIPB](#)

Some subsystem parameters cannot be updated by using panel DSNTIPB.

## OUTPUT BUFFER field (OUTBUFF subsystem parameter)

The OUTPUT BUFFER field sets the OUTBUFF subsystem parameter, which specifies the size of the output buffer for writing active log data sets.

<b>Acceptable values:</b>	OUTPUT BUFFER field: 409600–409600000, 400K - 400000K, 1M- 390M OUTBUFF subsystem parameter: 400–400000
<b>Default:</b>	OUTPUT BUFFER field: 4000K OUTBUFF subsystem parameter: 4000
<b>Update:</b>	option 41 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP OUTBUFF

### OUTPUT BUFFER field

#### 409600–409600000

The size in bytes of the output buffer for writing active log data sets, when specified in the OUTPUT BUFFER field.

#### 400K - 400000K

The size in kilobytes of the output buffer for writing active log data sets, when specified in the OUTPUT BUFFER field.

### 1M - 390M

The size in megabytes of the output buffer for writing active log data sets, when specified in the OUTPUT BUFFER field.

### OUTBUFF subsystem parameter

#### 400–400000

The size in kilobytes of the output buffer for writing active log data sets, when specified for the OUTBUFF subsystem parameter. Omit "K" in this context.

The larger the output buffer, the more likely that a log read request can return the required log records without needing I/O operations. This is a particularly important consideration if the Db2 subsystem is to be used with a data replication product that uses IFCID 306. In Db2 12, log buffers are permanently page-fixed. When you estimate real storage usage, you must use the entire size that you specify for the OUTBUFF parameter. To avoid page-fixing more storage than necessary, carefully choose the setting for OUTBUFF.

### ARCHIVE LOG FREQ field

The value of the ARCHIVE LOG FREQ field determines, in hours, the interval at which the active log is to be offloaded to the archive log.

<b>Acceptable values:</b>	1–200
<b>Default:</b>	24
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

If you accept the default value of 24, the active log is offloaded approximately once each day.

### UPDATE RATE field

The value of the UPDATE RATE field specifies the estimated average number of inserts, updates, and deletes that are expected per hour in your subsystem.

<b>Acceptable values:</b>	1–16,777,216
<b>Default:</b>	3600
<b>Update:</b>	cannot change during update
<b>DSNZPxxx:</b>	none

You can use K (as in 32K) for multiples of 1024 bytes and M (as in 16M) for multiples of 1,048,576 bytes.

The size calculations in the DSNTINST CLIST assume that about 400 bytes of data are logged for each insert, update, and delete. The amount of data that is logged for these changes might be different at your site. Therefore, consider changing the size of the log data sets after you gain some experience with Db2 and have a better idea of how many bytes of data are logged for each change. Generally, if you have a subsystem that is tuned for maximum efficiency, you can expect to log about 10 GB of data per hour while processing several millions of updates and inserts.

Together, the UPDATE RATE and the ARCHIVE LOG FREQ (field 3) determine the size of the active logs.

### REMOTE COPY SW ACCEL field (REMOTE\_COPY\_SW\_ACCEL subsystem parameter)

The REMOTE COPY SW ACCEL field specifies whether Db2 uses software to control the remote copy process for active log output in peer-to-peer remote copy (PPRC) environments.

<b>Acceptable values:</b>	DISABLE, ENABLE
---------------------------	-----------------

<b>Default:</b>	DISABLE
<b>Data sharing scope:</b>	It is recommended but not required that all members use the same setting. DISABLE is recommended if the active log data sets are not on PPRC-enabled devices.
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6LOGP.REMOTE_COPY_SW_ACCEL

### DISABLE

The hardware PPRC function is used if available; this setting is appropriate for non-PPRC environments.

### ENABLE

Host software is used. This option can improve overall Db2 performance in PPRC environments at the expense of some additional SRB CPU time in the xxxxMSTR address space. z/OS 2.1 or later is required to support this function.

### Related concepts

[Storage server device planning for Db2 for z/OS \(Db2 Performance\)](#)

## DSNTIPL1: Checkpoint parameters

The entries on the DSNTIPL1 panel define characteristics for log checkpoints.

```

DSNTIPL1          INSTALL DB2 - CHECKPOINT PARAMETERS
====>

Enter log checkpoint options:
 1 CHECKPOINT TYPE      ==> MINUTES LOGRECS only, MINUTES only, or BOTH
 2 RECORDS/CHECKPOINT  ==> NOTUSED  Log records per checkpoint
                                     - LOGRECS only: 1000 - 16000000
                                     - MINUTES only: NOTUSED
                                     - BOTH          : 1000 - 99999999
 3 MINUTES/CHECKPOINT  ==> 3        Minutes per checkpoint:
                                     - LOGRECS only: NOTUSED
                                     - MINUTES only: 1 - 5
                                     - BOTH          : 1 - 5
 4 UR CHECK FREQ       ==> 5        Checkpoints to enable UR check. 0-255
 5 UR LOG WRITE CHECK  ==> 10K      Log Writes to enable UR check. 0-1000K
 6 LIMIT BACKOUT       ==> AUTO     AUTO, YES, NO, LIGHT, or LIGHTAUTO
 7 BACKOUT DURATION    ==> 5        Checkpoints processed during backout if
                                     LIMIT BACKOUT is not NO (0-255)
 8 RO SWITCH TIME      ==> 45      Minutes to read-only switch. 1-32767
 9 LEVELID UPDATE FREQ ==> ON       Checkpoints between updates. ON or OFF

```

### CHECKPOINT TYPE field (CHKTYPE subsystem parameter)

The CHKTYPE subsystem parameter indicates whether the interval between log checkpoints is to be based on the number of written log records, the time between checkpoints, or both.

<b>Acceptable values:</b>	<b>CHECKPOINT TYPE field:</b> LOGRECS, MINUTES, BOTH <b>CHKTYPE subsystem parameter:</b> SINGLE, BOTH
<b>Default:</b>	MINUTES
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP CHKTYPE

The CHECKPOINT TYPE field and CHKTYPE subsystem parameters use different values.

## CHECKPOINT TYPE field value descriptions

The following values can be specified in the CHECKPOINT TYPE field on panel DSNTIPL1. If you run the installation or migration CLIST, the setting of the CHECKPOINT TYPE field determines the setting of the CHKTYPE subsystem parameter. The setting of the CHECKPOINT TYPE field also defines which settings are allowed in the RECORDS/CHECKPOINT and MINUTES/CHECKPOINT fields.

### MINUTES

Log checkpoints occur at an interval of a certain number of minutes, as specified by the CHKFREQ subsystem parameter. The CHKFREQ subsystem parameter is set through the MINUTES/CHECKPOINT field, and the CHKLOGR and CHKMINS subsystem parameters are both assigned a value of NOTUSED. When MINUTES is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to SINGLE.

### LOGRECS

Log checkpoints occur after a certain number of log records are created, as specified by the CHKFREQ subsystem parameter. The CHKFREQ subsystem parameter is set through the RECORDS/CHECKPOINT field, and the CHKLOGR and CHKMINS subsystem parameters are both assigned a value of NOTUSED. When LOGRECS is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to SINGLE.

### BOTH

Log checkpoints occur after a specified number of log records are created or after a specified number of minutes, whichever occurs first. The number of log records is specified by the CHKLOGR subsystem parameter and the number of minutes is specified by the CHKMINS subsystem parameter. These subsystem parameters are set through the RECORDS/CHECKPOINT and MINUTES/CHECKPOINT fields, respectively. The CHKFREQ parameter is assigned a value of NOTUSED. When BOTH is specified in the CHECKPOINT TYPE field, the CHKTYPE subsystem parameter is set to BOTH.

## CHKTYPE subsystem parameter value descriptions

The following settings are valid for the CHKTYPE subsystem parameter:

### SINGLE

The CHECKPOINT TYPE panel field setting is LOGRECS or MINUTES. The CHKFREQ subsystem parameter setting determines the checkpoint frequency, depending on the value specified:

#### 1–5

The number of minutes between checkpoints.

#### 1000–16 000 000

The number of log records between checkpoints. CHKFREQ settings from 200–999 are automatically increased to 1000.

The CHKLOGR and CHKMINS subsystem parameters must both be set to NOTUSED.

### BOTH

Log checkpoints occur after a specified number of log records are created or after a specified number of minutes, whichever occurs first. The CHKLOGR subsystem parameter specifies the number of log records and the CHKMINS subsystem parameter specifies the number of minutes. The CHKFREQ subsystem parameter must be set to NOTUSED.

## Panel fields and subsystem parameter settings for Db2 checkpoint frequency

The following table summarizes how the CHECKPOINT TYPE, MINUTES/CHECKPOINT, and RECORDS/CHECKPOINT fields on panel DSNTIPL1 set the related subsystem parameters to specify the Db2 checkpoint frequency. The following table shows panel DSNTIPL1 fields and related subsystem parameters for controlling the Db2 checkpoint frequency.

CHECKPOINT TYPE field	CHKTYPE subsystem parameter	CHKFREQ subsystem parameter	CHKMINS subsystem parameter	CHKLOGR subsystem parameter
MINUTES (default)	SINGLE	<b>1-5 (default 3)</b> Set in the MINUTES/ CHECKPOINT field to specify the number of minutes between checkpoints.	NOT USED	NOT USED
LOGRECS	SINGLE	<b>1000-16 000 000</b> Set in the RECORDS/ CHECKPOINT field to specify the number of log records between checkpoints.	NOT USED	NOT USED
BOTH	BOTH	NOT USED	<b>1-5</b> Set in the MINUTES/ CHECKPOINT field to specify the number of minutes between checkpoints.	<b>1000-99 999 999</b> Set in the RECORDS/ CHECKPOINT field to specify the number of log records between checkpoints.

### RECORDS/CHECKPOINT field (CHKFREQ and CHKLOGR subsystem parameters)

The RECORDS/CHECKPOINT field determines the approximate number of log records that are to be created between scheduled log checkpoints.

<b>Acceptable values:</b>	Depending on the CHECKPOINT TYPE value:  <b>CHECKPOINT TYPE is LOGRECS:</b> 1000-160 00 000 <b>CHECKPOINT TYPE is MINUTES:</b> NOT USED <b>CHECKPOINT TYPE is BOTH:</b> 1000-99 999 999
<b>Default:</b>	NOTUSED
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP.CHKFREQ and DSN6SYSP.CHKLOGR



**NOT USED (if CHECKPOINT TYPE is MINUTES)**

The value NOTUSED is assigned to the CHKLOGR parameter. (The CHECKFREQ parameter is assigned the value specified for the MINUTES/CHECKPOINT field. See “MINUTES/CHECKPOINT field (CHKFREQ and CHKMINS subsystem parameters)” on page 288.)

**1000–160 00 000 (if CHECKPOINT TYPE is LOGRECS)**

The number of log records that are created between checkpoints. The specified value is assigned to the CHKFREQ parameter, and the CHKLOGR parameter is set to NOT USED.

**1000–99 999 999 (if CHECKPOINT TYPE is BOTH)**

The number of log records that are created between checkpoints. The specified value is assigned to the CHKLOGR parameter, and the CHEKFREQ parameter is set to NOT USED.

Db2 prevents log checkpoints from being taken too frequently and degrading performance. Log checkpoints are scheduled, but not necessarily immediately taken, when the number of minutes that passes reaches the value of CHKMINS.

The following table summarizes how the CHECKPOINT TYPE, MINUTES/CHECKPOINT, and RECORDS/CHECKPOINT fields on panel DSNTIPL1 set the related subsystem parameters to specify the Db2 checkpoint frequency. The following table shows panel DSNTIPL1 fields and related subsystem parameters for controlling the Db2 checkpoint frequency.

<b>CHECKPOINT TYPE field</b>	<b>CHKTYPE subsystem parameter</b>	<b>CHKFREQ subsystem parameter</b>	<b>CHKMINS subsystem parameter</b>	<b>CHKLOGR subsystem parameter</b>
MINUTES (default)	SINGLE	<b>1–5 (default 3)</b> Set in the MINUTES/CHECKPOINT field to specify the number of minutes between checkpoints.	NOT USED	NOT USED
LOGRECS	SINGLE	<b>1000–16 000 000</b> Set in the RECORDS/CHECKPOINT field to specify the number of log records between checkpoints.	NOT USED	NOT USED
BOTH	BOTH	NOT USED	<b>1–5</b> Set in the MINUTES/CHECKPOINT field to specify the number of minutes between checkpoints.	<b>1000–99 999 999</b> Set in the RECORDS/CHECKPOINT field to specify the number of log records between checkpoints.

## MINUTES/CHECKPOINT field (CHKFREQ and CHKMINS subsystem parameters)

The MINUTES/CHECKPOINT field determines the approximate number of minutes that are to pass between scheduled log checkpoints.

<b>Acceptable values:</b>	Depending on the CHECKPOINT TYPE value: <b>CHECKPOINT TYPE is LOGRECS:</b> NOT USED <b>CHECKPOINT TYPE is MINUTES:</b> 1 -5 <b>CHECKPOINT TYPE is BOTH:</b> 1 -5
<b>Default:</b>	3
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP.CHKFREQ and DSN6SYSP.CHKMINS

### 1 -5 (if CHECKPOINT TYPE is MINUTES)

The number of minutes between checkpoints. The specified value is assigned to the CHKFREQ subsystem parameter value, and the CHKMINS subsystem parameter is set to NOT USED.

If you specify 6–60 for the CHKFREQ subsystem parameter setting, Db2 converts the value to 5 for the CHKFREQ setting, issues a warning message, and sets RC=4 for subsystem parameter assembly.

### NOT USED (if CHECKPOINT TYPE is LOGRECS)

NOTUSED is assigned to the CHKMINS parameter. (The CHKFREQ parameter is assigned the value specified for the RECORDS/CHECKPOINT field. See [“RECORDS/CHECKPOINT field \(CHKFREQ and CHKLOGR subsystem parameters\)”](#) on page 286.)

### 1 -5 (if CHECKPOINT TYPE is BOTH)

The number of minutes between checkpoints. The specified value is assigned to the CHKMINS subsystem parameter value, and the CHKFREQ subsystem parameter is set to NOT USED.

If you specify 6–1439 for the CHKMINS subsystem parameter setting, Db2, converts the value to 5 for the CHKMINS setting, issues a warning message, and sets RC=4 for subsystem parameter assembly.

Db2 prevents log checkpoints from being taken too frequently and degrading performance. Log checkpoints are scheduled, but not necessarily immediately taken, when the number of minutes that passes reaches the value of CHKMINS.

The following table summarizes how the CHECKPOINT TYPE, MINUTES/CHECKPOINT, and RECORDS/CHECKPOINT fields on panel DSNTIPL1 set the related subsystem parameters to specify the Db2 checkpoint frequency. The following table shows panel DSNTIPL1 fields and related subsystem parameters for controlling the Db2 checkpoint frequency.

CHECKPOINT TYPE field	CHKTYPE subsystem parameter	CHKFREQ subsystem parameter	CHKMINS subsystem parameter	CHKLOGR subsystem parameter
MINUTES (default)	SINGLE	<b>1–5 (default 3)</b> Set in the MINUTES/CHECKPOINT field to specify the number of minutes	NOT USED	NOT USED

CHECKPOINT TYPE field	CHKTYPE subsystem parameter	CHKFREQ subsystem parameter	CHKMINS subsystem parameter	CHKLOGR subsystem parameter
		between checkpoints.		
LOGRECS	SINGLE	<b>1000–16 000 000</b> Set in the RECORDS/ CHECKPOINT field to specify the number of log records between checkpoints.	NOT USED	NOT USED
BOTH	BOTH	NOT USED	<b>1–5</b> Set in the MINUTES/ CHECKPOINT field to specify the number of minutes between checkpoints.	<b>1000–99 999 999</b> Set in the RECORDS/ CHECKPOINT field to specify the number of log records between checkpoints.

### UR CHECK FREQ field (URCHKTH subsystem parameter)

Unless the option is disabled, Db2 issues a warning message to the console for an uncommitted unit of recovery (UR) after a certain number of checkpoint cycles. The URCHKTH subsystem parameter specifies the number of checkpoint cycles that are to complete before Db2 issues the warning message.

<b>Acceptable values:</b>	0–255
<b>Default:</b>	5
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP URCHKTH

This option does not affect performance. If you use this option, specify a value that is based on how often a checkpoint occurs in your system and how much time you can allow for a restart or shutdown. For example, if your site's checkpoint interval is 5 minutes and the standard limit for issuing commits with units of recovery is 20 minutes, divide 20 by 5 to determine the best value for your system.

### UR LOG WRITE CHECK field (URLGWTH subsystem parameter)

Unless this option is disabled, Db2 issues a warning message to the console after log records are written by an uncommitted unit of recovery (UR). The URLGWTH subsystem parameter specifies the number of log records that are to be written before Db2 issues a warning message.

<b>Acceptable values:</b>	0–1000K
<b>Default:</b>	10K
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP URLGWTH

The purpose of this option is to provide notification of a long-running UR. Long-running URs might result in a lengthy Db2 restart or a lengthy recovery situation for critical tables. Specify the value in 1 K (1000 log records) increments. A value of 0 indicates that no write check is to be performed.

## LIMIT BACKOUT field (LBACKOUT subsystem parameter)

The LBACKOUT subsystem parameter specifies whether Db2 postpones backward-log processing for some units of work.

<b>Acceptable values:</b>	AUTO, YES, LIGHT, LIGHTAUTO, NO
<b>Default:</b>	AUTO
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP LBACKOUT

### AUTO

Db2 postpones some backout processing, but automatically starts the backout processing when Db2 restarts and begins acceptance of new work. When Db2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, Db2 ignores this setting and behaves as if LBACKOUT is set to NO.

### YES

Db2 postpones backout processing for some units of work until the RECOVER POSTPONED command is issued. When Db2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, Db2 ignores this setting and behaves as if LBACKOUT is set to NO.

### LIGHT

Db2 postpones backout processing for some units of work until the RECOVER POSTPONED command is issued. When Db2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, it creates but does not process postponed-abort units of recovery (URs). The URs are not processed until the RECOVER POSTPONED command is issued on a normal Db2 restart.

### LIGHTAUTO

Db2 postpones some backout processing, but automatically starts the backout processing when Db2 restarts and begins acceptance of new work. When Db2 is restarted with the LIGHT(YES) or LIGHT(NOINDOUBTS) option, it creates but does not process postponed-abort URs. The postponed-abort URs are automatically processed after a normal Db2 restart.

### NO

Specifies that Db2 backward-log processing should process all in-flight and in-abort units of recovery (URs).

If you specify AUTO, YES, LIGHT, or LIGHTAUTO, backout processing runs concurrently with new work. Sets or partitions with pending backout work are unavailable until their backout work is complete.

### Related concepts

[Restart light in data sharing \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Deferring restart processing \(Db2 Administration Guide\)](#)

### Related reference

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

[BACKOUT DURATION field \(BACKODUR subsystem parameter\)](#)

The BACKODUR subsystem parameter is used to calculate the number of log records that are to be backed out during a restart. This value is applied when the LIMIT BACKOUT field is set to AUTO, YES, LIGHT, or LIGHTAUTO.

### BACKOUT DURATION field (BACKODUR subsystem parameter)

The BACKODUR subsystem parameter is used to calculate the number of log records that are to be backed out during a restart. This value is applied when the LIMIT BACKOUT field is set to AUTO, YES, LIGHT, or LIGHTAUTO.

<b>Acceptable values:</b>	0–255
<b>Default:</b>	5
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP BACKODUR

During a restart, backward-log processing continues until the following events occur:

- All inflight and in-abort URs with update activity against the catalog or directory are backed out.
- All inflight and in-abort URs that only update temporary tables are backed out.
- The number of processed log records equals the number specified in the BACKOUT DURATION field multiplied by the number of log records per checkpoint. If the CHECKPOINT TYPE field is set to LOGRECS or BOTH, the value of the RECORDS/CHECKPOINT field is used as the number of log records per checkpoint. If the CHECKPOINT TYPE field is set to MINUTES, the default value of 500000 is used as the number of log records per checkpoint.

Inflight and in-abort URs that are not completely backed out during restart are converted to postponed-abort status. Sets or partitions with postponed backout work are put into restart-pending (RESTP) state. This state blocks most access to the object. The exceptions are access by the RECOVER POSTPONED command state or by automatic backout processing that Db2 performs when the LIMIT BACKOUT field is set to AUTO or LIGHTAUTO.

A table space might be in restart-pending mode, without the associated index spaces also in restart-pending mode. This happens if a postponed-abort UR makes updates only to non-indexed fields of a table in a table space. In this case, the indexes are accessible to SQL (for index-only queries), even though the table space is inaccessible.

#### Related tasks

[Deferring restart processing \(Db2 Administration Guide\)](#)

[Resolving postponed units of recovery \(Db2 Administration Guide\)](#)

#### Related reference

[CHECKPOINT TYPE field \(CHKTYPE subsystem parameter\)](#)

The CHKTYPE subsystem parameter indicates whether the interval between log checkpoints is to be based on the number of written log records, the time between checkpoints, or both.

[LIMIT BACKOUT field \(LBACKOUT subsystem parameter\)](#)

The LBACKOUT subsystem parameter specifies whether Db2 postpones backward-log processing for some units of work.

[-RECOVER POSTPONED command \(Db2\) \(Db2 Commands\)](#)

### RO SWITCH TIME field (PCLOSET subsystem parameter)

The PCLOSET subsystem parameter specifies the number of minutes that a partition or page set remains read-write after it is updated. After the specified number of minutes, Db2 converts the set or partition to read-only.

<b>Acceptable values:</b>	1–32767
---------------------------	---------

<b>Default:</b>	45 (minutes)
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP PCLOSET

### 1-32767

The number of minutes that a page set or partition remains read-write after it is updated. After the specified number of minutes, Db2 converts the set or partition to read-only.

This value is used in conjunction with the value of the RO SWITCH CHKPTS field. If the condition for RO SWITCH CHKPTS or RO SWITCH TIME is met, the page set or partition is converted from read-write to read-only.

For NOT LOGGED table spaces, Db2 converts the page set or partition from read-write to read-only after one minute, regardless of the value of RO SWITCH TIME.

Having Db2 switch an infrequently updated page set from read-write to read-only can be a performance benefit for recovery, logging, and for data sharing processing.

#### Related tasks

[Testing group buffer pool caching](#)

You can use SQL statements in member DSNTESD to verify that the group buffer pool caching operates correctly.

## LEVELID UPDATE FREQ field (DLDFREQ subsystem parameter)

The DLDFREQ subsystem parameter specifies whether the level ID of a page set or partition is to be updated at Db2-determined checkpoint intervals.

<b>Acceptable values:</b>	ON, OFF
<b>Default:</b>	ON
<b>Update:</b>	option 42 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP DLDFREQ

#### ON

Level ID updates for down-level detection are enabled.

#### OFF

Level ID updates for down-level detection are disabled.

## DSNTIPA: Archive log data set parameters panel

The entries on the DSNTIPA panel define the characteristics of archive log data sets.

**Updating the parameters:** You can update all the parameters on this panel by using their subsystem parameter name.

```

DSNTIPA          INSTALL DB2 - ARCHIVE LOG DATA SET PARAMETERS
====> -
Enter data below:

 1 PRIMARY QUANTITY ====> 125      Primary space allocation in cylinders
 2 SECONDARY QTY    ====> 15       Secondary space allocation in cylinders
 3 DEVICE TYPE 1    ====> TAPE     Unit name for COPY1 archive logs
 4 DEVICE TYPE 2    ====>          Unit name for COPY2 archive logs
 5 BLOCK SIZE       ====> 24576     Rounded up to 4096 multiple
 6 READ TAPE UNITS  ====> 2        Number of allocated read tape units
 7 DEALLOC PERIOD   ====> 0        Time interval to deallocate tape units
 8 RECORDING MAX    ====> 10000     Number of data sets recorded in BSDS
 9 WRITE TO OPER    ====> YES       Issue WTOR before mount for archive
10 WTOR ROUTE CODE  ====> 1,3,4
11 RETENTION PERIOD ====> 9999     Days to retain archive log data sets
12 QUIESCE PERIOD  ====> 5         Maximum quiesce interval (1-999)
13 COMPACT DATA    ====> NO       YES or NO for data compaction
14 SINGLE VOLUME    ====> NO       Single volume for disk archives. NO or YES

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 47. Archive log data sets panel: DSNTIPA

## PRIMARY QUANTITY field (PRIQTY subsystem parameter)

The PRIQTY subsystem parameter specifies the amount of primary space that is to be allocated for archive log data sets. The units for this parameter are specified in cylinders.

<b>Acceptable values:</b>	1–999999 <a href="#">“1” on page 293</a>
<b>Default:</b>	125
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP PRIQTY

### Notes:

1. If the specified values exceeds 4369, Db2 issues message DSNT580I to indicate that an environment for allocating LARGE or EXTENDED-FORMAT data sets is required.

For subsystems that are migrated from Db2 11, the PRIMARY QUANTITY field is determined according to the following rules:

Table 30. PRIQTY values for subsystems that are migrated from Db2 11.

ALCUNIT at migration	How PRIQTY is determined in Db2 12
BLK	If the Db2 11 PRIQTY value is blank, the value is first calculated as in Db2 11 and then converted to cylinders. Otherwise, the Db2 11 PRIQTY value is converted to cylinders.
TRK	The Db2 11 PRIQTY value is converted to cylinders.
CYL	The Db2 11 PRIQTY value is used unchanged.

By default, DFSMS Direct Access Device Space Management (DADSM) limits the space allocation on a single volume to less than 65535 tracks. Therefore, if the archive log data set size can be greater than or equal to 65535 tracks, you need to specify a primary space quantity of less than 65535 tracks. This action forces the archive log data set to extend to a second volume.

Alternatively, the archive log data sets can be allocated by a DFSMS data class that has a DSNMTYP (data set name type) setting of LARGE or EXT. In this case, you can specify a primary space quantity larger than 65535 tracks without extending to a second volume. LARGE indicates that data sets in the data class are to be allocated in large physical sequential format. EXT indicates that data sets in the data class are to be allocated in extended physical sequential format. A setting of EXT is recommended, and it is required for

striping of data sets. If you specify EXT, also set the IFEXT (if extended) parameter to R (required) rather than P (preferred).

### Related concepts

[Archive log data sets storage requirements](#)

If you decide to store the archive log data sets on disk, you need to reserve enough space on the device. The active log data set and the BSDS are both written to the same location. Therefore, you must reserve enough storage for the active log and the BSDS.

### Related information

[DSNT580I \(Db2 Messages\)](#)

## SECONDARY QTY field (SECQTY subsystem parameter)

The SECQTY subsystem parameter specifies the amount of secondary space that is to be allocated for a disk data set. The unit for this subsystem parameter value is cylinders.

<b>Acceptable values:</b>	1–999999 <a href="#">“1” on page 294</a>
<b>Default:</b>	15
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP SECQTY

### Notes:

1. If the specified values exceeds 4369, Db2 issues message DSNT580I to indicate that an environment for allocating LARGE or EXTENDED-FORMAT data sets is required.

For subsystems that are migrated from Db2 11, the PRIMARY QUANTITY field is determined according to the following rules:

*Table 31. SECQTY values for subsystems that are migrated from Db2 11.*

ALCUNIT at migration	How SECQTY is determined in Db2 12
BLK	If the Db2 11 SECQTY value is blank, the value is first calculated as in Db2 11 and then converted to cylinders. Otherwise, the Db2 11 SECQTY value is converted to cylinders.
TRK	The Db2 11 SECQTY value is converted to cylinders.
CYL	The Db2 11 SECQTY value is used unchanged.

### Related information

[DSNT580I \(Db2 Messages\)](#)

## DEVICE TYPE 1 field (UNIT subsystem parameter)

The UNIT subsystem parameter specifies the device type or unit name that is to be used for storing archive log data sets.

<b>Acceptable values:</b>	device type or unit name
<b>Default:</b>	TAPE
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP UNIT



The value can be any alphanumeric string. If you choose to archive to disk, you can specify a generic device type with a limited volume range. Db2 requires all archive log data sets that are allocated on disk to be cataloged. If the device type specifies disk, set the CATALOG DATA field on panel DSNTIPA to YES.

If the unit name specifies disk, the archive log data sets can extend to a maximum of 15 volumes. If the unit name specifies a tape device, Db2 can extend to a maximum of 20 volumes. If you chose to use disk, make the values of the PRIQTY and SECQTY subsystem parameters large enough to contain all of the data that comes from the active log data sets without extending beyond 15 volumes.

When archiving to disk, Db2 uses the number of online storage volumes for the specified UNIT name to determine a count of candidate volumes, up to a maximum of 15 volumes. If the archives are to be managed by SMS, do not use a storage class with the Guaranteed Space attribute. SMS attempts to allocate a primary extent on every candidate volume. This can result in allocation failures or unused space because the primary extent on each unused volume is not released when the archive data set is closed.

### Related concepts

[Archive log data sets \(Db2 Administration Guide\)](#)

### Related tasks

[Defining Db2 12 initialization parameters for migrating data sharing members](#)

For migrating data sharing members after the first to Db2 12, you must define Db2 12 initialization parameters in the subsystem parameter module (DSNZPxxx) and update DDF related information in the BSDS.

## DEVICE TYPE 2 field (UNIT2 subsystem parameter)

The UNIT2 subsystem parameter specifies the device type or unit name that is to be used for storing the second copy of archive log data sets. These data sets are the COPY2 data sets.

<b>Acceptable values:</b>	device type or unit name
<b>Default:</b>	none
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP UNIT2

## BLOCK SIZE field (BLKSIZE subsystem parameter)

The BLKSIZE subsystem parameter determines the block size that is to be used for the archive log data set.

<b>Acceptable values:</b>	8192–28672
<b>Default:</b>	24576
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP BLKSIZE

The block size must be compatible with the device type that you use for archive logs. The value is rounded up to the next multiple of 4096 bytes. You can also enter the value with a K; for example, 28K.

If the archive log is written to tape, use the largest possible block size to improve the speed of reading the archive logs. Use the table below as a guide.

*Table 32. Recommended block size values*

Archive log device	Block size
Tape	28672
3390 geometry disk	24576

## READ TAPE UNITS field (MAXRTU subsystem parameter)

The MAXRTU subsystem parameter specifies the maximum number of dedicated tape units that can be allocated to concurrently read archive log tape volumes.

<b>Acceptable values:</b>	1–99
<b>Default:</b>	2
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP MAXRTU

This installation option, along with the DEALLOC PERIOD field, allows Db2 to optimize archive log reading from tape devices.

In a data sharing environment, the archive tape is not available to other members of the group until the deallocation period expires. You might not want to use this option in a data sharing environment unless all recover jobs are submitted from the same member.

**Recommendation:** Set the READ TAPE UNITS value to be at least one less than the number of tape units available to Db2. If you do otherwise, the OFFLOAD process could be delayed, which would affect the performance of your Db2 subsystem. For maximum throughput during archive log processing, specify the largest value possible for this option, remembering that you need at least one tape unit for offload processing. You can override this value by using the SET ARCHIVE command.

## DEALLOC PERIOD field (DEALLCT subsystem parameter)

The DEALLCT subsystem parameter determines the length of time that an archive read tape unit is to be allowed to remain unused before it is deallocated.

<b>Acceptable values:</b>	<i>minutes,seconds</i> , 1440, NOLIMIT
<b>Default:</b>	0
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP DEALLCT

### *minutes,seconds*

Sets the amount of time before deallocation as the specified number of minutes (0–1439) and number of seconds (0–59). Separate the number of minutes and number of seconds with a comma and no spaces.

### **NOLIMIT or 1440**

Sets no limit on the amount of time before deallocation. Specifying NOLIMIT or 1440 allows maximum optimization opportunities.

**Recommendation:** If you are not using data sharing and your archive log data is on tape, set this value high enough to allow Db2 to optimize tape handling for multiple read applications. When all tape reading is complete, you can update this option with the SET ARCHIVE command. If you are using data sharing, tapes should be deallocated quickly to avoid deadlocks. If Db2 is running in data sharing mode, it is strongly recommended that you use disk archive logs, not tape archive logs.

### **Examples**

Assume that you want the deallocation period to be 30 seconds. Enter 0,30.

Assume that you want the deallocation period to be 23 minutes and 47 seconds. Enter 23,47.

## RECORDING MAX field (MAXARCH subsystem parameter)

The MAXARCH subsystem parameter controls the maximum number of archive log volumes that are to be recorded in the BSDS.

**Deprecated subsystem parameter:** Non-default settings for MAXARCH are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 10000.

<b>Acceptable values:</b>	10–10000
<b>Default:</b>	10000
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6LOGP MAXARCH

When this number is exceeded, recording resumes at the beginning of the BSDS.

You must create image copies of all Db2 objects, probably several times, before the archive log data sets are discarded. If you fail to retain an adequate number of archive log data sets for all the image copies, you might need to cold start or reinstall Db2. In both cases, data is lost.

### Related tasks

[Managing the log \(Db2 Administration Guide\)](#)

## WRITE TO OPER field (ARCWTOR subsystem parameter)

The ARCWTOR subsystem parameter controls whether Db2 is to send a message to the operator and wait for an answer before attempting to mount an archive log data set.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP ARCWTOR

Other Db2 users can be forced to wait while the mount is pending. They are not affected while Db2 is waiting for a response to the message.

### YES

Specifies that the system is to send a message to the operator before attempting to mount an archive log data set. Specify this value if you use a device for storing archive log data sets, such as tape, that requires long delays for mounts.

### NO

Specifies that the system will not send a message to the operator and wait for an answer before attempting to mount an archive log data set. Use this value if you use a device that does not have long delays for mounts.

The DEVICE TYPE 1 field specifies the device type or unit name.

## WTOR ROUTE CODE field (ARCWRTC subsystem parameter)

The ARCWRTC subsystem parameter identifies the list of route codes to be used in messages from the archive log data sets to the operator.

<b>Acceptable values:</b>	1–16 route codes. Specify at least one code. Separate multiple codes by commas only, with no blanks; for example: 1,3,5,7,9,10,11
<b>Default:</b>	1,3,4

<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP ARCWRTC

#### Related reference

[Routing Codes \(MVS System Messages\)](#)

[Routing the Message \(z/OS MVS Assembler Services Guide\)](#)

### RETENTION PERIOD field (ARCRETN subsystem parameter)

The ARCRETN subsystem parameter specifies the retention period, which is the number of days that Db2 is to retain archive log data sets. The retention period is added to the current date to calculate the expiration date of the archive log data sets.

<b>Acceptable values:</b>	0–9999
<b>Default:</b>	9999
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP ARCRETN

The retention period is often used in tape management systems to control the reuse and scratching of data sets and tapes. Db2 uses the ARCRETN value as the value for the dynamic allocation parameter DALRETPD when archive log data sets are created.

The retention period set by the DFSMSdfp storage management subsystem (SMS) can be overridden by this Db2 parameter. Typically, the retention period is set to the smaller value that is specified by either Db2 or SMS. The storage administrator and database administrator should agree on a retention period value that is appropriate for Db2.

**Important:** A wide variety of tape management systems exists, along with the opportunity for external manual overrides of retention periods. Consequently, Db2 does not have an automated method to delete the archive log data sets from the BSDS inventory of archive log data sets. Therefore, the information about an archive log data set might be in the BSDS after its retention period has expired. The information might be held long after the tapes have been scratched by a tape management system. Conversely, the maximum number of archive log data sets might be exceeded (see READ TAPE UNITS field). In such a case, the data from the BSDS might be dropped long before the data set reaches its expiration date.

#### Related reference

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

### QUIESCE PERIOD field (QUIESCE subsystem parameter)

The QUIESCE subsystem parameter determines the maximum amount of time, in seconds, that Db2 is to be allowed to attempt a full system quiesce.

<b>Acceptable values:</b>	1–999
<b>Default:</b>	5
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP QUIESCE

This parameter requires some tuning. If you specify too short an interval, the quiesce period expires before a full quiesce is accomplished. If you specify too long an interval, the quiesce period might cause unnecessary Db2 lock contention and timeouts.

#### Related tasks

[Quiescing activity before offloading \(Db2 Administration Guide\)](#)

## COMPACT DATA field (COMPACT subsystem parameter)

The COMPACT subsystem parameter controls whether data that is written to archive logs is to be compacted.

<b>Acceptable values:</b>	YES or NO
<b>Default:</b>	NO
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP COMPACT

This option only applies to data that is written to a tape device that has the improved data recording capability (IDRC) feature. When this feature is turned on, hardware in the IDRC-compliant tape control unit uses several techniques to increase the amount of data that can be written on a tape. Specify NO if you do not want your data to be compacted or you do not use a tape device with the IDRC feature. Specify YES if you use a tape device with the IDRC feature and you want the data to be compacted.

**Recommendation:** Archive to disk and then use another facility, such as DFSMSHsm, to archive the archive log from disk to tape. Be aware that data that is compressed to tape can only be read with a device that supports the IDRC feature. This could be a concern when you send archive tapes to another site for remote recovery.

## SINGLE VOLUME field (SVOLARC subsystem parameter)

The SVOLARC subsystem parameter specifies whether Db2 is to use a single volume for disk archives.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 43 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6ARVP SVOLARC

### NO

When archiving to disk, Db2 determines a count of candidate volumes, up to 15, based on the number of online volumes that have a use attribute of STORAGE for the specified UNIT name. If one or zero volumes are mounted with STORAGE as the use attribute, Db2 does not pass a volume or unit count, which is effectively the same as specifying SVOLARC=YES.

### YES

Db2 specifies no unit or volume count. The result is the default unit and volume count of 1, unless SMS overrides it. Use YES for SMS-managed data sets. SMS provides the volume count from the data class. If no value is specified in the data class or no data class is assigned the default volume count is 1.

### Related concepts

[Tips for archiving with z/OS DFSMS \(Db2 Administration Guide\)](#)

## DSNTIPS: Databases and spaces to start automatically panel

The entries on the DSNTIPS panel name the databases, table spaces, and index spaces to restart automatically when you start Db2.

**Updating the parameters:** You can update all parameters on this panel by using their subsystem parameter name.

```

DSNTIPS          INSTALL DB2 - DATABASES AND SPACES TO START AUTOMATICALLY
====> _

Enter data below:

1  ==> RESTART          RESTART or DEFER the objects named below.
   The objects to restart or defer can be ALL in item 2, a database
   name, or database name.space name.

2  ==> ALL              14 ==>                26 ==>
3  ==>                  15 ==>                27 ==>
4  ==>                  16 ==>                28 ==>
5  ==>                  17 ==>                29 ==>
6  ==>                  18 ==>                30 ==>
7  ==>                  19 ==>                31 ==>
8  ==>                  20 ==>                32 ==>
9  ==>                  21 ==>                33 ==>
10 ==>                 22 ==>                34 ==>
11 ==>                 23 ==>                35 ==>
12 ==>                 24 ==>                36 ==>
13 ==>                 25 ==>                37 ==>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 48. Databases and spaces to start automatically panel: DSNTIPS

## RESTART OR DEFER field (RESTART subsystem parameter)

The RESTART subsystem parameter determines whether Db2 is to restart or defer processing for the specified databases, table spaces, and index spaces when Db2 is started. The specified objects are those that are listed in fields 2 through 37 of panel DSNTIPS

<b>Acceptable values:</b>	RESTART, DEFER
<b>Default:</b>	RESTART
<b>Update:</b>	option 44 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RESTART

### RESTART

Causes Db2 to perform restart processing for the listed objects.

### DEFER

Causes Db2 not to perform restart processing for the objects.

## START NAMES field (ALL subsystem parameter)

The ALL subsystem parameter specifies the databases, table spaces, and index spaces that are to be restarted or deferred when Db2 starts. The value of the RESTART OR DEFER field determines whether the object is to be restarted or if the restart is to be deferred.

<b>Acceptable values:</b>	ALL, space names
<b>Default:</b>	ALL
<b>Update:</b>	option 44 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ALL

### ALL

The restart or defer restart applies to all Db2 databases, table spaces, and index spaces. If you use this value, leave the remaining fields on the DSNTIPS panel blank. Use ALL in this field and DEFER in the RESTART OR DEFER field to defer recovery of all objects, including Db2 catalog objects. Trusted connections are not available if ALL is used in this field and DEFER is used in the RESTART OR DEFER field.

ALL is the default value.

**<database name>**

The restart or defer restart applies to all spaces in the database.

**<table space or index space name> in the format database-name . space-name**

The restart or defer restart applies to the individual table space or index space.

You can specify up to 36 object names on this panel. If you want to control restart processing for more than 36 objects, edit job DSNTIJUZ after you run the CLIST, and add the object names as ending positional parameters to macro DSN6SPRM. You can add up to 2500 object names in DSNTIJUZ.

**Related tasks**

[Deferring restart processing \(Db2 Administration Guide\)](#)

## DSNTIPR: Distributed data facility panel 1

The entries on the DSNTIPR panel control the starting of the distributed data facility (DDF). The entries on the DSNTIPR panel also specify location names that are used to connect another Db2 subsystem.

```
DSNTIPR          INSTALL DB2 - DISTRIBUTED DATA FACILITY
====>

Enter data below:
 1 DDF STARTUP OPTION  ===> NO          NO, AUTO, or COMMAND
 2 DB2 LOCATION NAME  ===> LOC1         The name other DB2s use to
                                         refer to this DB2
 3 DB2 VTAM LUNAME    ===>             The name VTAM uses to refer to this DB22
 4 DB2 VTAM PASSWORD  ===>             Password for DB2's VTAM application
 5 DB2 GENERIC LUNAME ===>             Generic VTAM LU name for this member
                                         of a Db2 data sharing group
 6 DB2 TCP/IP IPNAME  ===> DSN1        TCP/IP communication support only
 7 TCP/IP PORT        ===> 446         TCP/IP port number for DRDA clients
                                         and REST services.
                                         1-65534 (446 is reserved for DRDA)
 8 SECURE PORT        ===>             TCP/IP port number for secure DRDA
                                         clients and REST services. 1-65534
                                         (448 is reserved for DRDA using SSL)
 9 RESYNC PORT        ===> 5001        TCP/IP port for 2-phase commit. 1-65534
10 RESYNC INTERVAL   ===> 2          Minutes between resynchronization period

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 49. Distributed data facility panel: DSNTIPR

**Related concepts**

[Distributed data facility \(Introduction to Db2 for z/OS\)](#)

[Connecting distributed database systems](#)

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

[Communicating with data sharing groups \(Db2 Data Sharing Planning and Administration\)](#)

### DDF STARTUP OPTION field (DDF subsystem parameter)

The DDF subsystem parameter specifies whether the distributed data facility (DDF) is loaded at Db2 startup, and whether DDF is started automatically or by a command.

<b>Acceptable values:</b>	NO, AUTO, COMMAND
<b>Default:</b>	NO
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC DDF

## AUTO

DDF is automatically loaded and started when the Db2 subsystem is started.

## NO

DDF is not loaded at Db2 startup, and DDF cannot be started with a command.

If you specify NO, the stored procedures sample application and DDF sample jobs (DSNTEJ6, DSNTEJ6D, DSNTEJ6P, DSNTEJ6S, DSNTEJ6T, DSNTEJ6Z, DSNTEJ61, DSNTEJ62, DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66) are not edited.

Also, the remaining fields on the DSNTIPR panel are ignored, so you can accept the default values.

## COMMAND

DDF is loaded at Db2 startup but not started. However, DDF is prepared to receive the START DDF command.

If AUTO or COMMAND is specified, the DDF address space (*ssnmDIST*) is started when Db2 starts.

### Related concepts

[Distributed data facility \(Introduction to Db2 for z/OS\)](#)

[Starting and stopping DDF in data sharing \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Starting DDF \(Db2 Administration Guide\)](#)

### Related reference

[-START DDF command \(Db2\) \(Db2 Commands\)](#)

[-DISPLAY DDF command \(Db2\) \(Db2 Commands\)](#)

## DB2 LOCATION NAME field

The DB2 LOCATION NAME setting specifies a unique name that requesters use to connect to this Db2 subsystem or Db2 data sharing group. The setting must be unique within the network, but must be the same on all members within a Db2 data sharing group.

<b>Acceptable values:</b>	1–16 alphanumeric characters, beginning with a letter, and containing no special characters
<b>Default:</b>	LOC1
<b>Update:</b>	see <a href="#">“Updating subsystem parameters that cannot be updated by using DSNTIPB” on page 379</a>
<b>DSNZPxxx:</b>	none

The location name must begin with a letter and cannot contain special characters. Acceptable characters are letters A–Z, numbers 0–9, and underscores.

You must specify a value for this field, even if you do not use DDF.

The value of this field is stored in the bootstrap data set (BSDS). The BSDS is updated by the change log inventory utility in step DSNTLOG of installation job DSNTIJUZ.

### Related concepts

[Connecting distributed database systems](#)

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

[Communicating with data sharing groups \(Db2 Data Sharing Planning and Administration\)](#)

## DB2 VTAM LUNAME field

The DB2 VTAM LUNAME setting identifies this Db2 subsystem within your network, identifies transactions for indoubt resolution, and correlates trace records. The LUNAME value must be unique for each member in a Db2 data sharing group. It is used to start SNA communications. TCP/IP communications are also



started if TCP/IP PORT or SECURE PORT, or both, and RESYNC PORT are specified. To start TCP/IP communication only, specify DB2 TCP/IP IPNAME with TCP/IP PORT or SECURE PORT, or both, and specify RESYNC PORT.

<b>Acceptable values:</b>	1–8 alphanumeric characters, beginning with a letter and containing no special characters
<b>Default:</b>	none
<b>Update:</b>	see <a href="#">“Updating subsystem parameters that cannot be updated by using DSNTIPB” on page 379</a>
<b>DSNZPxxx:</b>	none

You must specify a value for this field.

If the DB2 TCP/IP IPNAME is set, TCP/IP communication is started but not SNA communications, regardless if there is a value for LUNAME. Inbound and outbound communications over TCP/IP are allowed, but Db2 makes no attempt to activate VTAM communications support.

### Related concepts

[SNA access methods for Db2 data sharing \(deprecated\) \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Connecting Db2 for z/OS distributed database systems with VTAM \(deprecated\)](#)

*Virtual Telecommunications Access Method (VTAM)* is a program that you can use to control remote Db2 communication.

[Choosing names for the local subsystem](#)

You define the names for the local subsystem and its VTAM password to Db2 by using the installation panels, or by using the change log inventory utility.

## DB2 VTAM PASSWORD field

The optional DB2 VTAM PASSWORD field specifies the password that VTAM is to use to recognize this Db2 subsystem.

<b>Acceptable values:</b>	1–8 alphanumeric characters
<b>Default:</b>	none
<b>Update:</b>	see Update on <a href="#">“Updating subsystem parameters that cannot be updated by using DSNTIPB” on page 379</a>
<b>DSNZPxxx:</b>	none

The password must begin with a letter and must not contain special characters.

This password must also be supplied to VTAM on the VTAM APPL definition statement.

If the DB2 TCP/IP IPNAME is set, TCP/IP communication is started but not SNA communications, regardless if there is a value for LUNAME. Inbound and outbound communications over TCP/IP are allowed, but Db2 makes no attempt to activate VTAM communications support.

### Related tasks

[Connecting Db2 for z/OS distributed database systems with VTAM \(deprecated\)](#)

*Virtual Telecommunications Access Method (VTAM)* is a program that you can use to control remote Db2 communication.

[Choosing a password for the local subsystem](#)

Choosing a VTAM password is optional. Db2 does not require you to use a password as long as you have not included one in the VTAM APPL statement.

## DB2 GENERIC LUNAME field

The value of the DB2 GENERIC LUNAME field specifies a generic LU name that identifies this Db2 subsystem or data sharing group in a network. The DB2 GENERIC LUNAME field value must be the same for all members in a Db2 data sharing group.

<b>Acceptable values:</b>	1–8 alphanumeric characters
<b>Default:</b>	none
<b>DSNZPxxx:</b>	none

You can use a generic LU name only if Db2 is running as part of a z/OS sysplex. Using a generic LU name helps you control the distributed workload among the servers in a data sharing group. Previously, you could associate only one LU name with a LOCATION name. Now, you can associate multiple NETID.LUNAME values with a single LOCATION name. When an application requests access to a particular location, Db2 uses the SYSIBM.LOCATIONS and SYSIBM.LULIST tables to find the available network destinations (LU names) for that location.

### Related concepts

[Connecting distributed database systems](#)

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

### Related tasks

[Configuring data sharing groups for group-generic SNA access \(Db2 Data Sharing Planning and Administration\)](#)

## DB2 TCP/IP IPNAME field

The DB2 TCP/IP IPNAME field value identifies and associates an IPNAME value with the Db2 distributed data facility (DDF). It identifies transactions for indoubt resolution, correlates trace records, and is the Db2 group RACF PassTicket APPLID. The IPNAME value must be the same for each member in a Db2 data sharing group. When this value is set, it also disables VTAM and SNA communication with Db2.

If the DB2 TCP/IP IPNAME is set, TCP/IP communication is started but not SNA communications, regardless if there is a value for LUNAME. Inbound and outbound communications over TCP/IP are allowed, but Db2 makes no attempt to activate VTAM communications support.

For stand-alone Db2 subsystems the default DB2 TCP/IP IPNAME setting is the SUBSYSTEM NAME (MVSSNAME) field on panel DSNTIPM. For data sharing members, the default DB2 TCP/IP IPNAME setting is the GROUP NAME (GRPNAME) on panel DSNTIPK if a member.

<b>Acceptable values:</b>	1–8 alphanumeric characters, beginning with a letter or alphabet extender
<b>Default:</b>	See “ <a href="#">#unique_578/unique_578_Connect_42_initvals</a> ” on page 305
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

The following table shows initial values for the DB2 TCP/IP IPNAME field on DSNTIPR.

<b>INSTALL TYPE</b>	<b>Data sharing?</b>	<b>IPNAME updateable?</b>	<b>Initial value if DSNTIDXn IPNAME parameter is not NULL</b>	<b>Initial value if DSNTIDXn IPNAME parameter is NULL or not found</b>
INSTALL	No	Yes	SUBSYSTEM NAME field on panel DSNTIPM, if it is modified  Otherwise, DSNTIDXn IPNAME parameter	BLANK
INSTALL	First member	Yes	GROUP NAME field on panel DSNTIPK	BLANK
INSTALL	Subsequent member	No	DSNTIDXn IPNAME parameter (from first data sharing group member)	BLANK
INSTALL	Enable	Yes		BLANK
MIGRATE	No	No	BLANK	BLANK
MIGRATE	Yes	No	BLANK	BLANK
UPDATE	N/A	Yes	DSNTIDXn IPNAME parameter	BLANK

### **Related concepts**

[TCP/IP access methods for Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

[Specifying a generic LU name and IPNAME value for the data sharing group \(Db2 Data Sharing Planning and Administration\)](#)

[Member-specific TCP/IP access \(Db2 Data Sharing Planning and Administration\)](#)

### **Related reference**

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## **TCP/IP PORT field**

The value of the TCP/IP PORT field determines the TCP/IP port number that is to be used for accepting TCP/IP connection requests from remote DRDA clients and REST services.

<b>Acceptable values:</b>	1–65534
<b>Default:</b>	446
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

If you are enabling data sharing, each member must have the same TCP/IP port number. You must specify a value for the TCP/IP PORT field if you plan to use TCP/IP. Leaving this field blank means that you are not using TCP/IP. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

If the TCP/IP PORT field and the SECURE PORT field have the same value, the TCP/IP port accepts only secure TCP/IP connection requests.

### **Related reference**

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## SECURE PORT field

The value of the SECURE PORT field specifies the TCP/IP port number that is to be used for accepting secure TCP/IP connection requests from remote DRDA clients and REST services.

<b>Acceptable values:</b>	1–65534
<b>Default:</b>	none
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

If you are enabling data sharing, each member must have the same secure TCP/IP port number. You must specify a value if you plan to use TCP/IP with Secure Socket Layer (SSL). Leaving this field blank means that you are not using TCP/IP with SSL. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

### Related reference

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## RESYNC PORT field

The value of the RESYNC PORT field specifies the TCP/IP port number that is to be used to process requests for two-phase commit resynchronization.

<b>Acceptable values:</b>	1–65534
<b>Default:</b>	5001
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

This value must be different than the values that are specified for TCP/IP PORT and SECURE PORT. If you are enabling data sharing, each member must have a unique resynchronization port. Leaving this field blank means that you are not using TCP/IP. A blank field is equivalent to using 0 in the change log inventory (DSNJU003) utility.

Db2 uses the resync port only for transaction completion states after failures, so no user data or authentication protocols are ever exchanged on the secure port. You can enable SSL security for the resync port by defining a network policy on all Db2 requesters and Db2 servers.

### Related reference

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## RESYNC INTERVAL field (RESYNC subsystem parameter)

A *resynchronization period* is the time during which indoubt logical units of work that involve this Db2 subsystem and partner logical units are processed. The RESYNC subsystem parameter specifies the time interval, in minutes, that is to occur between resynchronization periods.

**Deprecated subsystem parameter:** Non-default settings for RESYNC are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 2.

<b>Acceptable values:</b>	1–99
<b>Default:</b>	2
<b>Update:</b>	option 45 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC RESYXC

## DSNTIP5: Distributed data facility panel 2

The entries on the DSNTIP5 panel are used to configure the distributed data facility (DDF).

```
DSNTIP5          INSTALL DB2 - DISTRIBUTED DATA FACILITY PANEL 2
====>

Enter data below:
 1 DDF THREADS          ===> INACTIVE  Status of a qualifying database access
                                     thread after commit. ACTIVE or INACTIVE.
 2 MAX INACTIVE DBATS   ===> 0         Max inactive database activity threads
 3 IDLE THREAD TIMEOUT  ===> 120      0 or seconds until dormant server ACTIVE
                                     thread will be terminated (0-9999).
 4 EXTENDED SECURITY    ===> YES      Allow change password and descriptive
                                     security error codes. YES or NO.
 5 TCP/IP ALREADY VERIFIED ===> NO    Accept requests containing
                                     only a userid (no password)?YES, CLIENT,
                                     NO, SERVER, or SERVER_ENCRYPT.
 6 EXTRA BLOCKS REQ    ===> 100      Maximum extra query blocks when DB2 acts
                                     as a requester. 0-100
 7 EXTRA BLOCKS SRV    ===> 100      Maximum extra query blocks when DB2 acts
                                     as a server. 0-100
 8 TCP/IP KEEPALIVE     ===> 120      ENABLE, DISABLE, or 1-65534
 9 POOL THREAD TIMEOUT  ===> 120      0-9999 seconds
10 CONN QUEUE MAX DEPTH===> OFF      OFF, ON, or 1-19999 connections
11 CONN QUEUE MAX WAIT  ===> OFF      OFF, ON, or 5-3600 seconds

DSNT581I To ensure user credentials are not exposed in the network,
SERVER_ENCRYPT is recommended for TCP/IP ALREADY VERIFIED

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 50. Distributed data facility panel: DSNTIP5

### DDF THREADS field (CMTSTAT subsystem parameter)

The CMTSTAT subsystem parameter controls whether in-use database access threads (DBATS) can be pooled, for use by other connections, after they successfully commit or roll back. Threads cannot be pooled if they hold cursors, use defined temporary tables, or execute statements from the dynamic statement cache.

<b>Acceptable values:</b>	ACTIVE, INACTIVE
<b>Default:</b>	INACTIVE
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC CMTSTAT

**Deprecated function:** The CMTSTAT subsystem parameter is deprecated, which means that it might be removed eventually. Set the CMTSTAT value to INACTIVE. Although, the ACTIVE setting can sometimes provide limited CPU performance advantages, they are generally outweighed by increased use of other system resources and the lack of scalability for distributed application workloads. For the recommended alternatives to the ACTIVE setting, see [Enabling KEEP DYNAMIC refresh for DBATs \(Db2 Performance\)](#) and [Enabling high-performance DBATs \(Db2 Performance\)](#).

#### INACTIVE

DBATs can be pooled for use by other connections after a successful commit or rollback. Db2 can use *inactive connection support* (sometimes called *type 2 inactive threads*) or *inactive DBATs* (sometimes called *type-2 inactive threads*). In most cases, this option improves resource usage because fewer threads can typically service more connections. For more information, see [How DBATs process remote connections \(Db2 Performance\)](#).

## ACTIVE (DEPRECATED)

Threads remain associated with connections and are not pooled, even after they successfully commit or roll back and hold no cursors. If your installation supports many connections, specify INACTIVE instead.

### Related concepts

[Managing distributed database access threads \(DBATs\) \(Db2 Performance\)](#)

[How DBATs process remote connections \(Db2 Performance\)](#)

### Related tasks

[Enabling pooling of DBATs \(Db2 Performance\)](#)

[Controlling distributed data connections and database access threads \(DBATs\) \(Db2 Administration Guide\)](#)

## MAX INACTIVE DBATS field (MAXTYPE1 subsystem parameter)

The MAXTYPE1 subsystem parameter determines the number of inactive DBATs that Db2 is to allow.

**Deprecated subsystem parameter:** Non-default settings for MAXTYPE1 are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 0.

<b>Acceptable values:</b>	0 to the value of the MAX REMOTE CONNECTED field
<b>Default:</b>	0
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC MAXTYPE1

This limit is defined because a large number of inactive DBATs might adversely affect system performance. Inactive DBATs were traditionally used for private protocol, while DRDA uses inactive connections. However, inactive DBATS can occur in DRDA when Db2 acts as an intermediate server, receiving a connection from a client, and the thread then hops to another location while a held cursor spans the commit scope.

A value of 0 indicates that inactive DBATs are not allowed. If a thread meets the requirement of an inactive DBATs, and MAX INACTIVE DBATS is 0, the thread remains active.

A value of greater than 0 indicates that inactive DBATs are allowed, but they are limited to the specified number. When a thread meets the requirement of an inactive DBAT, and MAX INACTIVE DBATS is reached, the remote connection is terminated.

If you want to allow inactive DBATs, set this value to the maximum number of concurrent connections that you want to allow to go inactive that access another remote location with three-part names.

A value that is equal to the value in the MAX REMOTE CONNECTED field from panel DSNTIPE allows all remote threads to become type 1 inactive threads.

## IDLE THREAD TIMEOUT field (IDTHTOIN subsystem parameter)

The IDTHTOIN subsystem parameter controls the amount of time, in seconds, that an active server thread is allowed to remain idle. If the IDTHTOIN value is non-zero, the value is also the timeout value for TCP/IP synchronous receive operations with distributed clients.

<b>Acceptable values:</b>	0–9999
<b>Default:</b>	No timeout for idle thread timeout. 120 for TCP/IP synchronous receive operations.
<b>Update:</b>	Option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC IDTHTOIN

The amount of time, in seconds, that an active server thread is allowed to remain idle is known as the idle thread timeout value. The thread is canceled after the timeout value expires, and its locks and cursors are released. Threads are checked every two minutes to see if they have exceeded the timeout value. If the timeout value is less than two minutes, the thread might not be canceled if it has been inactive for more than the timeout value but less than two minutes.

Inactive and indoubt threads are not subject to timeout. The value that you specify for the DDF THREADS field determines whether a thread can become inactive, and thus not subject to timeout.

If the IDTHTOIN value is 0:

- For idle thread timeout, timeout processing is disabled, and idle server threads can remain in the system and continue to hold any resources.
- For TCP/IP synchronous receive operations, Db2 sets the timeout value to 120 seconds.

If the IDTHTOIN value is non-zero, Db2 also uses the IDTHTOIN value as the timeout value for TCP/IP synchronous receive operations. A Db2 server uses TCP/IP synchronous receive operations when the server determines that the requester has not yet sent it all the data for a DRDA request or for a LOB or XML object.

You can enable longer idle wait times for threads from specific remote applications, without increasing the system-wide limit for idle thread timeouts, by creating MONITOR IDLE THREADS profiles. The IDTHTOIN setting does not apply to any thread that qualifies for the filtering criteria of a MONITOR IDLE THREADS profile. For more information, see [Monitoring remote idle threads by using profile tables \(Db2 Administration Guide\)](#).

## EXTENDED SECURITY field (EXTSEC subsystem parameter)

The EXTSEC subsystem parameter specifies how two related security options are to be set. These settings control what happens when a DDF connection has security errors and whether RACF users can change their passwords through the DRDA change password function.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP EXTSEC
<b>Subsystem parameter:</b>	<a href="#">Yes</a>

### YES

Detailed reason codes are returned to a DRDA level 3 client when a DDF connection request fails because of security errors. When using SNA protocols, the requester must have included a product that supports the extended security sense codes. One such product is Db2 Connect.

RACF users can change their passwords by using the DRDA change password function. This support is only for DRDA requesters that have implemented support for changing passwords.

### NO

Generic error codes are returned to the clients and RACF users are prevented from changing their passwords.

**Recommendation:** Specify a value of YES. This setting allows properly enabled DRDA clients to determine the cause of security failures without requiring Db2 operator support. A value of YES also allows RACF users on properly enabled Db2 clients to change their passwords.

**Note:** This is a security-related parameter. When this parameter is set to YES, detailed reason codes are returned to the client when a DDF connection request fails because of security errors that might enable more malicious attacks. If this parameter is set to YES, RACF users can change their passwords by using the DRDA change password function.

## TCP/IP ALREADY VERIFIED field (TCPALVER subsystem parameter)

The TCPALVER subsystem parameter specifies whether Db2 accepts TCP/IP connection requests that contain only a user ID, or if stronger forms of security or encryption are required. The TCPALVER value does not prevent connection requests that use stronger forms of security or encryption than it requires.

<b>Acceptable values:</b>	NO (or SERVER), SERVER_ENCRYPT, YES (or CLIENT)
<b>Default:</b>	NO (SERVER)
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC TCPALVER
<b>Security parameter:</b>	<u>Yes</u>

**Recommendation:** Setting the TCPALVER subsystem parameter to SERVER\_ENCRYPT provides the best security because connections are accepted only if user credentials are provided to authenticate the user ID, and strong encryption is used to protect the user ID and credentials in the network. For more information, see [Sending encrypted passwords or password phrases from Db2 for z/OS clients \(Managing Security\)](#).



**Attention:** This is a security-related parameter. A setting of YES or CLIENT provides minimal security. With YES or CLIENT, Db2 is subject to security attacks, because the identity of the user or process that is attempting to gain access is not verified. Specify these settings only if you have a highly secure network.

### SERVER\_ENCRYPT (recommended)

A user ID and password are required for connection requests. Kerberos tickets are also accepted. Also, one of the following conditions must be true:

- The user ID and password is AES (Advanced Encryption Standard)-encrypted.
- The connection is accepted on a port that ensures Application Transparent Transport Layer Security (AT-TLS) policy protection, such as a Db2 security port (SECPort).

Non-encrypted security credentials are not accepted unless the connection is secured by the TCP/IP network. DES-based (Data Encryption Standard) encryption is also considered insecure. If RACF PassTickets are used, Db2 must be permitted to execute the SAF IRRSPK00 service. That is, the use of SERVER\_ENCRYPT requires a RACF PERMIT for Db2 (the user ID associated to the *ssnmDIST* started task ID) to execute the IRRSPK00 service, as shown in the following exempt RACF commands:

```
RDEF PTKTDATA IRRPTAUTH.SYEC1B.* UACC(NONE)
PE IRRPTAUTH.SYEC1B.* CLASS(PTKTDATA) ID(SYSDSP) ACCESS(READ)
SETR RACLIST(PTKTDATA) REFRESH
```

### NO (or SERVER)

A user ID and password are required for connection requests, or the connection must be authenticated by a RACF PassTicket or Kerberos ticket. The user ID and password can be encrypted or non-encrypted.

Any connection that is allowed when the TCPALVER value is SERVER\_ENCRYPT is also accepted. Connections can also be accepted on a port that ensures AT-TLS policy protection.

NO is the default setting.

SERVER can be used as an alternative to NO.

### YES (or CLIENT)

A new connection can be accepted with a user ID only.

Any connection that is allowed when the TCPALVER value is NO (or SERVER) or SERVER\_ENCRYPT is also accepted. Connections can also be accepted on a port that ensures AT-TLS policy protection.

CLIENT can be used as an alternative to YES.



This value must be the same for all members of a data sharing group.

### Related tasks

[Managing inbound TCP/IP-based connection requests \(Managing Security\)](#)

## EXTRA BLOCKS REQ field (EXTRAREQ subsystem parameter)

The EXTRAREQ subsystem parameter limits the number of extra DRDA query blocks that Db2 is to request from a remote DRDA server. This parameter does not limit the size of the SQL query answer set. It simply controls the total amount of data that can be transmitted on a network exchange.

**Deprecated subsystem parameter:** Non-default settings for EXTRAREQ are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 100.

<b>Acceptable values:</b>	0–100
<b>Default:</b>	100
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP EXTRAREQ

## EXTRA BLOCKS SRV field (EXTRASRV subsystem parameter)

The EXTRASRV subsystem parameter limits the number of extra DRDA query blocks that Db2 is to return to a DRDA client. This parameter not limit the size of the SQL query answer set. It simply controls the total amount of data that can be transmitted on a network exchange.

**Deprecated subsystem parameter:** Non-default settings for EXTRASRV are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value 100.

<b>Acceptable values:</b>	0–100
<b>Default:</b>	100
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP EXTRASRV

## TCP/IP KEEPALIVE field (TCPKPALV subsystem parameter)

The TCPKPALV subsystem parameter determines whether the TCP/IP KeepAlive value in the TCP/IP configuration is to be overridden with a different value. This option can be used in cases where the TCP/IP KeepAlive value in the TCP/IP configuration is not appropriate for the Db2 subsystem.

<b>Acceptable values:</b>	ENABLE, DISABLE, or 1–65534
<b>Default:</b>	120
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC TCPKPALV

### ENABLE

The TCP/IP KeepAlive configuration value is not overridden.

### DISABLE

KeepAlive probing is disabled for this subsystem.

## 1-65534

The TCP/IP KeepAlive configuration value is overridden with the value of the TCP/IP KEEPALIVE field. This value is specified in seconds. Consider setting this value close to the IDLE THREAD TIMEOUT value on installation panel DSNTIPR or the RESOURCE TIMEOUT value on installation panel DSNTIPI.

Avoid using very small values. KeepAlive detection is accomplished by probing the network based on the time that is entered in the KeepAlive parameter. A small KeepAlive value can cause excessive network traffic and system resource consumption. Maintain a proper balance that allows network failures to be detected on a timely basis without a severe impact on system and network performance.

### Related tasks

[Timing out idle active threads \(Db2 Performance\)](#)

## POOL THREAD TIMEOUT field (POOLINAC subsystem parameter)

The POOLINAC subsystem parameter specifies the approximate time, in seconds, that a pooled database access thread (DBAT) can remain idle in the pool before it is terminated.

<b>Acceptable values:</b>	0-9999
<b>Default:</b>	120
<b>Update:</b>	option 46 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6FAC POOLINAC

## 1-9999

The approximate time in seconds that pooled database access threads (DBAT) can remain idle in the pool before being terminated. The default value is 120 seconds.

Threads are checked every two minutes to see if they have exceeded the timeout value. That is, if the timeout value is less than two minutes, threads might not be canceled if they remain inactive longer than the timeout value but less than two minutes.

## 0

Specifies that no time limit applies to pooled regular DBATs that remain idle in the pool. However, the default time limit of 120 seconds still applies to high-performance DBATs that remain idle in the pool.

**Tip:** Although specifying 0 for the POOLINAC value means that no time limit applies to pooled regular DBATs, Db2 can still terminate pooled DBATs for other reasons. Db2 also sometimes prevents disconnected DBATs from being pooled in the first place, such as when the pool already has a sufficient number of pooled DBATs to process the existing inactive connections.

A DBAT in the pool counts as an active thread against the limit specified by the MAXDBAT subsystem parameter. These DBATs can hold locks but they do not hold any cursors.

### Related concepts

[How DBATs process remote connections \(Db2 Performance\)](#)

### Related tasks

[Enabling pooling of DBATs \(Db2 Performance\)](#)

[Enabling high-performance DBATs \(Db2 Performance\)](#)

### Related reference

[MAX REMOTE ACTIVE field \(MAXDBAT subsystem parameter\)](#)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

## CONN QUEUE MAX DEPTH field (MAXCONQN subsystem parameter)

If the number of active in-use DBATs has reached the MAXDBAT threshold, the MAXCONQN subsystem parameter specifies the maximum number of inactive or new connection requests that can be queued waiting for a DBAT to process the request.

<b>Acceptable values:</b>	OFF, ON, 1–19999
<b>Default:</b>	OFF
<b>Update:</b>	option 46 on panel DSNTIPB
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6FAC MAXCONQN

### ON

The depth of the connection queue is limited by the value of the MAXDBAT subsystem parameter. If the number of queued connection requests exceeds the MAXDBAT value, DDF closes the client connection that has waited the longest in the connection queue.

### OFF

The depth of the connection queue is limited by the value of the CONDBAT subsystem parameter. OFF is the default value.

### 1–19999

The maximum number of connections that can be queued waiting for a DBAT to process a request. If the number of queued connection requests exceeds the numeric MAXCONQN value, DDF closes the client connection that has waited the longest in the connection queue.

The closed connections give remote clients an opportunity to redirect the work to other members of the group that have more resources to process the work.

The function is enabled only when the Db2 subsystem is a member of a data sharing group, and Db2 was started with subsystem parameter CMTSTAT set to INACTIVE.

### Related reference

#### MAX REMOTE ACTIVE field (MAXDBAT subsystem parameter)

The value of the MAXDBAT subsystem parameter specifies the maximum number of database access threads (DBATs) that are allowed to be concurrently active.

#### MAX REMOTE CONNECTED field (CONDBAT subsystem parameter)

The CONDBAT subsystem parameter sets the maximum number of concurrent inbound DDF connections that are to be allowed.

#### DDF THREADS field (CMTSTAT subsystem parameter)

The CMTSTAT subsystem parameter controls whether in-use database access threads (DBATS) can be pooled, for use by other connections, after they successfully commit or roll back. Threads cannot be pooled if they hold cursors, use defined temporary tables, or execute statements from the dynamic statement cache.

## CONN QUEUE MAX WAIT field (MAXCONQW subsystem parameter)

The MAXCONQW subsystem parameter specifies the maximum length of time that a client connection waits for a DBAT to process the next unit-of-work or new connection request.

<b>Acceptable values:</b>	OFF, ON, 5–3600 seconds
<b>Default:</b>	OFF
<b>Update:</b>	option 46 on panel DSNTIPB

<b>DSNZPxxx:</b>	DSN6FAC MAXCONQW
------------------	------------------

**ON**

Connections wait as long as the value specified by the IDTHTOIN subsystem parameter.

**OFF**

Connections wait indefinitely for a DBAT to process requests.

**Numeric value**

The time duration in seconds that a connection waits for a DBAT to process the request.

Each queued connection request entry is examined to see if its time waiting in the queue has exceeded the specified value. If the time is exceeded, the client connection is closed.

The function is enabled only when the Db2 subsystem is a member of a data sharing group, and Db2 was started with subsystem parameter CMTSTAT set to INACTIVE.

This subsystem parameter can be updated online.

**Related reference**

IDLE THREAD TIMEOUT field (IDTHTOIN subsystem parameter)

The IDTHTOIN subsystem parameter controls the amount of time, in seconds, that an active server thread is allowed to remain idle. If the IDTHTOIN value is non-zero, the value is also the timeout value for TCP/IP synchronous receive operations with distributed clients.

## DSNTIPX: Routine parameters panel

The entries on this panel are used to start the stored procedures address space so that it can run stored procedures or user-defined functions.

```

DSNTIPX          INSTALL DB2 - ROUTINE PARAMETERS
====>_

Enter data below:

 1 WLM PROC NAME   ====> DSN1WLM  WLM-established stored procedure JCL PROC
 2 NUMBER OF TCBS  ====> 8         Number of concurrent TCBS (1-100)
 3 MAX ABEND COUNT ====> 0         Allowable ABENDs for a routine (0-255)
 4 TIMEOUT VALUE   ====> 180      Seconds to wait before SQL CALL or
                                     function invocation fails(5-1800,NOLIMIT)
 5 WLM ENVIRONMENT ====>                                     Default WLM
                                                             environment name
 6 MAX OPEN CURSORS ====> 500      Maximum open cursors per thread
 7 MAX STORED PROCS ====> 2000     Maximum active stored procs per thread
 8 BIF COMPATIBILITY====> CURRENT Compatibility level for DB2
                                     built-in functions (V9,
                                     V9_DECIMAL_VARCHAR, V9_TRIM, or CURRENT)
 9 ADMIN SCHEDULER ====> DSN1ADMT Administrative scheduler task proc name
10 SUBSTR COMPATIBILITY====> PREVIOUS Compatibility level for DB2 SUBSTR
                                     built-in function (PREVIOUS, CURRENT)
11 MAX UDFS        ====> 2000     Maximum active external scalar UDFs
                                     per thread (0-99999)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 51. Routine parameters panel: DSNTIPX

**Related concepts**

Migration step 23: Configure Db2 for running stored procedures and user-defined functions (optional)  
WLM management of stored procedures

*Workload Manager (WLM)* is a component of z/OS that manages incoming work requests for the operating system and allocates available system resources to meet these requests. Db2 for z/OS uses WLM to allocate workload requests for Db2 stored procedures.

## WLM PROC NAME field

The value of the WLM PROC NAME field specifies a name for the stored procedures JCL procedure that is to be generated during installation. This JCL procedure is generated for the default WLM environment that is specified in the WLM ENVIRONMENT field.

<b>Acceptable values:</b>	1–8 alphanumeric characters
<b>Default:</b>	ssnmWLM
<b>DSNZPxxx:</b>	none

This procedure is used for a WLM-established stored procedures address space.

If this field has a blank, the JCL procedure is still generated. In this case, the JCL procedure will be named by appending the string WLM to the Db2 subsystem name (specified on panel DSNTIPM in the field SUBSYSTEM NAME).

## NUMBER OF TCBS field

The NUMBER OF TCBS field determines the number of SQL CALL statements and invocations of user-defined functions that can be processed concurrently in the address space of the default WLM environment. The default WLM environment is specified in the WLM ENVIRONMENT field.

<b>Acceptable values:</b>	1–100
<b>Default:</b>	8
<b>DSNZPxxx:</b>	none

The larger the value, the more stored procedures and user-defined functions you can run concurrently in one address space. This value is dependent on the z/OS UNIX System Services MAXPROCUSER value. If this value is set above the z/OS UNIX System Services MAXPROCUSER value, you may exceed the maximum number of processes for the user.

### Related tasks

[Maximizing the number of procedures or functions that run in an address space \(Db2 Performance\)](#)

### Related reference

[WLM ENVIRONMENT field \(WLMENV subsystem parameter\)](#)

The WLMENV subsystem parameter specifies the name of the default WLM environment that is to be used for a user-defined function, stored procedure, or advanced trigger.

## MAX ABEND COUNT field (STORMXAB subsystem parameter)

The STORMXAB subsystem parameter specifies the number of times a stored procedure or an invocation of a user-defined function is to be allowed to terminate abnormally. If this threshold is reached, SQL CALL statements for the stored procedure or user-defined function are rejected.

<b>Acceptable values:</b>	0–255
<b>Default:</b>	0
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP STORMXAB

The default of 0 means that the firstabend of a stored procedure or user defined function causes SQL CALL statements to that procedure or function to be rejected. For production systems, you should accept the default.

### TIMEOUT VALUE field (STORTIME subsystem parameter)

The STORTIME subsystem parameter specifies the number of seconds before Db2 is to stop waiting for an SQL CALL statement or invocation of a user-defined function. This parameter applies to user-defined functions that are to be assigned to one of the task control blocks (TCBs) in a Db2 stored procedures address space.

<b>Acceptable values:</b>	5–1800, NOLIMIT
<b>Default:</b>	180
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP STORTIME

If the time interval expires, the SQL statement fails. The default is a reasonable waiting time for most sites. You might want to choose a higher value if your system has long queues. You might want to choose a lower value if you want to minimize the waiting time for end-user requests. The NOLIMIT value means that Db2 waits indefinitely for the SQL request to complete, while the thread is active.

**Recommendation:** Do not select the NOLIMIT value. If the stored procedure address space is down for some reason or the user-defined function does not complete, your SQL request hangs until the request is satisfied or the thread is canceled.

### WLM ENVIRONMENT field (WLMENV subsystem parameter)

The WLMENV subsystem parameter specifies the name of the default WLM environment that is to be used for a user-defined function, stored procedure, or advanced trigger.

<b>Acceptable values:</b>	Any valid name 1–32 alphanumeric characters, including underscores
<b>Default:</b>	blank
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SYSP WLMENV

This environment is used when a value is not specified for:

- The WLM ENVIRONMENT option on the CREATE FUNCTION statement or CREATE PROCEDURE statement for an external routine
- The WLM ENVIRONMENT FOR DEBUG MODE option on the CREATE FUNCTION or CREATE PROCEDURE statement for an SQL routine
- The WLM ENVIRONMENT FOR DEBUG MODE option on the CREATE TRIGGER statement for an advanced trigger

Changing this value does not change existing routines or triggers because the value is stored in the catalog when the function, procedure, or advanced trigger is created.

### MAX OPEN CURSORS field (MAX\_NUM\_CUR subsystem parameter)

The MAX\_NUM\_CUR subsystem parameter specifies the maximum number of cursors, including allocated cursors, that can be open at a given Db2 site for each thread.

<b>Acceptable values:</b>	0–99999
<b>Default:</b>	500

<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAX_NUM_CUR

Db2 keeps a count of currently open cursors. If an application attempts to open a thread after the maximum is reached, the statement will fail.

### **MAX STORED PROCS field (MAX\_ST\_PROC subsystem parameter)**

The MAX\_ST\_PROC subsystem parameter determines the maximum number of stored procedures that are to be allowed for each thread.

<b>Acceptable values:</b>	0–99999
<b>Default:</b>	2000
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAX_ST_PROC

If an application attempts to call a stored procedure after the maximum is reached, the statement will fail.

#### **Related information**

[00E70082 \(Db2 Codes\)](#)

### **BIF COMPATIBILITY field (BIF\_COMPATIBILITY subsystem parameter)**

The BIF\_COMPATIBILITY subsystem parameter specifies whether built-in functions and specifications are to return results in the newer format or revert to the pre-DB2 10 format.

**Recommendation:** Avoid making online changes to the BIF\_COMPATIBILITY setting, even though they are supported. Such changes do not affect SQL statements in the dynamic SQL statement cache.

<b>Acceptable values:</b>	V9_DECIMAL_VARCHAR, V9_TRIM, CURRENT, or V9
<b>Default:</b>	For installation: CURRENT For migration: the setting that your Db2 11 DSNTIDXA or DSNTIDXB input member specifies
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.BIF_COMPATIBILITY

In Db2 12, when the input data to the CHAR or VARCHAR function is a decimal value or a decimal is input to a CAST specification where the target data type is CHAR or VARCHAR, the result does not have any of the following attributes:

- Leading zeros.
- A trailing decimal point character.
- Leading blanks for positive decimal values.

You might need to modify some of your applications to handle this change, which differs from the behavior in DB2 9. While you prepare for this change, you can use the following options of the BIF\_COMPATIBILITY subsystem parameter to temporarily revert to the DB2 9 behavior.

#### **CURRENT**

All built-in functions return data in the Db2 12 format, unless they are controlled by the APPLCOMPAT bind option. When you run the installation CLIST in INSTALL mode, CURRENT is the default setting.

#### **V9\_DECIMAL\_VARCHAR**

For decimal input, the CHAR and VARCHAR functions, and the CAST specification with decimal input and a target data type of CHAR or VARCHAR, return data in the DB2 9 format.

**Tip:** You can run with BIF\_COMPATIBILITY set to CURRENT, and use the CHAR9 or VARCHAR9 functions instead for applications that depend on the DB2 9 behavior for the CHAR and VARCHAR functions with decimal input.

Db2 also continues to allow some unsupported timestamp strings for applications. Furthermore, as in previous Db2 releases, SQLCODE -180 is not issued for these unsupported timestamp strings. Because these strings are not supported by Db2, you must modify the application SQL to use a supported format for a timestamp string. For the supported formats, see [String representations of datetime values \(Db2 SQL\)](#).

### V9\_TRIM

The V9\_DECIMAL\_VARCHAR setting rules are in effect, and if the APPLCOMPAT bind option is V10R1, the LTRIM, RTRIM and STRIP built-in functions behave like in DB2 9 with respect to tolerating invalid EBCDIC mixed data strings and treatment of EBCDIC control characters X'0E0F'.

### V9

For decimal input, the CHAR built-in function returns data in the DB2 9 format.

This value has no effect on the output of the VARCHAR built-in function with a decimal value as input or on the result of the CAST(*decimal-expression* AS VARCHAR) specification. Unless you need DB2 9 behavior only for CHAR output, specify the V9\_DECIMAL\_VARCHAR value.

### Examples

The following examples show the effect of the BIF\_COMPATIBILITY subsystem parameter on the output of these built-in functions and cast specifications.

Table 33. Example output for CHAR based on BIF\_COMPATIBILITY settings

BIF_COMPATIBILITY setting	OUTPUT for CHAR(000.1)	OUTPUT for CHAR(1000.)	OUTPUT for CHAR(1.1)
V9_DECIMAL_VARCHAR	'000.1'	'1000.'	'1.1'
CURRENT	'.1 '	'1000 '	'1.1 '
V9	'000.1'	'1000.'	'1.1'

Table 34. Example output for VARCHAR and CAST(decimal-expression AS VARCHAR) based on BIF\_COMPATIBILITY settings

BIF_COMPATIBILITY setting	Output for VARCHAR(000.1) or CAST(000.1 AS VARCHAR(3))	Output for VARCHAR(1000.) or CAST(1000. AS VARCHAR(5))	Output for VARCHAR(1.1) or CAST(1.1 AS VARCHAR(3))
V9_DECIMAL_VARCHAR	'0.1'	'1000.'	'1.1'
CURRENT	'.1'	'1000'	'1.1'

Table 35. Example output for CAST(decimal-expression AS CHAR) based on BIF\_COMPATIBILITY settings

BIF_COMPATIBILITY setting	Output for CAST(000.1 AS CHAR(6))	Output for CAST(1000. AS CHAR(6))	Output for CAST(1.1 AS CHAR(4))
V9_DECIMAL_VARCHAR	'0.1 '	'1000. '	'1.1 '
CURRENT	'.1 '	'1000 '	'1.1 '
V9	'.1 '	'1000 '	'1.1 '

### Related reference

[CHAR scalar function \(Db2 SQL\)](#)



[CHAR9 scalar function \(Db2 SQL\)](#)  
[VARCHAR scalar function \(Db2 SQL\)](#)  
[VARCHAR9 scalar function \(Db2 SQL\)](#)

## ADMIN SCHEDULER field (ADMTPROC subsystem parameter)

The ADMIN SCHEDULER field identifies a name for the JCL procedure that is used to start the Db2 administrative task scheduler that is associated with this Db2 subsystem.

<b>Acceptable values:</b>	1–8 alphanumeric characters
<b>Default:</b>	ssnADMT
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM ADMTPROC

### 1–8 alphanumeric characters

When Db2 starts, it starts the administrative task scheduler that is specified in the ADMIN SCHEDULER field, if that scheduler is not yet started. Also, every time Db2 starts or stops, it posts an event to the administrative task scheduler so that the administrative task scheduler can execute tasks that depend on those events.

### blank

To disable the administrative task scheduler, enter blanks in the ADMIN SCHEDULER field. If you replace the default value with blanks, Db2 will not start the administrative task scheduler until you update the subsystem parameter.

This parameter cannot be updated online.

## SUBSTR COMPATIBILITY field (SUBSTR\_COMPATIBILITY subsystem parameter)

The SUBSTR\_COMPATIBILITY subsystem parameter specifies whether the Db2 built-in function SUBSTR always returns an error message for invalid input.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	PREVIOUS, CURRENT
<b>Default:</b>	PREVIOUS
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM.SUBSTR_COMPATIBILITY
<b>Data sharing scope:</b>	Group
<b>Online changeable:</b>	Yes

Previously, during execution of the SUBSTR built-in function, Db2 sometimes incorrectly returned a result for invalid input instead of issuing an appropriate error message. After the PTF for APAR PH36071 is applied and Db2 12 function level 500 or higher is activated, the SUBSTR\_COMPATIBILITY subsystem parameter is set to PREVIOUS by default and Db2 continues to behave as before the PTF was applied. If the SUBSTR\_COMPATIBILITY subsystem parameter is set to CURRENT, Db2 always enforces the rules for the SUBSTR built-in function that are documented in the *SQL Reference* and returns an SQL error code if the rules are not met.

Before you set the SUBSTR\_COMPATIBILITY subsystem parameter to CURRENT, you might need to modify some of your applications to handle this change.

## PREVIOUS

Specifies that the SUBSTR built-in function exhibits behavior from before installation of APAR PH36071. Db2 might incorrectly return a result for invalid input instead of an error code. This value is the default setting.

## CURRENT

Specifies that the SUBSTR built-in function always enforces the rules that are documented in the *SQL Reference*. If these rules are not met, Db2 returns an SQL error code.

If the SUBSTR\_COMPATIBILITY subsystem parameter is set to PREVIOUS and the SUBSTR built-in function incorrectly returns a result for invalid input, Db2 writes an incompatibility trace record, IFCID 0376, with function code 0014 in QW0376FN. Use these trace records to identify and correct affected applications so that they will be compatible if the SUBSTR\_COMPATIBILITY subsystem parameter is set to CURRENT in the future.

## Examples

The following table indicates how the result of the SUBSTR built-in function differs based on the SUBSTR\_COMPATIBILITY setting:

Example input for SUBSTR built-in function	Result with SUBSTR_COMPATIBILITY set to PREVIOUS	Result with SUBSTR_COMPATIBILITY set to CURRENT
SUBSTR('ABCD', 2+1, 3)	'CD '	SQLCODE -138
SUBSTR('ABCD', 3, 3)	SQLCODE -138	SQLCODE -138
SUBSTR('ABCD', 2+1, 2+1)	SQLCODE -138	SQLCODE -138

## MAX\_UDFS field (MAX\_UDF subsystem parameter)

The MAX\_UDF subsystem parameter determines the maximum number of user-defined external scalar functions that can run concurrently in a Db2 thread.

<b>Acceptable values:</b>	0–99999
<b>Default:</b>	2000
<b>Update:</b>	option 47 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAX_UDF

If an application attempts to call a user-defined external scalar function after the maximum is reached, the statement fails.

### Related information

[00E70082 \(Db2 Codes\)](#)

## DSNTIPX1: Db2 Java properties panel

The entries on this panel are used to specify local preferences for configuring JDBC and SQLJ and DSNWLMJ\_JAVA.

The fields on this panel can be updated only when you run the DB2 CLIST to install or migrate a Db2 subsystem or the first member of a data sharing group. They are displayed but cannot be changed when you install or migrate the second or a subsequent member of a data sharing group.

```

DSNTIPX1          INSTALL DB2 - DB2 JAVA PROPERTIES
====>

z/OS Java and z/OS Unix System Services Java object locations:
 1 Z/OS SDK HOME DIR      ==> /usr/lpp/java160/J6.0
 2 Z/OS USS JAVA CLASSES ==> /usr/include/java_classes
 3 Z/OS USS JAVA RUNTIME ==> /usr/lib/java_runtime

IBM Data Server Driver for JDBC and SQLJ environment configuration:
 4 JDBC/SQLJ ENV VAR DIR ==> /usr/lpp/db2c10/jdbc
 5 JDBC/SQLJ INSTALL ID ==>          For secure connections by PassTicket

DB2 Java classes, native methods library, and samples location:
 6 DB2 BASE JAVA DIR      ==> /usr/lpp/db2c10/base

DB2-supplied Java WLM Environment (DSNWLM_JAVA) configuration:
 7 JAVA ENV DATA SET     ==> prefix.ssnWLMJ.JAVAENV
 8 JAVA ENV VAR FILE      ==> /usr/lpp/db2c10/base/classes/ssnmenvfile.txt
 9 JVM PROPERTIES FILE    ==> /usr/lpp/java/properties/ssnmjvmosp
10 JVM ADDRESSING MODE    ==> 32          In bits (32 or 64)
11 INIT JAVA HEAP SIZE    ==> DEFAULT   DEFAULT or 1 - 99999 MB
12 MAX APPL HEAP SIZE     ==> DEFAULT   DEFAULT or 1 - 99999 MB
PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 52. Db2 Java properties panel: DSNTIPX

## z/OS SDK HOME DIR field

The absolute path of the HFS/zFS directory where the z/OS Java Software Development Kit (SDK) resides. If you do not use Java, just accept the default setting.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/lpp/java160/J6.0
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JAVAHOME

This directory is provided by z/OS and is referenced by the JAVA\_HOME variable in the file specified in the JAVA ENV VAR FILE field.

To find the minimum required Java Software Development kit (SDK) version for Db2 12, see [Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#).

## Z/OS USS JAVA CLASSES field

The absolute path of the HFS/zFS directory that contains JAR files provided by z/OS UNIX System Services (z/OS UNIX).

Verify that this directory contains the following JAR files:

- gxljapi.jar: z/OS XML System Services XML schema registration
- IRRRracf.jar: The Java interface to the system security product

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/include/java_classes/
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None

<b>z/OSMF variable:</b>	CLASPATH
-------------------------	----------

This directory is provided by z/OS and is referenced by the CLASSPATH variable in the file that is specified in the JAVA ENV VAR FILE field. If you do not use Java, accept the default setting.

### **z/OS USS JAVA RUNTIME field**

The absolute path of the HFS/zFS directory that contains the native library (DLLs) provided by z/OS Unix System Services (z/OS Unix). Verify that this directory contains libGXLNVBAT.so, the DLL for z/OS XML System Services.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/lib/java_runtime
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	LIBPATH

This directory is provided by z/OS and is referenced by the LIBPATH variable in the file specified in the JAVA ENV VAR FILE field. If you do not use Java, just accept the default setting.

### **JDBC/SQLJ ENV VAR DIR field**

The absolute path of the highest-level directory in the set of HFS/zFS directories that contain the classes and other objects for the IBM Data Server Driver for JDBC and SQLJ on Db2 12 for z/OS.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/lpp/db2c10/jdbc
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JCCHOME

This directory and its subdirectories are typically managed by SMP/E. It is referenced by the JCC\_HOME variable in the file specified in the JAVA ENV VAR FILE field. Verify that the directory specified here contains the following subdirectories which are used for Db2 configuration:

- **bin:** Contains the runtime objects for the IBM Data Server Driver for JDBC and SQLJ. This subdirectory is referenced by the JDBC and SQLJ PATH variable.
- **classes:** Contains the JAR files for the IBM Data Server Driver for JDBC and SQLJ. This subdirectory is referenced by the JDBC and SQLJ CLASSPATH variable.
- **lib:** Contains the DLLs for the IBM Data Server Driver for JDBC and SQLJ. This subdirectory is referenced by the JDBC and SQLJ LIBPATH variable.

This directory set exists only if you have received and applied JDBCC12, the FMID for IBM Data Server Driver for JDBC and SQLJ on Db2 12 for z/OS. If you have not, just accept the default setting.

### **JDBC/SQLJ INSTALL ID field**

The ID for connecting to Db2 using a secure sign on and a RACF PassTicket for authentication. The ID will be used for binding the IBM Data Server Driver for JDBC and SQLJ during installation or migration to Db2

and for running an installation verification procedure (IVP) to validate that JDBC and SQLJ are deployed correctly on Db2.

<b>Acceptable values:</b>	A user ID of 1–8 characters
<b>Default:</b>	The value of SECURITY ADMIN 1 on panel DSNTIPP1
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JCCSID

This ID is meaningful only if you have received and applied JDBCC12, the FMID for Db2 12 JDBC/SQLJ. If you have not, just accept the default setting.

## DB2 BASE JAVA DIR field

The absolute path of the highest-level directory in the set of HFS/zFS directories that contain the Db2 for z/OS-supplied Java classes, native methods (DLLs), and samples.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/lpp/db2c10/base
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	DB2BASE

This directory and its subdirectories are typically managed by SMP/E. It is referenced by the DB2\_BASE variable in the file specified in the JAVA ENV VAR FILE field. Verify that the directory specified here contains the following subdirectories which are used for Db2 configuration:

- classes: Contains the DB2 base-supplied jar files.
- lib: Contains the DB2 base-supplied DLLs.
- samples: Contains the DB2 base-supplied sample objects.

If you do not use Java, just accept the default setting.

## JAVA ENV DATA SET field

The name of the environment (JAVAENV) data set for the Db2-supplied Java WLM Java Environment, DSNWLM\_JAVA.

<b>Acceptable values:</b>	An data set name of up to 44 characters
<b>Default:</b>	<i>prefix.ssnm</i> WLMJ.JAVAENV or <i>prefix.group-attach-name</i> WLMJ.JAVAENV (if a group attach name was specified on panel DSNTIPK)
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JAVAENV

This data set is created by job DSNTIJMJ and must not already exist. It is allocated by the JAVAENV DD of DSNWLMJ, the address space startup procedure for DSNWLM\_JAVA. DSNWLMJ is created by job DSNTIJMW. It contains the \_CEE\_ENVFILE environment variable which provides the name and location of the Java environment variable file to be used when the DSNWLM\_JAVA environment is started.

The security profile of the user ID used to execute job DSNTIJMJ must include an OMVS segment. The user ID must also be authorized to create the specified data set.

If you do not use Java, just accept the default setting.

## JAVA ENV VAR FILE field

The absolute path and name of the HFS/zFS environment variable file for the Db2-supplied Java WLM environment, DSNWLM\_JAVA.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
<b>Default:</b>	/usr/lpp/db2c10/base/classes/ssnmenvfile.txt or /usr/lpp/db2c10/base/classes/group-attach-nameenvfile.txt (if a group attach name was specified on panel DSNTIPK)
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JAVAENVV

This file is created when you run installation job DSNTIJMJ and must not already exist. It is referenced in the \_CEE\_ENVFILE environment variable of the JAVAENV data set specified in the JAVA ENV DATA SET field. It specifies the names and locations of the following properties to be used when the DSNWLM\_JAVA environment is started:

- CLASSPATH: The HFS/zFS directory of the Java class that contains the jar file for z/OS XML System Services XML schema registration (gxljapi.jar).
- DB2\_BASE: The highest-level directory in the set of HFS/zFS directories that contain DB2 for z/OS-supplied Java classes and native methods (DLLs).
- JCC\_HOME: The highest-level directory in the set of HFS/zFS directories that contain the classes and other objects for the IBM Data Server Driver for JDBC and SQLJ
- JAVA\_HOME: The HFS/zFS directory where the z/OS Java Software Development Kit (SDK) resides.
- JVMPROPS: The HFS/zFS path and name of the startup options for the Java Virtual Machine (JVM) used by the DB2-supplied Java WLM environment, DSNWLM\_JAVA.
- LIBPATH: The HFS/zFS directory that contains the native library for z/OS XML System Services (libGXLNVBAT.so).
- STEPLIB: The name of the DB2 for z/OS runtime library.

The security profile of the user ID used to execute job DSNTIJMJ must include an OMVS segment. The user ID must also have write permission to the HFS directory where the file is to be created.

If you do not use Java, just accept the default setting.

## JVM PROPERTIES FILE field

The absolute path and name of the HFS/zFS Java Virtual Machine (JVM) startup options file used by the Db2-supplied Java WLM environment, DSNWLM\_JAVA.

<b>Acceptable values:</b>	An HFS/zFS path name of up to 47 characters
---------------------------	---

<b>Default:</b>	/usr/lpp/java/properties/ssnmjvmssp or /usr/lpp/java/properties/ <i>group-attach-name</i> jvmssp (if a group attach name was specified on panel DSNTIPK)
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JVMPROPS

This file is created when you run installation job DSNTIJMJ and must not already exist. It is referenced by the JVMPROPS variable in the file specified in the JAVA ENV VAR FILE field.

The security profile of the user ID used to execute job DSNTIJMJ must include an OMVS segment. The user ID must also have write permission to the HFS directory where the file is to be created.

If you do not use Java, just accept the default setting.

### JVM ADDRESSING MODE field

Indicates whether DSNWLMJ, the address space proc for DSNWLM\_JAVA, should be configured to request a 32-bit or a 64-bit JVM.

<b>Acceptable values:</b>	32 or 64
<b>Default:</b>	32
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JVMAMODE

The DSNWLMJ address space startup proc is added to the system proclib by installation job DSNTIJMW.

When this field is set to 32, DSNTIJMW is configured to add DSNWLMJ with the following characteristics:

- The NUMTCB setting is 5
- The started module is called DSNX9WLM

When this field is set to 64, DSNTIJMW is configured to add DSNWLMJ has the following characteristics:

- The NUMTCB setting is 25
- The started module is called DSNX9WJM

To find the minimum required Java Software Development kit (SDK) version for Db2 12, see [Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#).

If you do not use Java, just accept the default setting.

#### Related reference

[z/OS SDK HOME DIR field](#)

The absolute path of the HFS/zFS directory where the z/OS Java Software Development Kit (SDK) resides. If you do not use Java, just accept the default setting.

### INIT JAVA HEAP SIZE field

Indicates the size in megabytes of the initial Java heap (the middleware heap within non-system heap) for the JVM used by the DSNWLM\_JAVA WLM environment. This value is assigned to the -Xms option in the JVM startup options file specified in the JVM PROPERTIES FILE field.

<b>Acceptable values:</b>	DEFAULT or 1–99999 (in megabytes)
<b>Default:</b>	32
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JVMHEAP

If you specify DEFAULT, the -Xms option is assigned 64M, but remains commented out in the JVM startup options file. If you specify a numeric value, it is assigned to the -Xms option and the option is active in the JVM startup options file. Note that the CLIST has no way to validate whether system resources are available to support the specified size.

If you do not use Java, just accept the default setting.

### MAX APPL HEAP SIZE field

Indicates the maximum size in megabytes of memory for application work (non-system heap) in the JVM used by the DSNWLM\_JAVA WLM environment. This value is assigned to the -Xmx option in the JVM startup options file specified in the JVM PROPERTIES FILE field.

<b>Acceptable values::</b>	DEFAULT or 1–99999 (in megabytes)
<b>Default:</b>	DEFAULT
<b>Update:</b>	None
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	None
<b>z/OSMF variable:</b>	JVMAPPH

If you specify DEFAULT, the -Xmx option is assigned 128M but remains commented out in the JVM startup options file. If you specify a numeric value, it is assigned to the -Xmx option and the option is active (uncommented) in the JVM startup options file. Note that the CLIST has no way to validate whether system resources are available to support the specified size.

If you do not use Java, just accept the default setting.



## DSNTIPR1: Parameters for Db2-supplied routines panel

The DSNTIPR1 panel enables you to establish default WLM environment names for Db2-supplied routines and to access panels for advanced configuration of these routines.

```
DSNTIPR1      INSTALL DB2 PARAMETERS FOR DB2-SUPPLIED ROUTINES
===>
Enter the default WLM environment names for DB2-supplied routines:
  1 FOR MOST DB2 ROUTINES          ===> DSNWLM_GENERAL
  2 FOR ROUTINES IDENTIFIED
    TO PROGRAM CONTROL             ===> DSNWLM_PGM_CONTROL
  3 FOR SERIALIZED ROUTINES        ===> DSNWLM_NUMTCB1

  4 FOR DB2 UTILITIES ROUTINES     ===> DSNWLM_UTILS
  5 FOR DB2 XML PROCESSING ROUTINES===> DSNWLM_XML
  6 FOR DB2 JAVA ROUTINES          ===> DSNWLM_JAVA
  7 FOR DB2 REXX ROUTINES          ===> DSNWLM_REXX
  8 FOR UNIFIED DEBUGGER ROUTINES  ===> DSNWLM_DEBUGGER

  9 FOR THE DB2 CICS ROUTINE        ===> DSNWLM_DSNACICS
 10 FOR DB2 MQSERIES ROUTINES      ===> DSNWLM_MQSERIES
 11 FOR DB2 WEB SERVICES ROUTINES  ===> DSNWLM_WEBSERVICES

Specify whether to enter advanced configuration of DB2-supplied routines:
12 ADVANCED CONFIGURATION OPTIONS ===> NO   Enter advanced options (NO or YES)

PRESS: ENTER to continue   RETURN to exit   HELP for more information
```

Figure 53. Parameters for Db2-supplied routines panel: DSNTIPR1

Values on the DSNTIPR1 panel are used to customize configuration statements in installation job DSNTIJRT, which creates and grants access to the Db2-supplied routines and any related databases, table spaces, tables, indexes, and created global temporary tables. The values are also used to customize installation job DSNTIJRW, which defines core WLM environments for Db2-supplied stored procedures and user-defined functions. If you change an environment name on the DSNTIPR1 panel, the change is applied in the advanced configuration panel settings to all routines that use the original name.

If you change a WLM environment name on this panel, the WLM ENV NAME field of each corresponding routine in the advanced configuration options panels is also changed. For example, if you change the setting of the FOR DB2 XML PROCESSING ROUTINES field from DSNWLM\_XML to DSNWLM\_MY\_XML, then the DSNTIPRJ panel will contain DSNWLM\_MY\_XML in the WLM ENV NAME fields for all routines.

Changes on the DSNTIPR1 panel do not affect a corresponding routine's WLM ENV NAME field if the WLM ENV NAME value has been previously modified on the advanced configuration options panel. For example, if you change the WLM ENV NAME setting for XSR\_ADDSCHEMADOC from DSNWLM\_XML to MY\_WLM\_ENVIRONMENT on the DSNTIPRJ panel, it will remain MY\_WLM\_ENVIRONMENT even if you subsequently change the setting of the FOR DB2 XML PROCESSING ROUTINES field on the DSNTIPR1 panel from DSNWLM\_XML to DSNWLM\_MY\_XML.

### FOR MOST Db2 ROUTINES field

The value of the FOR MOST Db2 ROUTINES field identifies the WLM environment that is to be used for running most Db2-supplied routines.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_GENERAL
<b>DSNZPxxx:</b>	none

### Related reference

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

## FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL field

The FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL field identifies the WLM environment that is to be used for running Db2-supplied routines that require program control. These routines can be registered to RACF or an equivalent product.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_PGM_CONTROL
<b>DSNZPxxx:</b>	none

### Related reference

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

### Related information

[Defining modules to program control \(UNIX System Services Planning\)](#)

## FOR SERIALIZED ROUTINES field

The value of the FOR SERIALIZED ROUTINES field identifies the WLM environment that is to be used for Db2-supplied routines that need to run serially. A routine that must run serially cannot share a task control block with another routine.

These routines require an environment that has a NUMTCB setting of 1. These routines do not include LANGUAGE REXX routines or SYSPROC.DSNUTILS and SYSPROC.DSNUTILU.

<b>3Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_NUMTCB1
<b>DSNZPxxx:</b>	none

## FOR Db2 UTILITIES ROUTINES field

The value of the FOR Db2 UTILITIES ROUTINES field identifies the name of the WLM environment that is to be used for running the Db2-supplied routines for utilities. This WLM environment should be used only by the SYSPROC.DSNUTILS and SYSPROC.DSNUTILU stored procedures.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_UTILS
<b>DSNZPxxx:</b>	none

### Related reference

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

### **FOR Db2 XML PROCESSING ROUTINES field**

The value of the FOR Db2 XML PROCESSING ROUTINES field identifies the WLM environment that is to be used for running most Db2-supplied XML processing routines. This applies to the XSR\_ADDSCHEMADOC, XSR\_REGISTER, and XSR\_REMOVE routines.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_XML
<b>DSNZPxxx:</b>	none

#### **Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

### **FOR MOST Db2 JAVA ROUTINES field**

The value of the FOR MOST Db2 JAVA ROUTINES field identifies the WLM environment that is to be used for running most Db2-supplied Java routines.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_JAVA
<b>DSNZPxxx:</b>	none

#### **Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

### **FOR Db2 REXX ROUTINES field**

The value of the FOR Db2 REXX ROUTINES field identifies the name of the WLM environment that is to be used for Db2-supplied REXX routines.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_REXX
<b>DSNZPxxx:</b>	none

#### **Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

### **FOR UNIFIED DEBUGGER ROUTINES field**

The FOR UNIFIED DEBUGGER ROUTINES field identifies the WLM environment that is to be used for Db2-supplied routines that are for the unified debugger tool.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_DEBUGGER

<b>DSNZPxxx:</b>	none
------------------	------

**Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)  
 Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

**FOR THE Db2 CICS ROUTINE field**

The value of the FOR THE Db2 CICS ROUTINE field identifies the WLM environment that is to be used for the Db2 CICS transaction processor routine SYSPROC.DSNACICS.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_CICS
<b>DSNZPxxx:</b>	none

**Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)  
 Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

**FOR Db2 MQSERIES ROUTINES field**

The value of the FOR Db2 MQSERIES ROUTINES field specifies the name of the WLM environment that is to be used for Db2 IBM MQ functions.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_MQSERIES
<b>DSNZPxxx:</b>	none

**Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)  
 Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

**FOR Db2 WEB SERVICES ROUTINES field**

The value of the FOR Db2 WEB SERVICES ROUTINES field identifies the WLM environment that is to be used for Db2 web services functions.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_WEBSERVICES
<b>DSNZPxxx:</b>	none

**Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)



**To exit advanced configuration and display the next standard installation panel, DSNTIPZ:**

Leave the Option field blank and press the Enter key.

**To return to the DSNTIPRA panel:**

Press the Return key.

**Trace formatting routines panel: DSNTIPRB**

The DSNTIPRB panel allows you to modify configuration options for trace formatting routines.

**Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRB          Trace Formatting routines                    |
| ===>                                                     |
| DSNWSPM                                                   |
|   WLM ENV NAME   ===> DSNWLM_NUMTCB1                       |
|   GRANT EXECUTE  ===> PUBLIC                               |
|   PACKAGE OWNER  ===>                                     |
| DSNWZP                                                    |
|   WLM ENV NAME   ===> DSNWLM_NUMTCB1                       |
|   GRANT EXECUTE  ===> PUBLIC                               |
|   PACKAGE OWNER  ===>                                     |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit  |
+-----+

```

Figure 55. Trace formatting routines panel: DSNTIPRB

**WLM ENV NAME**

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_NUMTCB1
<b>DSNZPxxx:</b>	none

**GRANT EXECUTE**

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

**PACKAGE OWNER**

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
---------------------------	------------------------------------

<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### Utility invocation routines panel: DSNTIPRC

The DSNTIPRC panel allows you to modify configuration options for utility invocation routines.

#### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRC          Utility invocation routines
===>
DSNUTILS
  WLM ENV NAME    ===> DSNWLM_UTILS
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
DSNUTILU
  WLM ENV NAME    ===> DSNWLM_UTILS
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
DSNUTILV
  WLM ENV NAME    ===> DSNWLM_UTILS
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 56. Utility invocation routines panel: DSNTIPRC

#### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_UTILS
<b>DSNZPxxx:</b>	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

#### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### Db2 security routines panel: DSNTIPRE

The DSNTIPRE panel allows you to modify configuration options for the SYSIBM.USERNAMES encryption routine.

#### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by + or -. The + indicates that you can scroll down, and - indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRE                DB2 security routines                |
| ===>                                                            |
|                                                                    |
| DSNLEUSR                                                         |
|   WLM ENV NAME  ===> DSNWLM_NUMTCB1                             |
|   GRANT EXECUTE ===> PUBLIC                                     |
|   PACKAGE OWNER ===>                                          |
|                                                                    |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit      |
+-----+
```

Figure 57. Db2 security routines panel: DSNTIPRE

#### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_NUMTCB1
<b>DSNZPxxx:</b>	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

#### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
---------------------------	------------------------------------



<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### Java and SQL procedure processing routines panel: DSNTIPRF

The DSNTIPRF panel allows you to modify configuration options for SQL procedure processing routines.

#### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRF  Java and SQL procedure processing routines
====>

ALTER_JAVA_PATH
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
DB2_INSTALL_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
DB2_REMOVE_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
DB2_REPLACE_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
DB2_UPDATEJARINFO
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
INSTALL_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
REMOVE_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
REPLACE_JAR
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
DSNTBIND
  WLM ENV NAME  ===> DSNWLM_REXX
  GRANT EXECUTE ===> PUBLIC
DSNTPSMP
  WLM ENV NAME  ===> DSNWLM_REXX
  GRANT EXECUTE ===> PUBLIC
WLM_REFRESH
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 58. Java and SQL procedure processing routines panel: DSNTIPRF

#### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_GENERAL for most routines, DSNWLM_REXX for DSNTBIND and DSNTPSMP
<b>DSNZPxxx:</b>	none

## GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

## PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

## ***Unified debugger for Java and SQL routines panel: DSNTIPRH***

The DSNTIPRH panel allows you to modify configuration options for unified debugger for SQL and Java routines.

### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRH Unified debugger for Java and SQL routines
===>
CREATE_SESSION
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DEBUGGERLEVEL
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DESTROY_SESSION
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
GET_REPORT
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
LIST_SESSION
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
PUT_COMMAND
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
QUERY_SESSION
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_ENDSESSIONMANAGER
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_INITIALIZECLIENT
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_LOOKUPSESSIONMANAGER
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_PINGSESSIONMANAGER
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_RECVCLIENTREPORTS
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_RUNSESSIONMANAGER
WLM ENV NAME ===> DSNWLM_GENERAL
GRANT EXECUTE ===> PUBLIC
DBG_SENDCLIENTCOMMANDS
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_SENDCLIENTREQUESTS
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
DBG_TERMINATECLIENT
WLM ENV NAME ===> DSNWLM_DEBUGGER
GRANT EXECUTE ===> PUBLIC
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 59. Unified debugger for Java and SQL routines panel: DSNTIPRH

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_DEBUGGER for most routines, DSNWLM_GENERAL for DBG_RUNSESSIONMANAGER
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### XML processing routines panel: DSNTIPRI

The DSNTIPRI panel allows you to modify configuration options for XSL transform and XML schema processing routines.

#### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by + or -. The + indicates that you can scroll down, and - indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRI          XML processing routines                      |
| ===>                                                     |
| XSLTRANSFORM                                           |
|   WLM ENV NAME   ===> DSNWLM_JAVA                       |
|   GRANT EXECUTE  ===> PUBLIC                            |
| XSR_ADDSCHEMADOC                                       |
|   WLM ENV NAME   ===> DSNWLM_XML                        |
|   GRANT EXECUTE  ===> PUBLIC                            |
|   PACKAGE OWNER  ===>                                  |
| XSR_COMPLETE                                           |
|   WLM ENV NAME   ===> DSNWLM_JAVA                       |
|   GRANT EXECUTE  ===> PUBLIC                            |
|   PACKAGE OWNER  ===>                                  |
| XSR_REGISTER                                           |
|   WLM ENV NAME   ===> DSNWLM_XML                        |
|   GRANT EXECUTE  ===> PUBLIC                            |
|   PACKAGE OWNER  ===>                                  |
| XSR_REMOVE                                           |
|   WLM ENV NAME   ===> DSNWLM_XML                        |
|   GRANT EXECUTE  ===> PUBLIC                            |
|   PACKAGE OWNER  ===>                                  |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit |
+-----+

```

Figure 60. XML processing routines panel: DSNTIPRI

#### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_XML for most routines, DSNWLM_JAVA for XSR_COMPLETE and XSLTRANSFORM
<b>DSNZPxxx:</b>	none

#### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
---------------------------	-------------------------------------

<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command. If this field is not displayed, the routine has no package.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### ***IBM Text Search routines panel: DSNTIPRJ***

The DSNTIPRJ panel allows you to modify configuration options for Text Search routines.

#### **Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRJ          IBM Text Search routines
===>
SYSTS_ALTER
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_CREATE
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_DROP
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_ENCRYPT
  WLM_ENV_NAME    ===> DSNWLM_JAVA
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_RESTORE
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_START
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_STOP
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_TAKEOVER
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
SYSTS_UPDATE
  WLM_ENV_NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 61. IBM Text Search routines panel: DSNTIPRJ

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_GENERAL (DSNWLM_JAVA for SYSTS_ENCRYPT)
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

## PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### ***Database metadata routines panel: DSNTIPRK***

The DSNTIPRK panel allows you to modify configuration options for database metadata routines.

#### **Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRK          Database metadata routines
===>

SQLCAMESSAGE
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
SQLCOLPRIVILEGES
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLCOLUMNS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLFOREIGNKEYS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLFUNCTIONCOLS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLFUNCTIONS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLGETTYPEINFO
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLPRIMARYKEYS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLPROCEDURECOLS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLPROCEDURES
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLPSEUDOCOLUMNS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLSPECIALCOLUMNS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLSTATISTICS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLTABLEPRIVILEGES
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLTABLES
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>
SQLUDTS
  WLM ENV NAME  ===> DSNWLM_GENERAL
  GRANT EXECUTE ===> PUBLIC
  PACKAGE OWNER ===>

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit
+-----+

```

Figure 62. Database metadata routines panel: DSNTIPRK

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
---------------------------	------------------------------



<b>Default:</b>	DSNWLM_GENERAL
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command. If this field is not displayed, the routine has no package.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### ***Db2 administration routines panel: DSNTIPRL***

The DSNTIPRL panel allows you to modify configuration options for routines that are to be used for administration.

#### **Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRL          DB2 administration routines
===>
ADMIN_COMMAND_DB2
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_COMMAND_DSN
  WLM ENV NAME    ===> DSNWLM_REXX
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_COMMAND_MVS
  WLM ENV NAME    ===> DSNWLM__GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_COMMAND_UNIX
  WLM ENV NAME    ===> DSNWLM_PGM_CONTROL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_BROWSE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_DELETE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_LIST
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_RENAME
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_SEARCH
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_DS_WRITE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_EXPLAIN_MAINT
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_INFO_HOST
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_INFO_IFCID
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_INFO_SMS
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_INFO_SQL
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>
ADMIN_INFO_SSID
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
  PACKAGE OWNER   ===>

```

Figure 63. DB2 administration routines panel: DSNTIPRL (part 1 of 3)

```

ADMIN_INFO_SYSLOG
WLM ENV NAME ==> DSNWLM_REXX
GRANT EXECUTE ==> PUBLIC
ADMIN_INFO_SYSPARM
WLM ENV NAME ==> DSNWLM_NUMTCB1
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_JOB_CANCEL
WLM ENV NAME ==> DSNWLM_PGM_CONTROL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_JOB_FETCH
WLM ENV NAME ==> DSNWLM_PGM_CONTROL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_JOB_QUERY
WLM ENV NAME ==> DSNWLM_PGM_CONTROL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_JOB_SUBMIT
WLM ENV NAME ==> DSNWLM_PGM_CONTROL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_ADD
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_CANCEL
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_LIST
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_OUTPUT
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_REMOVE
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_STATUS
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_TASK_UPDATE
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_UPDATE_SYSPARM
WLM ENV NAME ==> DSNWLM_REXX
GRANT EXECUTE ==> PUBLIC
ADMIN_UTL_EXECUTE
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_UTL_MODIFY
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_UTL_MONITOR
WLM ENV NAME ==> DSNWLM_PGM_CONTROL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
ADMIN_UTL_SCHEDULE
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>

```

Figure 64. DB2 administration routines panel: DSNTIPRL (part 2 of 3)

```

ADMIN_UTL_SORT
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSN_WLM_APPLENV
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
DSNACCOX
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_CONFIG
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_MESSAGE
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
GET_SYSTEM_INFO
WLM ENV NAME ==> DSNWLM_NUMTCB1
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
SET_MAINT_MODE_RECORD_NO_TEMPORALHISTORY
GRANT EXECUTE ==> user-id
SET_PLAN_HINT
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
WLM_SET_CLIENT_INFO
WLM ENV NAME ==> DSNWLM_GENERAL
GRANT EXECUTE ==> PUBLIC
PACKAGE OWNER ==>
PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 65. Db2 administration routines panel: DSNTIPRL (part 3 of 3)

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	see the panel illustration for the default environment name of each routine
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
---------------------------	------------------------------------



<b>DSNZPxxx:</b>	none
------------------	------

### **CICS and IMS transaction invocation routines panel: DSNTIPRN**

The DSNTIPRN panel allows you to modify configuration options for CICS and IMS transaction invocation routines.

#### **Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRN CICS and IMS transaction invocation routines          |
| ===>                                                         |
| DSNACICS                                                       |
|   WLM ENV NAME  ===> DSNWLM_DSNACICS                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                       |
| DSNAIMS                                                       |
|   WLM ENV NAME  ===> DSNWLM_GENERAL                          |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                       |
| DSNAIMS2                                                    |
|   WLM ENV NAME  ===> DSNWLM_GENERAL                          |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                       |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit    |
+-----+
```

Figure 67. CICS and IMS transaction invocation routines panel: DSNTIPRN

#### **WLM ENV NAME**

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_GENERAL (DSNWLM_DSNACICS for DSNACICS)
<b>DSNZPxxx:</b>	none

#### **GRANT EXECUTE**

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

#### **PACKAGE OWNER**

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### **MQSeries routines panel: DSNTIPRO**

The DSNTIPRO panel allows you to modify configuration options for IBM MQ routines.

#### **Scrolling the panel**

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```
+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRO                MQSeries routines                    |
| ===>                                                            |
| MQREAD                                                           |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQREADALL                                                       |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQREADALLCLOB                                                   |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQREADCLOB                                                      |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQRECEIVE                                                       |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQRECEIVEALL                                                    |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQRECEIVEALLCLOB                                               |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQRECEIVECLOB                                                  |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| MQSEND                                                          |
|   WLM ENV NAME  ===> DSNWLM_MQSERIES                         |
|   GRANT EXECUTE ===> PUBLIC                                  |
|   PACKAGE OWNER ===>                                        |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit    |
+-----+
```

Figure 68. IBM MQ routines panel: DSNTIPRO

#### **WLM ENV NAME**

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_MQSERIES

<b>DSNZPxxx:</b>	none
------------------	------

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### PACKAGE OWNER

Specify the authorization ID of the package owner for the routine. The BIND PACKAGE command for the routine uses this value for the OWNER option. The default is blank, which means that the OWNER option is omitted from the BIND PACKAGE command.

<b>Acceptable values:</b>	blank, or a valid authorization ID
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	none

### Related concepts

[Db2 MQ functions and Db2 MQ XML stored procedures \(Db2 Application programming and SQL\)](#)

### Related tasks

[Customizing the WLM application environment for running IBM MQ user-defined function support](#)

To run the Db2 MQ user-defined functions, you must configure a WLM environment and the corresponding WLM startup procedure.

### **Web services/SOAP routines panel: DSNTIPRP**

The DSNTIPRP panel allows you to modify configuration options for web services and SOAP routines.

### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)



```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
| DSNTIPRP          Web services/SOAP routines                |
| ===>                                                     |
|                                                           |
| SOAPHTTPC                                               |
|   WLM ENV NAME   ===> DSNWLM_WEBSERVICES                |
|   GRANT EXECUTE  ===> PUBLIC                            |
| SOAPHTTPNC                                               |
|   WLM ENV NAME   ===> DSNWLM_WEBSERVICES                |
|   GRANT EXECUTE  ===> PUBLIC                            |
| SOAPHTTPNV                                               |
|   WLM ENV NAME   ===> DSNWLM_WEBSERVICES                |
|   GRANT EXECUTE  ===> PUBLIC                            |
| SOAPHTTPV                                               |
|   WLM ENV NAME   ===> DSNWLM_WEBSERVICES                |
|   GRANT EXECUTE  ===> PUBLIC                            |
| PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit |
+-----+

```

Figure 69. Web services/SOAP routines panel: DSNTIPRP

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_WEBSERVICES
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

### JSON routines panel: DSNTIPRQ

The DSNTIPRQ panel allows you to modify configuration options for JSON routines.

#### Scrolling the panel

Because space on this panel is limited, all fields might not be displayed at one time, and it is defined as a scrollable panel in ISPF. The number of fields that are displayed depends on how many rows your ISPF device can display, whether you use split screen mode, and where you split the screen. You can scroll the panel to see more fields if **More** displays in the upper right side of the panel followed by **+** or **-**. The **+** indicates that you can scroll down, and **-** indicates that you can scroll up.

To scroll through the fields, use the DOWN and UP scroll commands . (You can also assign your PF keys to the DOWN and UP commands.)

```

+----- DB2 ROUTINES: ADVANCED CONFIGURATION OPTIONS -----+
DSNTIPRQ          JSON routines
===>

BSON2JSON
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_BINARY
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_BINARY2
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_GET_POS_ARR_INDEX
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_LEN
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_TABLE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_TABLE_BINARY
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_TYPE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON_UPDATE
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
JSON2BSON
  WLM ENV NAME    ===> DSNWLM_GENERAL
  GRANT EXECUTE   ===> PUBLIC
REGSP
  GRANT EXECUTE   ===> PUBLIC
REG_MATCHES
  GRANT EXECUTE   ===> PUBLIC

PRESS: ENTER to continue UP/DOWN to scroll RETURN to exit

```

Figure 70. JSON routines panel: DSNTIPRQ

### WLM ENV NAME

Specify the WLM environment name for the routine.

<b>Acceptable values:</b>	a valid WLM environment name
<b>Default:</b>	DSNWLM_GENERAL
<b>DSNZPxxx:</b>	none

### GRANT EXECUTE

Specify one or more authorization IDs that are to be granted EXECUTE access on the routine. Use commas to separate individual IDs. Do not use embedded blanks. You can enter up to 44 characters, including commas.

<b>Acceptable values:</b>	at least one valid authorization ID
<b>Default:</b>	PUBLIC
<b>DSNZPxxx:</b>	none

## DSNTIPZ: Data definition control support panel

The entries on the DSNTIPZ panel allow you to install and tailor data definition control support.

Two SQL tables (application registration and object registration) are identified and created even if data definition control support is not installed. This simplifies future activation of the facility. Specified

application identifiers (Db2 plans or collections of packages) can be registered in the application registration table, and, optionally, their associated Db2 object names can be registered in the object registration table. Db2 consults these two tables prior to accepting a given DDL statement to make sure that a particular application identifier and object name are registered.

```

DSNTIPZ      INSTALL DB2 - DATA DEFINITION CONTROL SUPPORT
====>

Enter data below:

 1 INSTALL DD CONTROL SUPT  ===> NO          YES - activate the support
                               NO - omit DD control support
 2 CONTROL ALL APPLICATIONS ===> NO          YES or NO
 3 REQUIRE FULL NAMES       ===> YES        YES or NO
 4 UNREGISTERED DDL DEFAULT ===> ACCEPT     Action for unregistered DDL:
                                         ACCEPT - allow it
                                         REJECT - prohibit it
                                         APPL - consult ART
 5 ART/ORT ESCAPE CHARACTER ===>           Used in ART/ORT Searches
 6 REGISTRATION OWNER       ===> DSNRGCOL   Qualifier for ART and ORT
 7 REGISTRATION DATABASE   ===> DSNRGFDB   Database name
 8 APPL REGISTRATION TABLE ===> DSN_REGISTER_APPL Table name
 9 OBJT REGISTRATION TABLE ===> DSN_REGISTER_OBJT Table name

Note: ART = Application Registration Table
      ORT = Object Registration Table

PRESS: ENTER to continue RETURN to exit HELP for more information

```

Figure 71. Data definition control support panel: DSNTIPZ

**Related information**

[Managing access through data definition control \(Managing Security\)](#)

**INSTALL DD CONTROL SUPT field (RGFINSTL subsystem parameter)**

The RGFINSTL subsystem parameter determines whether data definition control support is to be installed.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFINSTL

**YES**

Data definition control support is installed.

**NO**

Data definition control support is not installed. DDL statements are not validated by this support. The application registration table and object registration table are still created according to values that are entered in fields 5 through 8 on panel DSNTIPZ.

**CONTROL ALL APPLICATIONS field (RGFDEDPL subsystem parameter)**

The RGFDEDPL subsystem parameter specifies whether the Db2 subsystem is to be completely controlled by a set of closed applications that are identified in the application registration table.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	NO
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFDEDPL

Closed applications require their Db2 objects to be managed solely through the plans or packages of the closed application that is registered in the application registration table.

### **REQUIRE FULL NAMES field (RGFFULLQ subsystem parameter)**

The RGFFULLQ subsystem parameter specifies whether registered objects are to require fully qualified names.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFFULLQ

### **UNREGISTERED DDL DEFAULT field (RGFDEFLT subsystem parameter)**

The RGFDEFLT subsystem parameter specifies the action that is to be taken for DDL statements that name unregistered objects.

<b>Acceptable values:</b>	ACCEPT, REJECT, APPL
<b>Default:</b>	ACCEPT
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFDEFLT

#### **ACCEPT**

DDL statements that name unregistered objects are accepted.

#### **REJECT**

DDL statements that name unregistered objects are rejected.

#### **APPL**

DDL statements that name unregistered objects are rejected if the current application is not registered.

### **ART/ORT ESCAPE CHARACTER field (RGFESCP subsystem parameter)**

The RGFESCP subsystem parameter specifies the escape character that is to be used in the application registration table (ART) or object registration table (ORT).

<b>Acceptable values:</b>	any non-alphanumeric character
<b>Default:</b>	none
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFESCP

Sets of names in the ART and ORT can be represented by patterns that use the underscore (\_) and percent sign (%) characters in the same way as in an SQL LIKE predicate.

If you enter a character in this field, it can be used in those patterns in the same way as an escape character is used in an SQL LIKE predicate.

#### **Related tasks**

[Installing data definition control support \(Managing Security\)](#)

### **REGISTRATION OWNER field (RGFCOLID subsystem parameter)**

The RGFCOLID subsystem parameter specifies the ID that is to own both the application registration table and the object registration table.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSNRGCOL
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFCOLID

### **REGISTRATION DATABASE field (RGFDBNAM subsystem parameter)**

The RGFDBNAM subsystem parameter specifies the name of the database that is to contain the registration tables that are used for data definition control support.

<b>Acceptable values:</b>	1–8 characters
<b>Default:</b>	DSNRGFDB
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFDBNAM

### **APPL REGISTRATION TABLE field (RGFNMPRT subsystem parameter)**

The RGFNMPRT subsystem parameter specifies the name that is to be used for the application registration table.

<b>Acceptable values:</b>	1–17 characters
<b>Default:</b>	DSN_REGISTER_APPL
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFNMPRT

### **OBJT REGISTRATION TABLE field (RGFNMORT subsystem parameter)**

The RGFNMORT subsystem parameter specifies the name that is to be used for the object registration table (ORT).

<b>Acceptable values:</b>	1–17 characters
<b>Default:</b>	DSN_REGISTER_OBJT
<b>Update:</b>	option 50 on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM RGFNMORT

## DSNTIPY: Job editing panel

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

```
DSNTIPY          INSTALL DB2 - JOB EDITING
====>

Enter data below:
 1 REMOTE LOCATION  ===>          Remote location for sample
                                   distributed applications

Enter job card information for install jobs:
 2 ===>
 3 ===>
 4 ===>
 5 ===>
 6 ===>
 7 ===>
Enter job card information for sample jobs:
 8 ===>
 9 ===>
10 ===>
11 ===>
12 ===>
13 ===>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 72. Job editing panel: DSNTIPY

### Related concepts

[The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

### Related tasks

[Generating tailored Db2 12 installation, migration, or function level activation jobs](#)

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

### Related reference

[JCLLIB statement \(MVS JCL Reference\)](#)

[JES2 Control Statements \(MVS JCL Reference\)](#)

[JES3 Control Statements \(MVS JCL Reference\)](#)

## REMOTE LOCATION field

The REMOTE LOCATION field specifies the location of another Db2 subsystem. The remote subsystem is used by the COBOL preparation sample job DSNTEJ3C, the DDF remote location update sample job DSNTEJ6, and the stored procedures sample jobs. The stored procedures sample jobs that require a remote location name are DSNTEJ6D, DSNTEJ6P, DSNTEJ6S, DSNTEJ6T, DSNTEJ61, and DSNTEJ62.

<b>Acceptable values:</b>	1–16 characters
<b>Default:</b>	none
<b>Update:</b>	See <a href="#">“Updating subsystem parameter and application default values”</a> on page 373
<b>DSNZPxxx:</b>	none

The location name must begin with a letter and must not contain special characters. A remote location name is accepted only if you have also entered a Db2 location name for the Db2 LOCATION NAME field on installation panel DSNTIPR.

### Related reference

#### DB2 LOCATION NAME field

The DB2 LOCATION NAME setting specifies a unique name that requesters use to connect to this Db2 subsystem or Db2 data sharing group. The setting must be unique within the network, but must be the same on all members within a Db2 data sharing group.

## Job card information fields

The installation job card information fields specify the job statements for all the installation jobs. The sample application job card information fields specify the job statements for all the sample application jobs.

<b>Acceptable values:</b>	see below
<b>Default:</b>	none
<b>Update:</b>	option 51 on panel DSNTIPB
<b>DSNZPxxx:</b>	none

Specify the job name in one of two ways:

- If the job name is *member*, the job name for each job is the same as its member name.
- If the job name is any value other than *member*, the name is truncated to seven characters, and one character is added to the end of the name to identify the run order for that job.

An example of job card information follows:

```
3====> //MEMBER JOB,
4====> // MSGLEVEL=(1,1),MSGCLASS=H,REGION=2M,CLASS=A
5====> // USER=SYSADM,PASSWORD=SYSADM,NOTIFY=SYSADM
6====>
```

If you use the installation SYSOPR authority for Db2 installation or migration, you must set the USER parameter in the job card for installation jobs to a primary or secondary authorization ID with the installation SYSOPR authority.

## DSNTIPC: CLIST calculations panel 1

The DSNTIPC panel displays the messages that the installation CLIST issues to indicate calculated storage sizes.

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

Space estimates from these messages do not account for cylinder rounding. Base requirements can be 10% - 20% higher than the message indicates, depending on the disk type.

The messages show that most of the needed virtual storage is in extended private storage and storage above the 2 GB bar, including the buffer pool, the EDM pool, and almost all of the code and working storage.

For most fields on this panel, you have a choice between accepting or overriding the calculated value:

During the tailoring session, message DSNT438I is issued to the tailoring terminal. This message, which shows the IRLM LOCK MAXIMUM SPACE and MAX STORAGE FOR LOCKS values, is always issued if you accept the default values.

This message indicates that the IRLM could request a total amount of space that is larger than the available space, causing an abend. The message is based on the following variables:

- The maximum number of data or row locks per user that is specified on installation panel DSNTIPJ (LOCKS PER USER)
- The number of users that is specified on installation panel DSNTIPE for MAX USERS and MAX REMOTE ACTIVE

The CLIST assumes that the private region that is available for IRLM locks is estimated as 60,000 KB.

```

DSNTIPC          INSTALL DB2 - CLIST CALCULATIONS - PANEL 1
====>

You can update the DSMAX, EDM STATEMENT CACHE (if CACHE DYNAMIC is YES),
EDM DBD CACHE, EDM SKELETON POOL, SORT POOL, and RID POOL sizes if necessary.
                                Calculated  Override
1  DSMAX - MAXIMUM OPEN DATA SETS =      20000                (1-200000)
2  DSNT485I EDM STATEMENT CACHE   =    122880 K                K
3  DSNT485I EDM DBD CACHE         =     40960 K                K
4  DSNT485I EDM SKELETON POOL SIZE =     81920 K                K
5  DSNT485I BUFFER POOL SIZE      =         109 M
6  DSNT485I SORT POOL SIZE        =     10000 K                K
7  DSNT485I MAX IN-MEMORY SORT SIZE =      1000 K                K
8  DSNT485I RID POOL SIZE         =   1000000 K                K
9  DSNT485I DATA SET STORAGE SIZE =     26000 K
10 DSNT485I CODE STORAGE SIZE     =     38200 K
11 DSNT485I WORKING STORAGE SIZE  =     45024 K
12 DSNT486I TOTAL MAIN STORAGE    =         689 M
13 DSNT487I TOTAL STORAGE BELOW 16M =      1036 K WITH SWA ABOVE 16M LINE
14 DSNT438I IRLM LOCK MAXIMUM SPACE =      2160 M, AVAILABLE = 2160 M

PRESS:  ENTER to continue  RETURN to exit  HELP for more information

```

Figure 73. CLIST calculations panel 1: DSNTIPC

### Related tasks

[Calculating storage requirements with the installation CLIST](#)

By providing information about the sizes of your Db2 environment, you can use the installation CLIST to calculate certain storage requirements for your Db2 subsystem.

[Estimating the storage needed for locks \(Db2 Performance\)](#)

### Related reference

[DSNTIPD: Sizes panel 1](#)

The entries on the DSNTIPD panel establish the size of the Db2 catalog, directory, and log data sets.

Entries on the DSNTIPD panel also define the amount of storage that can be used for storing large object (LOB) values.

### Related information

[DSNT438I \(Db2 Messages\)](#)

## DSMAX field (DSMAX subsystem parameter)

The DSMAX subsystem parameter specifies the maximum number data sets that can be open at one time.

<b>Acceptable values:</b>	1–200000
<b>Default:</b>	based on calculations
<b>Update:</b>	enter a value in the override column
<b>DSNZPxxx:</b>	DSN6SPRM DSMAX

### 32768 - 200000

If the number of open data sets reaches the specified value, new OPEN statements begin to fail with reason code 00C20113. However, when the number of open data sets approaches the specified value,



Db2 also begins closing a number of open data sets, starting with the least recently used CLOSE YES data sets.

### 1-32767

For any value in this range, if the number of open data sets reaches 32,768, new OPEN statements begin to fail with reason code 00C20113. However, when the number of open data sets approaches 32,768, Db2 also begins closing a number of open data sets, starting with the least recently used CLOSE YES data sets.

Although the maximum number of data sets is 200000, the practical limit can be much lower, depending on the available 31-bit storage below the bar in the database services address space (*ssnmDBM1*). The value that you enter can substantially influence the performance of Db2.

Complete one of the following actions to improve the performance of opening and closing data sets:

- Update the ALLOCxx parmlib member to set the SYSTEM MEMDSENQMGMT value to ENABLE.
- Issue system command SETALLOC SYSTEM,MEMDSENQMGMT=ENABLE.

It is best to update the ALLOCxx parmlib because the change remains effective across IPLs. If the SETALLOC command is used to enable SYSTEM MEMDSENQMGMT, you must restart Db2.

When a secondary index is nonpartitioned, the number of data sets that are required for the index is dependent on the total required space to contain the tree structure and on the size limit of each data set. When a secondary index is data-partitioned, the number of data sets that are required for the index is equal to the number of data partitions in the table space that contains the table. Unless a small piece size is used for nonpartitioned secondary indexes, partitioning generally results in an increase in the number of data sets for the index.

If the partitioning of secondary indexes causes the number of data sets to increase or decrease appreciably, you can modify the value of DSMAX. The default value for DSMAX is calculated by Db2 and does not count partitioned objects. Choose the value for DSMAX according to the impact that partitioning secondary indexes has on the number of data sets for those objects. Db2 defers closing and deallocating table spaces or indexes until the number of open data sets reaches the operating system limit or approaches the value that is specified by DSMAX.

#### Related concepts

[How Db2 determines the initial value of DSMAX \(Db2 Performance\)](#)

#### Related tasks

[Managing the opening and closing of data sets \(Db2 Performance\)](#)

[Evaluating the value of DSMAX \(Db2 Performance\)](#)

#### Related information

[00C20113 \(Db2 Codes\)](#)

## EDM STATEMENT CACHE field (EDMSTMTC subsystem parameter)

The EDMSTMTC subsystem parameter determines the upper limit on the amount of EDM pool storage that is used for cached dynamic statements. The EDMSTMTC value is in kilobytes. This storage pool is located above the 2 GB bar.

<b>Acceptable values:</b>	5000–4194304
<b>Default:</b>	113386 <a href="#">“1” on page 359</a>
<b>Update:</b>	press ENTER on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM EDMSTMTC

#### Notes:

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

You can use the SET SYSPARM command to change this value. If the amount of storage that is used exceeds the value of EDMSTMTC, Db2 reduces the amount of storage to the value of EDMSTMTC.

Storage for cached dynamic statements is allocated as it is needed. When the EDMSTMTC value is reached, and new statements are added to the dynamic statement cache, statements that are already in the cache and are not currently in use are removed, to keep the storage that is in use below the EDMSTMTC value.

### Related tasks

[Calculating storage requirements with the installation CLIST](#)

By providing information about the sizes of your Db2 environment, you can use the installation CLIST to calculate certain storage requirements for your Db2 subsystem.

[Calculating EDM pool sizes](#)

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

### Related reference

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

## EDM DBD CACHE field (EDMDBDC subsystem parameter)

The EDMDBDC subsystem parameter determines the maximum amount of EDM storage, in kilobytes, that is to be used for DBDs. This storage pool is located above the 2 GB bar.

<b>Acceptable values:</b>	5000–4194304
<b>Default:</b>	23400 <a href="#">“1” on page 360</a>
<b>Update:</b>	press ENTER on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM EDMDBDC

### Notes:

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

You can use the SET SYSPARM command to change this value. If the amount of storage that is used exceeds the value of EDMDBDC, the Db2 database manager reduces the amount of storage to the value of EDMDBDC.

### Related tasks

[Calculating EDM pool sizes](#)

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

**Related reference**

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

**EDM SKELETON POOL SIZE field (EDM\_SKELETON\_POOL subsystem parameter)**

The EDM\_SKELETON\_POOL subsystem parameter determines the maximum size in kilobytes, that is to be used for the EDM skeleton pool. This storage is located above the 2 GB bar.

<b>Acceptable values:</b>	5120–4194304
<b>Default:</b>	51200 <a href="#">“1” on page 361</a>
<b>Update:</b>	press ENTER on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM EDM_SKELETON_POOL

**Notes:**

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST” on page 6](#)

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

You can change this value by using the SET SYSPARM command. If the amount of storage that is used exceeds the value of EDM\_SKELETON\_POOL, Db2 reduces the amount of storage to the value of EDM\_SKELETON\_POOL.

**Related tasks**

[Calculating EDM pool sizes](#)

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects. These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

**Related reference**

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

**BUFFER POOL SIZE field**

The value of the BUFFER POOL SIZE field is the buffer pool size that is calculated by the CLIST.

<b>Acceptable values:</b>	none
<b>Default:</b>	101 M <a href="#">“1” on page 361</a>
<b>Update:</b>	run CLIST again
<b>DSNZPxxx:</b>	none

**Notes:**

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

This field is protected and cannot be changed during update processing. If you want to change the size of a buffer pool, you must use the command ALTER BUFFERPOOL.

#### Related reference

[-ALTER BUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

## SORT POOL SIZE field (SRTPOOL subsystem parameter)

The SRTPOOL subsystem parameter specifies the amount of storage in kilobytes that is needed for the sort pool.

<b>Acceptable values:</b>	240–128000
<b>Default:</b>	10000 <a href="#">“1” on page 362</a>
<b>Update:</b>	press Enter twice on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM SRTPOOL

#### Notes:

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

If you decide to change this field, estimate the sort pool value by using the following formula:

$$32000 * (16 + \text{sort key length} + \text{sort data length})$$

#### Related tasks

[Improving the performance of sort processing \(Db2 Performance\)](#)

[Choosing buffer pool sizes \(Db2 Performance\)](#)

## MAX IN-MEMORY SORT SIZE field (MAXSORT\_IN\_MEMORY subsystem parameter)

The MAXSORT\_IN\_MEMORY subsystem parameter specifies the maximum allocation of storage in kilobytes for a query that contains an ORDER BY clause, a GROUP BY clause, or both. The storage is allocated only during the processing of the query. Increasing the value in this field can improve performance of such queries but might require large amounts of real storage when several such queries run simultaneously.

<b>Acceptable values:</b>	1000 to the value specified in SORT POOL SIZE, whichever is larger
<b>Default:</b>	1000 <a href="#">“1” on page 363</a>

<b>Update:</b>	press Enter twice on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAXSORT_IN_MEMORY

**Notes:**

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

**Related reference**

[SORT POOL SIZE field \(SRTPOOL subsystem parameter\)](#)

The SRTPOOL subsystem parameter specifies the amount of storage in kilobytes that is needed for the sort pool.

**RID POOL SIZE field (MAXRBLK subsystem parameter)**

The MAXRBLK subsystem parameter specifies the amount of storage in kilobytes that is needed for the RID pool.

<b>Acceptable values:</b>	0, 128–2000000
<b>Default:</b>	1000000 <a href="#">“1” on page 363</a>
<b>Update:</b>	press Enter twice on panel DSNTIPB
<b>DSNZPxxx:</b>	DSN6SPRM MAXRBLK

**Notes:**

1. Db2 calculates the value when you run the installation CLIST with INSTALL for INSTALL TYPE on panel DSNTIPA1, based on values that you specify on panel DSNTIPD.

When you run the installation CLIST with MIGRATE for INSTALL TYPE on panel DSNTIPA1, Db2 12 uses the Db2 11 field value. For more information, see [“Calculating storage requirements with the installation CLIST”](#) on page 6

The **Override** column of panel DSNTIPC controls whether Db2 uses the calculated value:

- To accept the calculated value, ensure that the **Override** column contains no value.
- To override the calculated value, specify a value in the **Override** column.

If you decide to change this field, estimate the storage that is required for the RID pool by using the following formula:

$$\text{Number of concurrent RID processing activities} * \text{average number of RIDs} * 2 * 8 \text{ (bytes per RID)}$$

Choosing 0 disables the use of the RID pool. In this case, Db2 does not use access paths or join methods that depend on RID pool storage.

This storage is located above the 2 GB bar.

**Related tasks**

[Managing RID pool size \(Db2 Performance\)](#)

### Related reference

MAX TEMP RID field (MAXTEMPS\_RID subsystem parameter)

The MAXTEMPS\_RID subsystem parameter determines the maximum amount of temporary storage in the work file database that a single RID list can use at a time.

### CLIST messages fields for panel DSNTIPC

The CLIST messages fields display storage sizes that are calculated by the CLIST. These fields are protected and cannot be changed by the user.

<b>Acceptable values:</b>	none
<b>Default:</b>	none
<b>Update:</b>	run CLIST again
<b>DSNZPxxx:</b>	none

### Storage messages fields

The storage messages fields indicate the results of the calculations described on panel DSNTIPC. These fields are protected and cannot be changed by a user.

<b>Acceptable values:</b>	none
<b>Default:</b>	none
<b>Update:</b>	run CLIST again
<b>DSNZPxxx:</b>	none

## DSNTIPC1: CLIST calculations panel 2

The DSNTIPC1 panel displays CLIST messages that indicate a variety of calculations. This panel is displayed only when you run the CLIST in INSTALL mode.

```
DSNTIPC1          INSTALL DB2 - CLIST CALCULATIONS - PANEL 2
===> _

1 DSNT488I DATA SETS CREATED BY THE INSTALLATION CLIST
   WILL REQUIRE AT LEAST 4000 KILOBYTES (83 TRACKS)
2 DSNT488I OTHER NON-VSAM DATA SETS CREATED BY INSTALLATION AND IVP JOBS
   WILL REQUIRE AT LEAST 4000 KILOBYTES (83 TRACKS)
3 DSNT488I DATA SETS FOR STORAGE GROUPS CREATED BY INSTALLATION AND IVP JOBS
   WILL REQUIRE AT LEAST 44360 KILOBYTES (924 TRACKS)
4 DSNT488I VSAM DATA SETS CREATED FOR THE DB2 CATALOG AND DIRECTORY
   WILL REQUIRE AT LEAST 323972 KILOBYTES (6749 TRACKS)
5 DSNT488I VSAM DATA SETS CREATED FOR DB2 CATALOG AND DIRECTORY INDEXES
   WILL REQUIRE AT LEAST 250764 KILOBYTES (5224 TRACKS)
6 DSNT488I VSAM DATA SETS CREATED FOR ACTIVE LOG 1 AND BSDS 2
   WILL REQUIRE AT LEAST 103980 KILOBYTES (2166 TRACKS)
7 DSNT488I VSAM DATA SETS CREATED FOR ACTIVE LOG 2 AND BSDS 1
   WILL REQUIRE AT LEAST 103980 KILOBYTES (2166 TRACKS)
-----
8 DSNT488I DATA SETS CREATED FOR DB2 INSTALLATION AND VERIFICATION
   WILL REQUIRE AT LEAST 835056 KILOBYTES (17397 TRACKS)

PRESS:  ENTER to continue   RETURN to exit   HELP for more information
```

Figure 74. CLIST calculations panel 2: DSNTIPC1

## CLIST messages fields for panel DSNTIPC1

The messages in these fields might be used depending on how many unique volume names were supplied on installation panel DSNTIPA2. These fields are protected and cannot be changed.

<b>Acceptable values:</b>	none
<b>Default:</b>	none
<b>Update:</b>	run CLIST again
<b>DSNZPxxx:</b>	none

## CLIST panel session output

---

As output, the CLIST produces several data sets and a data set member.

Specifically, the CLIST panel session produces the following data sets and members:

***prefix*.SDSNSAMP**

The existing data set contains a new member, if specified, that contains the resulting parameter values from the session.

***prefix*.NEW.SDSNSAMP**

A new data set that contains the edited JCL with the values that you entered on the panels.

***prefix*.NEW.SDSNTEMP**

A new data set that contains tailored CLISTs for input to job DSNTIJVC, which is run during installation or migration.

The following data sets are also created if you specify the use of z/OSMF for installation or migration. (If you run the CLIST to generate artifacts for provisioning Db2 subsystems, only these data sets are generated. For more information, see [“Creating artifacts for provisioning Db2 by running the installation CLIST”](#) on page 371).

***prefix*.NEW.SDSNMFSA**

A new data set that contains the z/OSMF workflow definitions

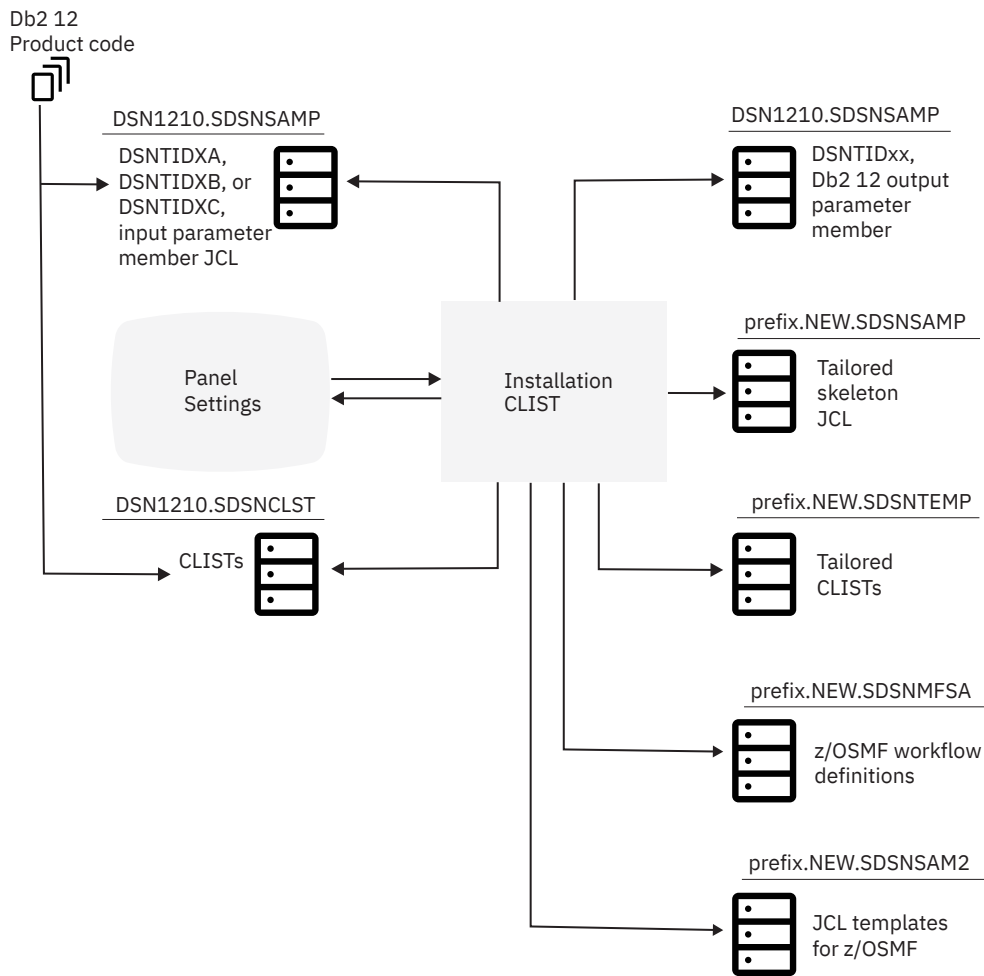
***prefix*.NEW.SDSNSAM2**

A new data set that contains the JCL templates for z/OSMF

You can use job DSNTIJVC to combine the CLISTs into a common data set.

Db2 performs validity checking of the values that you enter during the panel sessions. If you receive an ISPF error message, press the HELP key for additional information.

The following figure illustrates by examples how the CLIST works during installation.



The following figure illustrates how the CLIST works during migration.





Jobs	Jobs	Jobs	Jobs	Jobs
DSNADMZW	DSNTEJ2E	DSNTEJ7	DSNTESH	DSNTIJRT
DSNTEJ0	DSNTEJ2F	DSNTEJ71	DSNTIJCA	DSNTIJRV
DSNTEJ1	DSNTEJ2H	DSNTEJ73	DSNTIJCB	DSNTIJRW
DSNTEJ1L	DSNTEJ2P	DSNTEJ75	DSNTIJDE	DSNTIJSG
DSNTEJ1P	DSNTEJ3C	DSNTEJ76	DSNTIJEX	DSNTIJTC
DSNTEJ1S	DSNTEJ3M	DSNTEJ77	DSNTIJIC	DSNTIJTM
DSNTEJ1T	DSNTEJ3P	DSNTEJ78	DSNTIJID	DSNTIJUZ
DSNTEJ1U	DSNTEJ4C	DSNTESA	DSNTIJIE	DSNTIJUA
DSNTEJ2A	DSNTEJ4P	DSNTESC	DSNTIJIF	DSNTIJUM
DSNTEJ2C	DSNTEJ67	DSNTESD	DSNTIJIN	DSNTIJUL
DSNTEJ2D	DSNTEJ6U	DSNTESE	DSNTIJMV	DSNTIJVC

If you specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ2U, DSNTEJ6O, DSNTEJ6R, DSNTEJ6V, and DSNTEJ6W.

If you activated DDF and specified a value in the REMOTE LOCATION field of panel DSNTIPY, the CLIST also tailors job DSNTEJ6.

If you activated DDF and specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ6Z, DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66.

If you activated DDF, specified a value in the REMOTE LOCATION field of panel DSNTIPY, and specified a default WLM environment name in the WLM ENVIRONMENT field of installation panel DSNTIPX, the CLIST edits DSNTEJ6D, DSNTEJ6P, DSNTEJ6S, DSNTEJ6T, DSNTEJ61, and DSNTEJ62.

If CICS is selected, the CLIST edits DSNTEJ5A, DSNTEJ5C, and DSNTEJ5P.

If you are using data sharing, the CLIST edits DSNTIJGF and DSNTIJFT.

The installation CLIST tailors the DSNHC, DSNH, DSNU, and DSNEMC01 CLISTs for installation.

When SYSINSTL is specified on panel DSNTIPG, the installation CLIST performs the following additional changes:

- All BIND statements specify the package owner as entered in the INSTALL PKG OWNER field.
- All dynamic SQL streams begin with the SET CURRENT SQLID 'SYSINSTL' statement.
- All CREATE TABLE and CREATE INDEX statements are stripped of the creator name and preceded (as a group) by a SET CURRENT SCHEMA statement to indicate the creator.
- The following notice is added to the prolog of each affected job. Itemized statements are individually included or excluded, as applicable:

```

/** NOTICE: This job must be run by a user ID with DB2 Installation
/**          System Operator authority because it has been customized
/**          as follows for performing DB2 installation or migration
/**          without DB2 System Administrator authority:
/**          - Dynamic SQL processing is performed with the current
/**            SQL ID set to SYSINSTL
/**          - DSNTIAD runs with PLAN(DSNTIAIN)
/**          - Creator IDs are removed from create statements for
/**            tables and indexes
/**          - SET CURRENT SCHEMA statements are added to provide
/**            the necessary creator IDs for these objects
/**

```

Additional tailoring is performed on job DSNTIJTM for SYSINSTL. For example, the job prepares and binds DSNTIAD, a program for processing executable dynamic SQL statements. It uses a version-specific naming convention of DSNTIA $nn$ , where  $nn$  is 12, 11, or 10, to bind a package and plan for DSNTIAD. When configured for SYSINSTL, job DSNTIJTM binds an additional DSNTIAD package and plan, both named DSNTIAIN. No access is granted on the DSNTIAIN package or plan.

## Jobs for migrating to Db2 12

If you are migrating to Db2 12, the CLIST tailors the following jobs:

Jobs	Jobs	Jobs
DSNADMZW	DSNTIJCX	DSNTIJRT
DSNTEJxx <sup>1</sup> on page 369	DSNTIJEX	DSNTIJRV
DSNTESA <sup>1</sup> on page 369	DSNTIJFV	DSNTIJRW
DSNTESC <sup>1</sup> on page 369	DSNTIJIC	DSNTIJSG
DSNTESD <sup>1</sup> on page 369	DSNTIJIN	DSNTIJTC
DSNTESE <sup>1</sup> on page 369	DSNTIJMV	DSNTIJTM
DSNTESH <sup>1</sup> on page 369	DSNTIJNH	DSNTIJUZ
DSNTIJCI	DSNTIJPD	DSNTIJUA
DSNTIJCB		DSNTIJUM
DSNTIJCV		DSNTIJUL
		DSNTIJVC

The installation CLIST tailors the DSNHC, DSNH, DSNU, and DSNEMC01 CLISTs for migration.

### Important:

1. The DSNTEJxx jobs are for use only after new function is activated.

## Jobs for activating Db2 12 function levels

If you are activating function level 500 or higher, the CLIST tailors jobs DSNTIJTC and DSNTIJAF. Depending on the target function level, the CLIST might also tailor job DSNTIJA1 if the current function level is V12R1M100.

## Jobs for updating a Db2 12 installation

If you are updating, the CLIST tailors any of the following jobs based on the values that you update:

DSNTIJUZ  
DSNTIJUA  
DSNTIJUM  
DSNTIJUL

### Related information

[DSNT489I \(Db2 Messages\)](#)

## Tailoring the installation jobs

You might want to tailor several items in the installation jobs, such as data set names or library names, to meet the requirements of your site.

### About this task

The changes that are described below are general; that is, they apply to all the jobs processed by the CLIST.

Before you begin editing, you might want to print or back up the jobs. You can print the JCL for these jobs by using IEBPTPCH or any other print facility that is available at your site.

### Procedure

To prepare the installation jobs for your site:

1. Tailor the jobs to suit the needs of your site.

You should edit the jobs to conform to any unique requirements that you might have. Also, you might want to make any minor JCL changes for items that the ISPF panels did not handle.

2. If you specified volume serial numbers on installation panel DSNTIPA3, examine the volume serial numbers that are used in the various jobs.

The volume serial number fields of installation panel DSNTIPA3 enable you to specify up to five volumes for the data sets that are defined during installation or migration. If you want to use more than five volumes, specify them before continuing with installation or migration tasks.

If you specified volume serial numbers on installation panel DSNTIPA3, the DSNTINST CLIST spreads the data sets across these volumes. If you use explicit volume serials instead of SMS, adding more volumes to provide more separation of data sets can help improve system performance and recoverability. Many of the log data sets are large and easy to place on separate volumes. The CLIST produces a series of messages that estimate space for each type of data set that is created during the installation or migration process.

3. Edit the DSNH CLIST if needed.

The DSNH CLIST allows you to precompile, compile, prelink-edit, link-edit, bind, and run an application by issuing a single command. You might need to edit the DSNH CLIST to change values for some of the entries. Verify that DSNH keyword parameters for all Db2-supported compilers that your applications use.

- a) Check the default data set names for the licensed programs that you have installed.

These defaults are in the parameter definitions at the beginning of each program. If the names and prefixes are not correct for your site, change them.

- b) Check default library names.

If the names and prefixes are not correct for your site, change them. Ensure that the data sets exist and are cataloged for BLIB, CLIB, LLIB, and PLIB. When the DSNH CLIST runs, it creates DBRMLIB and LOAD data sets if they do not already exist. The DBRMLIB data set is created only if the DBRMLIB(DEFAULT) is set. The following are the default library names:

- BLIB(NONE)
- DBRMLIB(DEFAULT) - The DBRM library must be allocated exclusively when the precompiler writes to it.

**Recommendation:** Set up a temporary library, or one per user, rather than trying to share libraries.

- CLIB(NONE)
- LLIB(NONE)
- LOAD(RUNLIB.LOAD) - This library is allocated exclusively when it is being written.

**Recommendation:** Set up a temporary library, or one per user, rather than trying to share libraries.

- PLIB(NONE)

- c) Check default processor options.

If you prefer other default options, change them. The default processor options follow:

- CICSOPT(NONE)
- LOPTION(NONE)
- COPTION(NONE)
- PASS(DEFAULT)

- d) Check print and work space defaults.

If the default allocation sizes are not acceptable for your site, change them. The print and work space defaults follow:

- PSECSPAC(20)
- PSPACE(20)

- WORKUNIT(DEFAULT)
- WSECSPAC(20)
- WSPACE(20)

4. Examine the data set names for other products.

Many data set names for other products appear in the jobs. These names are shown in the table on panel DSNTIPU. Change them if they are different at your site.

### Related reference

[DSNTIPA3: Data parameters panel](#)

The entries on the DSNTIPA3 panel define the storage management preferences for the storage groups and data sets that are created during installation and migration.

[DSNTIPU: Host language data set names panel 1](#)

The entries on panels DSNTIPU, DSNTIPU1, and DSNTIPW establish data set names for other product libraries. The values that you enter on these panels are edited into sample and installation jobs. If you do not have the product, accept the default values. Jobs for those particular products should not be run.

[DSNH command procedure \(TSO CLIST\) \(Db2 Commands\)](#)

## Creating artifacts for provisioning Db2 by running the installation CLIST

You can run the installation CLIST to create artifacts for provisioning Db2 subsystems and data sharing groups.

### Before you begin

Apply the PTFs for the following APARs:

- PH19751
- PH09857

Configure z/OSMF Version 2.3 with APAR PH09130 or higher.

### About this task

With IBM Cloud<sup>®</sup> Provisioning and Management for z/OS, you can create services for provisioning Db2 for z/OS subsystems and data sharing groups. Certain artifacts are needed for creating the services, and one way to create the artifacts is by running the Db2 installation CLIST.

For an overview of process for creating services, see [IBM Cloud Provisioning and Management for z/OS](#).

**Tip:** The CLIST approach supports more customization for the provisioned Db2 subsystem. However, you can also create artifacts for provisioning Db2 in a standard configuration by downloading and customizing the sample Db2 software services template. For more information, see [“Creating services for provisioning Db2 for z/OS \(DBaaS\)” on page 947](#).

### Procedure

To create artifacts for services that provision Db2 subsystems by running the installation CLIST, complete the following steps:

1. Generate the required JCL jobs and input files. You can run the Db2 installation CLIST in interactive mode to generate the files. See steps 1- 6 in [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode” on page 52](#).
2. In the CLIST panel session, specify on panel DSNTIPA1 that you are preparing artifacts for provisioning Db2 subsystems by specifying the following options:
  - USE Z/OSMF WORKFLOW ==> YES

- INSTALL TYPE ===> PROVISION
- DATA SHARING ===> NO or YES
- Set the PREFIX and SUFFIX fields to the values that you used when you allocated the Db2 libraries by using job DSNALLOC.
- INPUT MEMBER NAME ===> DSNTIDXC The default name is DSNTIDXC. You can also specify your own name. However, do not specify DSNTIDXA or DSNTIDXB.
- OUTPUT MEMBER NAME ===> Specify a name other than DSNTIDSA, DSNTIDVB, DSNTIDXA, DSNTIDXB, or DSNTIDXC.

When you specify these options, the **PROVISIONING PREFERENCES AND DATA SET NAMES** panel DSNTIPAP is shown next in the CLIST panel session.

3. On panel DSNTIPAP, specify the preferences for provisioning Db2 subsystems.  
For details, see [“DSNTIPAP: Provision DB2 - provisioning preferences and data set names”](#) on page 70.
4. On panel DSNTIPG, specify the user ID that executes the provisioning workflow in the PROVISION EXEC ID field.  
This value populates the AGEXECID input variable in DSNTIVIN.
5. Complete the rest of the CLIST panel session, as described in [“The Db2 installation CLIST panel session”](#) on page 56.

The CLIST panel session is modified for the provisioning process. For example, certain z/OSMF workflow steps are force selected or deselected, some fields are preset with values generated in the provisioning process and protected, and all fields that are associated with z/OSMF variables are force selected.

## Results

The CLIST generates the following output data sets. The generated z/OSMF artifacts are always written to the zFS path specified in the field PATH FOR Z/OSMF ARTIFACTS on panel DSNTIPM1. This field is mandatory for provisioning.

### ***prefix*.NEW.SDSNMFSA**

A new data set that contains the z/OSMF variable input and workflow definitions, and the following new z/OSMF files that provide services for the provisioned Db2 subsystems. Except where otherwise noted, all files are common for provisioning both Db2 data sharing and stand-alone Db2 subsystems.

#### **ACTIONS (DSNACTION)**

Describes the actions that can be performed on a provisioned Db2 system.

#### **DSNDDDF**

Describes the workflow for displaying DDF information of a provisioned Db2 system.

#### **DSNDGRPD**

Describes the workflow for displaying group information of a provisioned Db2 system.

#### **DSNDEPRV (standalone only)**

Describes the workflow for deprovisioning a standalone Db2 subsystem.

#### **DSNDEPRC (data sharing only)**

Describes the workflow for deprovisioning a provisioned Db2 data sharing group.

#### **DSNOPENT**

Describes entities for the workflow to enable optional features, such as JDBC, ODBC, Db2 REST Services, on a provisioned Db2 system. This file contains the steps that are shared/included in the DSNOPTFT, DSNTIWIN and DSNTIWPC workflow definition files.

#### **DSNOPTFT**

Describes the workflow to enable optional features, such as JDBC, ODBC, Db2 REST Services, on a provisioned Db2 system.

#### **DSNSTART**

Describes the workflow to start provisioned Db2 systems.

**DSNTSTOP**

Describes the workflow to stop provisioned Db2 systems.

**DSNTIVIN**

Describes the variables that define a standalone Db2 subsystem or the first member of a Db2 data sharing group. This is the file that the CLIST normally generates when installing the second or subsequent members of a data sharing group.

**DSNTIVIA (data sharing only)**

An input variable file that describes the variables that defines additional Db2 data sharing members after the first. This is the file that the CLIST normally generates when installing the second or subsequent members of a data sharing group.

**DSNTIWIN (standalone only)**

Describes the workflow to provision a standalone Db2 subsystem.

**DSNTIWPC (data sharing only)**

Describes the workflow to provision a data sharing group with at least 2 members. This workflow contains steps for installing an  $n$ -way data sharing system, where  $n > 1$ . It is basically a merge of DSNTIWIN (the workflow for provisioning a stand-alone Db2 subsystem) and DSTIWIA (the workflow for installing the second or subsequent member of a data sharing group).

***prefix*.NEW.SDSNSAM2**

The JCL templates for z/OSMF.

The CLIST generates the following mandatory steps for provisioning stand-alone Db2 subsystems. The new steps s00INSSS to s00DEFSS are added at the beginning, and stepJTU is added at the end before dsnOpEnt, of the DSNTIWIN workflow, which is the workflow generated when installing a stand-alone Db2 subsystem.

1. s00INSSS — Instantiate and validate the Db2 subsystem identifier *ssid*. (DSNTRSSN)
2. s00SETVP — Set values for variables whose values are generated at provisioning time. (setVariable)
3. s00PORT — Acquire Db2 ports from the network resource pool. (REST API)
4. s00PORTRES — Acquire a TCP/IP port that is used to process requests for two-phase commit resynchronization.
5. s00ALIAS — Define aliases for the instantiated Db2 system. (DSNTIJDA)
6. s00PPROC — Allocate private procedure library for the instantiated Db2 system. (DSNTIJPP)
7. s00SETVL — Assign values to BSDS, active and archive logs variables. (setVariable)
8. s00IRLM — Assign IRLM SSID based on the instantiated Db2 system SSID. (Inline shell-JCL)
9. s00DEFSS — Define the instantiated Db2 and IRLM systems to z/OS. (DSNTIJMD)
10. stepJTU -- Create and grant usage of Db2 storage group for user data (DSNTIJTU)

**Related tasks**

[Creating services for provisioning Db2 for z/OS \(DBaaS\)](#)

You can use the sample Db2 software services template to create a service that rapidly provisions multiple Db2 for z/OS subsystems or data sharing groups, and deprovision them later.

## Updating subsystem parameter and application default values

---

You can dynamically update the value of some subsystem parameters while Db2 is running. For other subsystem parameters, you must stop and restart Db2 to change the values.

**Before you begin**

**Important:** Changes to subsystem parameters affect the entire subsystem. Carefully evaluate and plan for the impact of any changes to these values. Also, follow any advice that is included in the documentation for the parameter.

Determine whether you will update the subsystem parameters values online or offline. Not all parameters can be updated online. To check whether a particular subsystem parameter can be updated online, see [“Directory of subsystem parameters, panel fields, and application default values”](#) on page 406.

To change the following security-related subsystem parameters, the privilege set of the process must include installation SYSADM authority or SECADM authority:

- [AUTH\\_COMPATIBILITY](#)
- [AUTHCACH](#)
- [BINDNV](#)
- [DBACRVW](#)
- [DISALLOW\\_SSARAUTH](#)
- [EXTSEC](#)
- [ENCRYPTION\\_KEYLABEL](#)
- [MFA\\_AUTHCACHE\\_UNUSED\\_TIME](#)
- [REVOKE\\_DEP\\_PRIVILEGES](#)
- [SECADM1](#)
- [SECADM1\\_TYPE](#)
- [SECADM2](#)
- [SECADM2\\_TYPE](#)
- [SEPARATE\\_SECURITY](#)
- [SYSADM](#)
- [SYSADM2](#)
- [SYSOPR1](#)
- [SYSOPR2](#)
- [TCPALVER](#)

## About this task

**Restriction:** The following procedure cannot be used for some subsystem parameters that define characteristics of the Db2 catalog, directory, BSDS, and logs or for the DDF subsystem parameter. For these parameters, follow the instructions in [“Updating subsystem parameters that cannot be updated by using DSNTIPB”](#) on page 379.

## Procedure

**GUI** To update subsystem parameter values, complete the following steps:

1. Invoke the CLIST:
  - a) Check that your TSO logon region size is sufficient.  
Usually 2 MB is enough.
  - b) Invoke ISPF.
  - c) Select option 6 on the main ISPF panel.
  - d) Run the Db2 installation CLIST by entering one of the following specifications:

- EXEC '*prefix*.SDSNCLST(DSNTINST)'
- If you want to receive the messages that trace the progress of the CLIST, use the following specification:

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CONTROL(LIST)'
```



- If you want to use the CLIST but skip the verification of output data sets, use the following specification:

```
EXEC 'prefix.SDSNCLST(DSNTINST)' 'CHKOUTDS(NO)'
```

By default, the CLIST verifies the following information when installation panels DSNTIPT and DSNTIPA1 are displayed:

- The CLIST verifies that the TEMP CLIST LIBRARY and SAMPLE LIBRARY that you specify on DSNTIPT can be allocated and opened for output.
- If you specify a value for OUTPUT MEMBER NAME on DSNTIPA1, the CLIST verifies that the data set *prefix.SDSNSAMP* can be allocated and opened for output.

The CLIST reads a set of default values and displays them on the panels. The values can be the original default values that are supplied by IBM, values that you specified in a previous run of the CLIST, or values that were generated when you ran the DSNTXAZP tool.

2. On installation panel DSNTIPA1, in field 1 INSTALL TYPE, specify UPDATE and press Enter.
3. On installation panel DSNTIPT, in field 2 SAMPLE LIBRARY, specify the output SDSNSAMP data set and press Enter.  
Panel DSNTIPB is displayed.
4. On panel DSNTIPB, specify the installation panel that you want to update and press Enter.
5. Change the values on the panel as needed, and press Enter to return to panel DSNTIPB.
6. Optional: Repeat steps 4–5 until you specify all of the updates that you want.
7. On panel DSNTIPB, press ENTER again to complete the update process.

Depending on the values that you change, this process produces any of the following jobs with the new values: DSNTIJUZ, DSNTIJUA, and DSNTIJUL.

The default SQL processing level (SQLLEVEL) for the precompiler/coprocessor can be changed anytime, such as after activating a higher Db2 function level. For more information, see [“PRECOMPILED SQL LEVEL field \(SQLLEVEL DECP value\)” on page 90](#).

**Important:** With the exception of SQLLEVEL, updates to application defaults parameters are generally not recommended. In general, you must restart Db2 for changes to any application programming parameters to take effect.

For updates, the Db2 installation CLIST generates job DSNTIJUL only for changes to any of the following parameters:

- [“DB2 LOCATION NAME field” on page 302](#)
- [“DB2 VTAM LUNAME field” on page 302](#)
- [“DB2 GENERIC LUNAME field” on page 304](#)
- [“DB2 VTAM PASSWORD field” on page 303](#)
- [“DB2 TCP/IP IPNAME field” on page 304](#)
- [“TCP/IP PORT field” on page 305](#)
- [“SECURE PORT field” on page 306](#)
- [“RESYNC PORT field” on page 306](#)

This process produces a new DSNTIJUZ job with the new values; it also saves these values in the file that is specified in the OUTPUT MEMBER NAME field on panel DSNTIPA1. For more information, see [“OUTPUT MEMBER NAME field” on page 68](#).

8. Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix.SDSNEXIT* and *prefix.SDSNLOAD*, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module” on page 403.](#)

9. If you modified application programming default values, run the generated DSNTIJUA job. Job DSNTIJUA defines the Db2 data-only application defaults module.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix.SDSNEXIT* and *prefix.SDSNLOAD*, you can move the SYSLMOD output to that library.

For more information, see [“Job DSNTIJUA: define data-only application defaults module” on page 404.](#)

10. If the CLIST generated the DSNTIJUL job when you completed step [“7” on page 375](#), run job DSNTIJUL.

Job DSNTIJUL runs the Db2 change log inventory (DSNJU003) to update DDF-related information in the BSDS. For more information, see [“Job DSNTIJUL: update DDF related BSDS information” on page 405.](#)

11. Use one of the following methods to tell the subsystem to begin using the new load module:


- For online updates, issue the SET SYSPARM command:

```
SET SYSPARM LOAD(load-module-name)
```

where *load-module-name* is the same as the OUTPUT MEMBER NAME field value that was specified on the DSNTIPA1 panel.

If you want to specify the load module name that is used during Db2 startup, you can issue the following command:

```
SET SYSPARM RELOAD
```

- For offline updates, stop and restart Db2 with the new subsystem parameter load module. 

### Related tasks

[Optimizing subsystem parameters \(Db2 Performance\)](#)

[Optimizing subsystem parameters for SQL statements by using profile tables \(Db2 Performance\)](#)

### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

[DSNTIPT: Db2 data set names panel](#)

The entries on the DSNTIPT panel establish data set names for the libraries that are used in the Db2 CLIST and JCL that Db2 provides. The values that you enter on this panel are edited into all pertinent sample and installation jobs.

[DSNTIPB: Update selection menu panel](#)

During the update process, you can use the DSNTIPB panel to access all the installation panels and view the values that you specified during installation or migration.

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

## Directory of subsystem parameters, panel fields, and application default values

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## DSNTIPB: Update selection menu panel

During the update process, you can use the DSNTIPB panel to access all the installation panels and view the values that you specified during installation or migration.

Parameters that you can update are highlighted. Panels containing fields that cannot be updated are marked with an asterisk.

```
-----
DSNTIPB          UPDATE DB2 - SELECTION MENU
====>
Select one of the following:
----- Use the UP/DOWN keys to access all options -----
                                     More:  +
 1 CATALOG AND DIRECTORY                26 RESOURCE LIMIT FACILITY
 2 DATA PARAMETERS PANEL                27 APPLICATION PROGRAMMING DEFAULTS 1
 3 BSDS AND ACTIVE LOGS                  28 APPLICATION PROGRAMMING DEFAULTS 2
 4 DEFINE GROUP OR MEMBER                29 PERFORMANCE & OPTIMIZATION PANEL 1
 5 ACTIVATE A FUNCTION LEVEL             30 PERFORMANCE & OPTIMIZATION PANEL 2
 6 INSTALLATION PREFERENCES *            31 QUERY ACCELERATOR PREFERENCES
 7 INSTALLATION PREFERENCES PANEL 2 *    32 IRLM PANEL 1
 8 SYSTEM RESOURCE DATA SET NAMES       33 IRLM PANEL 2
 9 DB2 DATA SET NAMES                   34 DB2 UTILITIES PARAMETERS
10 HOST LANGUAGE DATA SET NAMES 1 *     35 DB2 UTILITIES PARAMETERS PANEL 2
11 HOST LANGUAGE DATA SET NAMES 2 *     36 DB2 UTILITIES PARAMETERS PANEL 3
12 OTHER DATA SET NAMES *              37 DB2 UTILITIES PARAMETERS PANEL 4
13 SIZES                                  38 PROTECTION
14 SQL OBJECT DEFAULTS PANEL 1           39 PROTECTION PANEL 2
15 SQL OBJECT DEFAULTS PANEL 2           40 MVS PARMLIB UPDATES
16 SQL OBJECT DEFAULTS PANEL 3           41 ACTIVE LOG DATA SET PARAMETERS
17 WORK FILE DATABASE                   42 ACTIVE LOG CHECKPOINT PARAMETERS
19 WORK FILE DATABASE PANEL 2           43 ARCHIVE LOG DATA SET PARAMETERS
19 THREAD MANAGEMENT PANEL 1            44 DATABASES TO START AUTOMATICALLY
20 THREAD MANAGEMENT PANEL 2            45 DISTRIBUTED DATA FACILITY
21 BUFFER POOL SIZES PANEL 1            46 DISTRIBUTED DATA FACILITY PANEL 2
22 BUFFER POOL SIZES PANEL 2            47 ROUTINE PARAMETERS
23 TRACING AND CHECKPOINT PARAMETERS     48 DB2 JAVA PROPERTIES
24 OPERATOR FUNCTIONS                   49 PARAMETERS FOR DB2-SUPPLIED ROUTINES
25 DEFAULT STARTUP MODULES              50 DATA DEFINITION CONTROL SUPPORT
                                         51 JOB EDITING
-----
* None of the fields on these panels can be updated.
PRESS: ENTER to continue  UP/DOWN to scroll  RETURN to EXIT
-----
```

Figure 75. Individual update menu panel: DSNTIPB

## Panels to update field

From the DSNTIPB panel, you can select a family of parameters to display and update. Some parameters cannot be updated.

On the command line, enter a number to select the family of parameters that you want to update. These numbers correspond to the installation panels in the following table.

Table 36. Panel names and identifiers, by DSNTIPB panel to update field option values

Option Value	Panel Name and Identifier
1	<a href="#">“DSNTIPA2: Db2 catalog and directory panel” on page 73</a>
2	<a href="#">“DSNTIPA3: Data parameters panel” on page 78</a>

Table 36. Panel names and identifiers, by DSNTIPB panel to update field option values (continued)

Option Value	Panel Name and Identifier
3	<a href="#">“DSNTIPA4: BSDS and active log panel” on page 83</a>
4	<a href="#">“DSNTIPK: Define group or member panel ” on page 91</a>
5	<a href="#">“DSNTIP00: Activate a function level panel” on page 86</a>
6	<a href="#">“DSNTIPG: Installation preferences panel” on page 95</a>
7	<a href="#">“DSNTIPG1: Installation preferences panel 2” on page 101</a>
8	<a href="#">“DSNTIPH: System resource data set names panel” on page 107</a>
9	<a href="#">“ DSNTIPT: Db2 data set names panel ” on page 111</a>
10	<a href="#">“ DSNTIPU: Host language data set names panel 1 ” on page 117</a>
11	<a href="#">“DSNTIPU1: Host language data set names panel 2” on page 126</a>
12	<a href="#">“ DSNTIPW: Other data set names panel ” on page 129</a>
13	<a href="#">“DSNTIPD: Sizes panel 1 ” on page 133</a>
14	<a href="#">“DSNTIP7: SQL OBJECT DEFAULTS PANEL 1 ” on page 137</a>
15	<a href="#">“DSNTIP71: SQL OBJECT DEFAULTS PANEL 2” on page 139</a>
16	<a href="#">“DSNTIP72: SQL OBJECT DEFAULTS PANEL 3 ” on page 145</a>
17	<a href="#">“DSNTIP9: Work file database panel” on page 149</a>
18	<a href="#">“DSNTIP91: Work file database panel 2” on page 155</a>
19	<a href="#">“DSNTIPE: Thread management panel 1 ” on page 159</a>
20	<a href="#">“DSNTIPE1: Thread management panel 2” on page 164</a>
21	<a href="#">“DSNTIP1: Buffer pool sizes panel 1 ” on page 167</a>
22	<a href="#">“DSNTIP2: Buffer pool sizes panel 2” on page 168</a>
23	<a href="#">“ DSNTIPN: Tracing parameters panel” on page 172</a>
24	<a href="#">“DSNTIPO: Operator functions panel” on page 183</a>
25	<a href="#">“DSNTIPO3: Default startup modules panel” on page 187</a>
26	<a href="#">“DSNTIPO4: Resource Limit Facility panel” on page 189</a>
27	<a href="#">“DSNTIPF: Application programming defaults panel 1” on page 193</a>
28	<a href="#">“DSNTIP4: Application programming defaults panel 2 ” on page 202</a>
29	<a href="#">“DSNTIP8: Performance and optimization panel” on page 209</a>
30	<a href="#">“DSNTIP81: Performance and optimization panel 2” on page 218</a>
31	<a href="#">“DSNTIP82: Query accelerator preferences panel” on page 223</a>
32	<a href="#">“DSNTIPI: IRLM panel 1 ” on page 231</a>
33	<a href="#">“DSNTIPJ: IRLM panel 2” on page 236</a>
34	<a href="#">“ DSNTIP6: Db2 utilities parameters panel 1 ” on page 243</a>
35	<a href="#">“DSNTIP61: Db2 utilities parameters panel 2 ” on page 249</a>
36	<a href="#">“DSNTIP62: Db2 utilities parameters panel 3 ” on page 254</a>

Table 36. Panel names and identifiers, by DSNTIPB panel to update field option values (continued)

Option Value	Panel Name and Identifier
37	<a href="#">“DSNTIP63: Db2 utilities parameters panel 4 ” on page 258</a>
38	<a href="#">“DSNTIPP: Protection panel ” on page 264</a>
39	<a href="#">“DSNTIPP1: Protection panel 2 ” on page 268</a>
40	<a href="#">“DSNTIPM: MVS PARMLIB updates panel” on page 277</a>
41	<a href="#">“DSNTIPL: Active log data set parameters” on page 281</a>
42	<a href="#">“DSNTIPL1: Checkpoint parameters” on page 284</a>
43	<a href="#">“DSNTIPA: Archive log data set parameters panel” on page 292</a>
44	<a href="#">“DSNTIPS: Databases and spaces to start automatically panel” on page 299</a>
45	<a href="#">“DSNTIPR: Distributed data facility panel 1 ” on page 301</a>
46	<a href="#">“DSNTIP5: Distributed data facility panel 2” on page 307</a>
47	<a href="#">“DSNTIPX: Routine parameters panel” on page 314</a>
48	<a href="#">“DSNTIPX1: Db2 Java properties panel” on page 320</a>
49	<a href="#">“DSNTIPR1: Parameters for Db2-supplied routines panel” on page 327</a>
50	<a href="#">“DSNTIPZ: Data definition control support panel” on page 352</a>
51	<a href="#">“DSNTIPY: Job editing panel” on page 356</a>

When the panel that you select is displayed, enter the new parameters. Press the Enter key to return to the update selection menu panel. Make another panel selection, or press Enter again to process. Press End to leave the update selection menu panel and return to the main panel (DSNTIPA1).

#### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

## Updating subsystem parameters that cannot be updated by using DSNTIPB

Some subsystem parameters cannot be updated by using panel DSNTIPB.

### Procedure

To update subsystem parameters that you cannot update by using panel DSNTIPB:

- To update the CATALOG ALIAS and DEFINE CATALOG fields on DSNTIPA2, see [Changing the high-level qualifier for Db2 data sets \(Db2 Administration Guide\)](#).  
The CATALOG ALIAS parameter establishes an alias name for your ICF catalog. This name is also used as the high-level qualifier name for Db2 VSAM data sets. The DEFINE CATALOG parameter controls the creation of the ICF catalog.
- To update Db2 to use the distributed data facility (DDF), follow these steps:
  - a) Go through the normal update process of running the CLIST to add DDF information to installation panel DSNTIPR.
  - b) Run job DSNTIJUZ.
  - c) Populate the CDB.
  - d) Stop and start Db2.
  - e) Bind or rebind these plans:

**GUI**

```

BIND PLAN(DSNESPCS) PKLIST(*.DSNESPCS.DSNESM68)
ISOLATION(CS) ACTION(REPLACE)

BIND PLAN(DSNESPRR) PKLIST(*.DSNESPRR.DSNESM68)
ISOLATION(RR) ACTION(REPLACE)

BIND PLAN(DSNESPUR) PKLIST(*.DSNESPUR.DSNESM68)
ISOLATION(UR) ACTION(REPLACE)

```

**GUI**

- f) Start DDF if you specified COMMAND instead of AUTO as the DDF STARTUP OPTION on installation panel DSNTIPR.
- To change the data set sizes for the Db2 catalog and directory:
    - a) Copy the catalog and directory table spaces.
    - b) Stop the table spaces or their databases.
    - c) Delete the data sets and redefine them, using VSAM commands.
    - d) Use the RECOVER utility to recover the catalog and directory to the new data sets.
    - e) Start the table spaces or databases again.
  - To change from single to dual logging for the active log:
    - a) Define the second copy of the log with a VSAM IDCAMS DEFINE statement.  
Refer to job DSNTIJIN, which contains the DEFINE statement for the first copy of the log.
    - b) Run the DSNJU003 (change log inventory) utility.  
This adds the second copy of the log to the BSDS.
    - c) Update the NUMBER OF COPIES field on installation panel DSNTIPH in the range 1–2.
    - d) Run job DSNTIJUZ to make the change effective.
  - To move or expand the bootstrap data sets, use the IMPORT and EXPORT commands of access method services.  
The bootstrap data sets are accessed using JCL when Db2 starts.
  - To access the log data sets, you can use stand-alone access macros or the IMPORT and EXPORT commands of access method service.
  - To change the number of data sets for active logs, you can use the DSNJU003 utility.

**Related tasks**

[Populating the communications database for use with TCP/IP](#)

If you plan to use Db2 only as a server, you do not need to populate the CDB.

[Defining a new integrated catalog alias \(Db2 Administration Guide\)](#)

**Related reference**

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

**Related information**

[Recovering from active log failures \(Db2 Administration Guide\)](#)

## Subsystem parameters that are not on installation panels

Some subsystem parameters are defined by job DSNTIJUZ and are not associated with fields on any installation panels.

**Related tasks**

[Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL](#)

For Db2 12 installation, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdccp*), define the offline message generator CCSID (DSNHMCID), and update DDF related information in the BSDS.

**Related reference**

[Defining data classes \(DFSMS Implementing System-Managed Storage: Optimizing Tape Usage\)](#)

**ACCELMODEL in macro DSN6SPRM**

Specifies whether to enable the modeling of query workloads for evaluating the potential savings for both accumulated elapsed time and processor time if the plan is run on an accelerator server.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	YES
<b>DSNZPxxx:</b>	DSN6SPRM ACCELMODEL
<b>Security parameter:</b>	No

**YES**

Enables modeling of query acceleration. The YES value applies only when the following requirements are also met:

- The value of the QUERY ACCELERATION subsystem parameter value is NONE, ENABLE, ENABLE WITH FAILBACK or ELIGIBLE.
- The CURRENT GET\_ACCEL\_ARCHIVE special register value is NO.
- The GET\_ACCEL\_ARCHIVE subsystem parameter value is NO

If other values are specified, Db2 tries to accelerate queries instead of doing accelerator modeling.

Only queries that Db2 deems eligible to run on an accelerator server are included in the accelerator-related fields of accounting trace IFCID 3.

**NO**

Disables modeling of query acceleration.

**Related tasks**

[Determining whether queries can benefit from acceleration \(Db2 Performance\)](#)

**Related reference**

[CURRENT QUERY ACCEL field \(QUERY\\_ACCELERATION subsystem parameter\)](#)

The QUERY\_ACCELERATION subsystem parameter determines the default value that is to be used for the CURRENT QUERY ACCELERATION special register.

[CURRENT GET\\_ACCEL\\_ARCHIVE special register \(Db2 SQL\)](#)

[GET ACCEL ARCHIVE field \(GET\\_ACCEL\\_ARCHIVE subsystem parameter\)](#)

The GET\_ACCEL\_ARCHIVE subsystem parameter determines the default value that is to be used for the CURRENT GET\_ACCEL\_ARCHIVE special register.

**ALLOW\_UPD\_DEL\_INS\_WITH\_UR in macro DSN6SPRM**

The ALLOW\_UPD\_DEL\_INS\_WITH\_UR subsystem parameter specifies whether Db2 allows UPDATE, DELETE, or INSERT statements to be prepared with the *isolation-clause* attribute WITH UR.

The WITH UR *isolation-clause* is not allowed for UPDATE, INSERT, and DELETE statements. However, Db2 inadvertently allowed these statements to be prepared with the WITH UR *isolation-clause* attribute.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Online changeable:</b>	Yes

<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	DSN6SPRM ALLOW_UPD_DEL_INS_WITH_UR

**NO**

Db2 disallows UPDATE, DELETE, or INSERT statements to be prepared with the *isolation-clause* attribute WITH UR. NO is the default value.

**YES**

Db2 allows UPDATE, DELETE, or INSERT statements to be prepared with the *isolation-clause* attribute WITH UR.

For best results, identify any applications that prepare UPDATE, DELETE, or INSERT statements with the WITH UR attribute and correct them. When such usage is encountered during execution of a PREPARE statement and ALLOW\_UPD\_DEL\_INS\_WITH\_UR is set to YES, Db2 writes an incompatibility trace record, IFCID 376 with the function code 13 in QW0376FN. Use these trace records to identify and correct applications that are using the illegal SQL syntax.

**Related tasks**

[Specifying isolation levels in SQL statements \(Db2 Performance\)](#)

**Related reference**

[isolation-clause \(Db2 SQL\)](#)

**AUTH\_COMPATIBILITY in macro DSN6SPRM**

The AUTH\_COMPATIBILITY parameter specifies whether Db2 uses the authorization rules of the Db2 12 release, or previous Db2 releases, for specific Db2 operations.

This subsystem parameter is new in Db2 12. It can be set at any function level, but it takes effect only after activation of function level 500 or higher.

<b>Acceptable values:</b>	blank, SELECT_FOR_UNLOAD
<b>Default:</b>	blank
<b>DSNZPxxx:</b>	DSN6SPRM AUTH_COMPATIBILITY
<b>Security parameter:</b>	<a href="#">Yes</a>

**Null (blank)**

Indicates that AUTH\_COMPATIBILITY has no effect and that there is no authorization check override, and Db2 uses the authorization rules of the Db2 12 release. That is, Db2 uses the following authorization rules:

- SELECT authority for the unloaded table is not sufficient for running the UNLOAD utility. To temporarily revert this rule, use SELECT\_FOR\_UNLOAD.

**SELECT\_FOR\_UNLOAD**

When this value is specified, the UNLOAD utility checks if the user has the SELECT or UNLOAD privilege on the target table. If this value is not specified, the UNLOAD utility checks if the user has the UNLOAD privilege on the target table. For more information, see "Changes to the authorization check of the UNLOAD utility" in [Security release incompatibilities \(Db2 for z/OS What's New?\)](#).

**Related concepts**

[UNLOAD privilege for the UNLOAD utility \(Db2 for z/OS What's New?\)](#)

**Related reference**

[UNLOAD \(Db2 Utilities\)](#)

[Explicit table and view privileges \(Managing Security\)](#)



## CDDS\_MODE in macro DSN6LOGP

The CDDS\_MODE subsystem parameter specifies how a member of a Db2 data sharing group participates in a GDPS® Continuous Availability with zero data loss (GDPS Continuous Availability with zero data loss) environment.

<b>Acceptable values:</b>	NONE, SOURCE, PROXY
<b>Default:</b>	NONE
<b>Data sharing scope:</b>	A setting of SOURCE or PROXY is valid only in a data sharing environment. All members of the data sharing group must have the same setting.
<b>Online changeable:</b>	No
<b>DSNZPxxx:</b>	DSN6LOGP.CDDS_MODE

### NONE

The Db2 subsystem or data sharing group does not participate in a GDPS Continuous Availability with zero data loss environment. The subsystem or data sharing group member supports only replication of its own log. The data set that the CDDS\_PREFIX parameter specifies can be defined locally but is not used.

### SOURCE

The data sharing group that contains the member that is being installed is the source group in an implementation of the GDPS Continuous Availability with zero data loss solution. The source data sharing group supports replication of the logs and log data sets of its members by another data sharing group, which is the proxy group in the implementation of the GDPS Continuous Availability with zero data loss solution. The proxy group performs replication of tables in the source data sharing group that are enabled for changed data capture.

The source group must contain a key-sequenced data set with the name that is specified by the CDDS\_PREFIX subsystem parameter. That data set is the compression dictionary data set (CDDS). When IFI READS calls are made to the proxy group to retrieve compressed log records, Db2 uses the CDDS to decompress the log records.

The location of the source group must be defined in the communications database of the proxy group.

### PROXY

The data sharing group that contains the member that is being installed supports only replication of log data sets for the source data sharing group in an implementation of the GDPS Continuous Availability with zero data loss solution.

The location of the proxy group must be defined in the communications database of the source group.

### Related tasks

[Populating the communications database for use with TCP/IP](#)

If you plan to use Db2 only as a server, you do not need to populate the CDB.

[Upgrading a Db2 11 GDPS Continuous Availability with zero data loss environment to a Db2 12 environment \(Db2 Administration Guide\)](#)

### Related reference

[CDDS\\_PREFIX in macro DSN6LOGP](#)

The CDDS\_PREFIX subsystem parameter specifies the prefix for the name of the data set that contains dictionaries that Db2 uses to decompress compressed log records when a proxy data sharing group in an implementation of the GDPS Continuous Availability with zero data loss (GDPS Continuous Availability with zero data loss) solution captures the log records on behalf of a source data sharing group. The data set is known as the *compression dictionary data set* (CDDS).

## CDDS\_PREFIX in macro DSN6LOGP

The CDDS\_PREFIX subsystem parameter specifies the prefix for the name of the data set that contains dictionaries that Db2 uses to decompress compressed log records when a proxy data sharing group in an implementation of the GDPS Continuous Availability with zero data loss (GDPS Continuous Availability with zero data loss) solution captures the log records on behalf of a source data sharing group. The data set is known as the *compression dictionary data set* (CDDS).

<b>Acceptable values:</b>	1–39 bytes that form a valid z/OS data set name prefix
<b>Default:</b>	DSNCAT
<b>Data sharing scope:</b>	All members of the data sharing group must have the same setting.
<b>Online changeable:</b>	No
<b>DSNZPxxx:</b>	DSN6LOGP.CDDS_PREFIX

The data set name is formed by appending the string '.CDDS' to the value of CDDS\_PREFIX.

This subsystem parameter is used only if the Db2 data sharing group that contains a member that is being installed is part of an implementation of the GDPS Continuous Availability with zero data loss solution.

If CDDS\_MODE is set to SOURCE or PROXY, the CDDS must be defined at the source data sharing group and mirrored through peer-to-peer remote copy (PPRC) at the proxy data sharing group.

### Related tasks

[Modifying Db2 for the GDPS Continuous Availability with zero data loss solution \(Db2 Administration Guide\)](#)

[Upgrading a Db2 11 GDPS Continuous Availability with zero data loss environment to a Db2 12 environment \(Db2 Administration Guide\)](#)

### Related reference

[CDDS\\_MODE in macro DSN6LOGP](#)

The CDDS\_MODE subsystem parameter specifies how a member of a Db2 data sharing group participates in a GDPS® Continuous Availability with zero data loss (GDPS Continuous Availability with zero data loss) environment.

## COMCRIT in macro DSN6SPRM

Sets the Common Criteria environment, which requires that tables that you create (other than created global temporary tables, declared global temporary tables, and auxiliary tables) must have multilevel security.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM COMCRIT
<b>Security parameter:</b>	<a href="#">Security-related</a>

### NO

The behavior of Db2 is unchanged.

### YES

All tables that you create (other than created global temporary tables, declared global temporary tables, and auxiliary tables) must have multilevel security. If the AS SECURITY LABEL clause is missing from a table, an error occurs and the table is not created. Setting COMCRIT to YES causes some of the current installation and migration processes to fail. A value of YES also limits the number of concurrent sessions that are allowed for a primary authorization ID if a RACF custom field is defined for that ID.

You can change the value of COMCRIT online by using SET SYSPARM and you can audit COMCRIT with IFCID 0106.

### Related concepts

[Security labels \(Managing Security\)](#)

[Introduction to the Common Criteria \(Common Criteria\)](#)

[Procedural requirements for the Common Criteria \(Labeled Security only\) \(Common Criteria\)](#)

## CHECK\_FASTREPLICATION in macro DSN6SPRM

The CHECK\_FASTREPLICATION parameter specifies the type of replication that DSS COPY uses to copy objects to shadow data sets when it is invoked by the Db2 CHECK utilities. The CHECK utilities can stipulate fast replication as NONE, PREFERRED, or REQUIRED.

**Deprecated subsystem parameter:** Non-default settings for CHECK\_FASTREPLICATION are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is likely to be removed eventually. For best results, use the default value REQUIRED.

<b>Acceptable values:</b>	PREFERRED, REQUIRED, NONE
<b>Default:</b>	REQUIRED
<b>DSNZPxxx:</b>	DSN6SPRM.CHECK_FASTREPLICATION

### PREFERRED

The CHECK utilities direct DSS COPY to use fast replication only if FlashCopy support is available.

### REQUIRED

The CHECK utilities force DSS COPY to use fast replication, ensuring that object copies occur as quickly as possible. This reduces the opportunity for resource contention and unavailability. This option causes CHECK utilities to fail if FlashCopy cannot be used.

### NONE

The CHECK utilities direct DSS COPY not to use fast replication.

### Related concepts

[Subsystem parameters for refining DFSMSdss COPY operation with utilities \(Db2 Utilities\)](#)

### Related tasks

[Checking data consistency with the CHECK utilities \(Managing Security\)](#)

## DDF\_COMPATIBILITY in macro DSN6FAC

Controls certain characteristics of a connection between a client application and a Db2 for z/OS data server.

**Deprecated subsystem parameter:** Non-default settings for DDF\_COMPATIBILITY are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value NULL.

Values can be specified in any combination and in any order. If more than one value is specified, the values must be separated by commas, and the entire set of values must be enclosed in parentheses.

You can specify the following values for DDF\_COMPATIBILITY:

### null

The DDF\_COMPATIBILITY parameter has no effect and Db2 12 new function behavior is used for all applications.

### RESET\_IFCID402

Specifies that Db2 uses a new behavior and resets IFCID 0402 counters to 0 if the associated warning or error threshold for the associated profile is changed when a START PROFILE command issued.

### DISABLE\_IMPCAST\_NJV

Specifies that the Db2 for z/OS disables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types, when the application is a non-Java client application that uses an IBM Data Server client or driver that is at Version 10.5 or earlier.

If DISABLE\_IMPCAST\_NJV is not specified, Db2 enables implicit casting of input host variables from numeric data types to string data types, or from string data types to numeric data types.

### IDNTFY\_V12\_PRIOR\_VER

Specifies that a Db2 12 server at any function level identifies itself to all remote clients as a Db2 11 server in new-function mode.

Specify IDNTFY\_V12\_PRIOR\_VER as a temporary solution if an error occurs for a connection from a remote client or driver only because the server identifies itself to the client or driver as a Db2 12 server.

### IGNORE\_TZ

Specifies that the time zone information is ignored during boundary error checking for TIMESTAMP WITH TIME ZONE input variables when the target data type is TIMESTAMP and the client driver is IBM Data Server Driver for JDBC and SQLJ.

IGNORE\_TZ is deprecated. IGNORE\_TZ is effective only if application compatibility is set to V10R1.

IGNORE\_TZ is not needed and has no effect if the client JDBC driver is at version 3.63 or 4.13, or later.

### SP\_PARMS\_NJV

Specifies that when a non-Java client application calls a Db2 for z/OS stored procedure, Db2 returns output argument values with data types that match the data types of the corresponding CALL statement arguments.

**Exception:** For stored procedure parameters with data types that were introduced in DB2 10 (XML, TIMESTAMP WITH TIMEZONE, or TIMESTAMP with precision greater than 6), the data types of output argument values do not match the data types of the corresponding CALL statement arguments. Instead, the data types of the output argument values match the data types of the corresponding parameters in the stored procedure definition.

If SP\_PARMS\_NJV is not specified, Db2 returns output parameter values with data types that match the data types of the parameters in the stored procedure definition.

SP\_PARMS\_NJV is deprecated. Db2 ignores this value if application compatibility is set to V11R1 or later.

### DISALLOW\_SEL\_INTO\_UNION in macro DSN6SPRM

Specifies whether to disallow a UNION or UNION ALL as the outermost from-clause of a SELECT INTO statement, which is invalid SQL syntax. Such statements were inadvertently allowed before Db2 12. However, in Db2 12 they are disallowed by default.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Online changeable:</b>	YES
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	DSN6SPRM DISALLOW_SEL_INTO_UNION

### YES

SELECT INTO statements with UNION or UNION ALL as the outermost from-clause are not supported. This setting enforces valid SQL syntax.

## NO

SELECT INTO statements with UNION or UNION ALL as the outermost from-clause are accepted. This setting tolerates invalid SQL syntax.

**Important:** In Db2 12, the default value of DISALLOW\_SEL\_INTO\_UNION changes from NO to YES.

DISALLOW\_SEL\_INTO\_UNION is also deprecated. Although it remains supported, support is likely to be removed eventually. Identify any packages that use UNION or UNION ALL in the from-clause of a SELECT INTO statement and correct them as necessary.

You can identify affected packages while DISALLOW\_SEL\_INTO\_UNION is set to NO by binding suspected packages into a dummy collection ID with EXPLAIN(ONLY) and monitoring IFCID 0376 records. Use the following procedure:

1. Issue the following SQL statement to generate a list of BIND commands.

```
SELECT 'BIND PACKAGE(DUMMYCOL) COPY(' ||  
      COLLID || '.' || NAME || ') ' ||  
      CASE WHEN(VERSION <> '')  
          THEN 'COPYVER(' || VERSION || ') '  
          ELSE '' END ||  
      'EXPLAIN(ONLY) '  
FROM SYSIBM.SYSPACKSTMT  
WHERE STATEMENT LIKE '%SELECT%INTO%UNION%';
```

The statement generates output similar to the following result:

```
BIND PACKAGE(DUMMYCOL) COPY(DSN_DEFAULT_COLLID_PLAY01.PLAY01) EXPLAIN(ONLY)
```

2. Copy the SELECT statement in a BIND job. If the result is longer than 72 characters, formatting is required.
3. Start and collect the IFCID 0376 trace.
4. Run the bind job that you created.
5. Stop the IFCID 0376 trace and analyze the output.

### Related concepts

[Application and SQL release incompatibilities \(Db2 for z/OS What's New?\)](#)

## DISALLOW\_SSARAUTH in macro DSN6SPRM

The DISALLOW\_SSARAUTH subsystem parameter determines whether user address spaces are blocked from setting a Db2 address space as a secondary address space.

**Important:** The DISALLOW\_SSARAUTH subsystem parameter takes effect only after the PTF for APAR PH01725 is applied. Do not set the value to YES before that APAR is applied, and you have verified that all of your tools support this parameter. Also, set the DISALLOW\_SSARAUTH subsystem parameter to YES in your test environment before you do so in production.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM DISALLOW_SSARAUTH
<b>Security parameter:</b>	<a href="#">Yes</a>

## NO

User address spaces are permitted to set a Db2 address space as a secondary address space.

## YES

User address spaces are blocked from setting a Db2 address space as a secondary address space.

## ENCRYPTION\_KEYLABEL field in macro DSN6SPRM

The ENCRYPTION\_KEYLABEL subsystem parameter specifies the name of a ICSF key label to provide to DFSMS when using z/OS DFSMS data set encryption support to define encrypted data sets for the Db2 catalog, directories, and archive logs.

[FL 502](#)

The setting is used to define encrypted data sets for the Db2 catalog, directory objects, user-defined indexes on the catalog, and archive logs only when the Db2 function level is V12R1M502 or higher.

<b>Acceptable values:</b>	blank, or a string of 1-64 bytes
<b>Default:</b>	blank
<b>Online changeable:</b>	Yes
<b>Data sharing scope</b>	Group
<b>DSNZPxxx:</b>	DSN6SPRM ENCRYPTION_KEYLABEL
<b>Security parameter:</b>	<a href="#">Yes</a>

### blank

Db2 does not provide the key label during allocation of the data sets associated with Db2 system objects, including Db2 catalog, directory objects, user-defined indexes on the catalog, and archive logs. The default value is blank.

### string of 1–64 bytes

A string of 1–64 bytes that identifies a protected data key or Db2 system objects in the ICSF key repository.

A change to this parameter does not take effect until you use the -SET SYSPARM command to bring it online. Even if you start or restart Db2 after changing the value, the change is not honored until you issue the -SET SYSPARM command.

In Db2 data sharing, all members must use the same setting. When changing the setting of ENCRYPTION\_KEYLABEL for a data sharing group, make the change on all members before running the -SET SYSPARM command on any member.

### Related concepts

[Encrypting your data with z/OS DFSMS data set encryption \(Managing Security\)](#)

### Related reference

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

## EN\_PJSJ in macro DSN6SPRM

Disables or enables *dynamic index ANDing*, which is also called *pair-wise join* processing, when star-join processing is enabled on Db2.

<b>Acceptable values:</b>	OFF, ON
<b>Default:</b>	OFF
<b>DSNZPxxx:</b>	DSN6SPRM EN_PJSJ
<b>Security parameter:</b>	No

### OFF

Dynamic index ANDing is disabled.

### ON

Dynamic index ANDing is enabled.

When dynamic index ANDing is enabled, it can improve the execution performance of qualified queries in the following cases:

- The fact table has indexes that provide matching for join predicates with some dimension tables having local filtering. The indexes on the fact table can be single-key indexes (but not limited).
- No multi-column index on the fact table is suitable for the existing star join method.

Setting EN\_PJSJ to ON might provide more flexibility with index design on star schema fact tables when multi-column index design makes effective exploitation the star join access method difficult.

### Related concepts

[Pair-wise join access \(JOIN\\_TYPE='P'\) \(Db2 Performance\)](#)

[Star join access \(JOIN\\_TYPE='S'\) \(Db2 Performance\)](#)

## HONOR\_KEEPDICTIONARY in macro DSN6SPRM

Specifies whether Db2 honors the LOAD and REORG parameter KEEPDICTIONARY when tables are converted between basic row format and reordered row format.

**Deprecated subsystem parameter:** Non-default settings for HONOR\_KEEPDICTIONARY are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is likely to be removed eventually. For best results, use the default value NO.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM HONOR_KEEPDICTIONARY
<b>Security parameter:</b>	No

### NO

Db2 ignores the LOAD and REORG parameter KEEPDICTIONARY when tables are converted between basic row format and reordered row format.

### YES

Db2 honors the LOAD and REORG parameter KEEPDICTIONARY.

## IMPDSIZE in macro DSN6SYSP

Specifies the default maximum data set size (DSSIZE) in gigabytes, for implicitly created table spaces for base tables.

<b>Acceptable values:</b>	1, 2, 4, 8, 16, 32, 64, 128, 256
<b>Default:</b>	64 for SAP, otherwise 4
<b>DSNZPxxx:</b>	DSN6SYSP IMPDSIZE
<b>Security parameter:</b>	No

### 1, 2, 4, 8, 16, 32, 64, 128, 256

Maximum data set size (DSSIZE) in gigabytes that Db2 uses for creating implicit base table spaces.

If you specify an SAP-specific input member (for example, DSNTIDXB) during installation or migration, the DSNTIJUZ job that is generated by the Db2 CLIST specifies IMPDSIZE=64.

### Related concepts

[Implicitly defined table spaces \(Db2 Administration Guide\)](#)

## IMPTKMOD in macro DSN6SYSP

Specifies the default TRACKMOD option for CREATE TABLESPACE statements and implicitly created tables spaces, which specifies that Db2 tracks changed pages of the base table space in the space map pages.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>DSNZPxxx:</b>	DSN6SYSP IMPTKMOD
<b>Security parameter:</b>	No

### YES

Db2 tracks changed pages of the base table space in the space map pages. This tracking is intended to improve the performance of incremental image copies. YES is the default value.

### NO

Db2 does not track changed pages in the space map pages. Db2 uses the LRSN value in each page to determine whether a page has been changed.

If you specify an SAP-specific input member (for example, DSNTIDXB) during installation or migration, the DSNTIJUZ job that is generated by the Db2 CLIST specifies IMPTKMOD=NO.

The setting is not used for LOB or XML table spaces.

### Related concepts

[Control of tracking updates to reduce coupling facility overhead \(Db2 Data Sharing Planning and Administration\)](#)

### Related reference

[CREATE TABLESPACE statement \(Db2 SQL\)](#)

## INLISTP in macro DSN6SPRM

Specifies the maximum number of elements in an IN-list for certain IN predicate optimizations to occur.

<b>Acceptable values:</b>	1–5000, 0
<b>Default:</b>	1000
<b>DSNZPxxx:</b>	DSN6SPRM INLISTP
<b>Security parameter:</b>	No

### 1–5000

Db2 optimizes for an IN predicate with the specified number of values, with the following optimizations:

- Pushes the IN predicate down from the parent query block into the materialized table expression.
- Moves a correlated IN predicate in a subquery that is generated by transitive closure up to the parent query block.

### 0

Disables optimization for in predicates.

### Related tasks

[Optimizing queries with IN predicates \(Db2 Performance\)](#)



## LA\_SINGLESEL\_ISOCS\_CDY subsystem parameter

LA\_SINGLESEL\_ISOCS\_CDY subsystem parameter specifies whether Db2 enables lock avoidance for singleton SELECT with ISOLATION(CS) CURRENTDATA (YES).

A *singleton SELECT* is a cursor SELECT that returns at most one row. Allowing lock avoidance can significantly lessen locking activity for such singleton SELECT statements. However, occasional false warning or error conditions are possible during certain small timing windows, such as SQLCODE -811 (more than one row returned) or SQLCODE +100 (no row found) .

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>Data sharing scope:</b>	Group
<b>DSNZPxxx:</b>	DSN6SPRM.LA_SINGLESEL_ISOCS_CDY

### NO

Db2 disables lock avoidance for singleton SELECT with ISOLATION(CS) and CURRENTDATA (YES). NO is the default setting.

### YES

Db2 enables lock avoidance for singleton SELECT with ISOLATION(CS) and CURRENTDATA (YES).

**Important:** With the YES setting, occasional false error or warning conditions are possible when lock avoidance is used for singleton SELECT statements that run with the ISOLATION(CS) and CURRENTDATA(YES) options, including SQLCODE -811 (more than one row returned) and +100 (no row found). Use this setting only if your environment can tolerate these situations.

### Related concepts

[Lock avoidance \(Db2 Performance\)](#)

[The ISOLATION \(CS\) option \(Db2 Performance\)](#)

### Related reference

[ISOLATION bind option \(Db2 Commands\)](#)

## LIKE\_BLANK\_INSIGNIFICANT in macro DSN6SPRM

LIKE\_BLANK\_INSIGNIFICANT subsystem parameter specifies whether blanks are significant when applying the LIKE predicate to a string. If set, the blank insignificant behavior applies.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM.LIKE_BLANK_INSIGNIFICANT

### NO

LIKE treats trailing blanks within fixed-length character strings as significant.

### YES

When the LIKE predicate is applied against fixed-length character column data, Db2 strips trailing blanks from the data before performing the comparison. If the data is all blank, Db2 reduces it to a single blank before performing the comparison.

### Related reference

[LIKE predicate \(Db2 SQL\)](#)

## MATERIALIZED\_NODET\_SQLTUDF in macro DSN6SPRM

Specifies whether the Db2 database manager materializes the result of a user-defined SQL table function that is defined as NOT DETERMINISTIC.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM MATERIALIZED_NODET_SQLTUDF
<b>Security parameter:</b>	No

### NO

Valid values are YES and NO. The Db2 database manager enables the merging of a user-defined SQL table function that is defined as NOT DETERMINISTIC.

### YES

The Db2 database manager materializes the result of a user-defined SQL table function that is defined as NOT DETERMINISTIC. Use this setting to avoid errors in processing SQL statements that reference those user-defined SQL table functions.

### Related reference

[CREATE FUNCTION statement \(SQL table function\) \(Db2 SQL\)](#)

## MAX\_CONCURRENT\_PKG\_OPS in macro DSN6SPRM

Specifies the maximum number of requests that can be processed simultaneously for automatic bind (also called "autobind") requests, remote bind or rebind requests, CREATE TRIGGER statements, or CREATE PROCEDURE statements.

<b>Acceptable values:</b>	1–20
<b>Default:</b>	10
<b>DSNZPxxx:</b>	DSN6SPRM MAX_CONCURRENT_PKG_OPS
<b>Security parameter:</b>	No

### 1–20

The maximum number of automatic bind requests, remote bind requests, remote rebind requests, CREATE TRIGGER statements, and CREATE PROCEDURE statements for packages that can be processed simultaneously.

### Related concepts

[Automatic rebinds \(Db2 Application programming and SQL\)](#)

### Related reference

[AUTO BIND field \(ABIND subsystem parameter\)](#)

The ABIND subsystem parameter specifies whether Db2 automatically rebinds packages and plans in certain situations at run time.

## MINDVSCL subsystem parameter in DSN6SPRM

The MINDVSCL subsystem parameter specifies the minimum scale for the result of a decimal division. If set to a value other than NONE, MINDVSCL overrides the DECDIV3 subsystem parameter.

<b>Acceptable values:</b>	NONE, 3, 6
<b>Default:</b>	NONE
<b>Online changeable:</b>	Yes
<b>DSNZPxxx:</b>	DSN6SPRM MINDVSCL

## NONE

No minimum divide scale. The DECDIV3 subsystem parameter influences the minimum divide scale for decimal division.

NONE is the default value.

## 3

The minimum divide scale is 3.

## 6

The minimum divide scale is 6.

### Related concepts

[Arithmetic operators in expressions \(Db2 SQL\)](#)

### Related reference

[MINIMUM DIVIDE SCALE field \(DECDIV3 subsystem parameter\)](#)

The DECDIV3 subsystem parameter determines whether to retain at least three digits to the right of the decimal point after any decimal division.

## MOVE\_TO\_ARCHIVE\_DEFAULT in macro DSN6SPRM

Specifies the default for the SYSIBMADM.MOVE\_TO\_ARCHIVE built-in global variable.

<b>Acceptable values:</b>	N, E, Y
<b>Default:</b>	N
<b>DSNZPxxx:</b>	DSN6SPRM MOVE_TO_ARCHIVE_DEFAULT
<b>Security parameter:</b>	No

## N

Specifies that a delete of a row in an archive-enabled table will not result in storing a copy of the deleted row in the associated archive table.

## E

Specifies that a delete of a row in an archive-enabled table will result in storing a copy of the deleted row in the associated archive table.

## Y

Specifies that a delete of a row in an archive-enabled table will result in storing a copy of the deleted row in the associated archive table. Additionally, when the global variable is set to 'Y', an insert or update operation that specifies the archive-enabled table as the target of the statement will result in an error.

### Related concepts

[Archive-enabled tables and archive tables \(Introduction to Db2 for z/OS\)](#)

### Related reference

[MOVE\\_TO\\_ARCHIVE \(Db2 SQL\)](#)

[GET\\_ARCHIVE \(Db2 SQL\)](#)

## NPGTHRSH in macro DSN6SPRM

Specifies that Db2 favors matching index access, through the index with the most matching columns, for tables or partitions that have fewer data pages than the specified value.

Db2 compares the NPGTHRSH value to the NPAGESF column in the SYSIBM.SYSTABLES catalog table for table-level comparisons and the NPAGES column of the SYSIBM.SYSTABSTATS table for partition-level comparisons.

**Tip:** For best results, set NPGTHRSH to a non-zero value so that Db2 uses matching index access for tables with default statistics. For more information, see [Favoring index access \(Db2 Performance\)](#).

<b>Acceptable values:</b>	0, 1–2147483647
<b>Default:</b>	1 <a href="#">“1” on page 394</a>
<b>DSNZPxxx:</b>	DSN6SPRM NPGTHRSH
<b>Security parameter:</b>	No

**Note:**

1. For SAP installations, the default value is 10.

**1–2147483647**

Db2 uses matching index access for queries that access a table or partition that contains fewer data pages than the specified NPGTHRSH value. Db2 uses the index with the most matching columns.

For default statistics (-1), Db2 12 uses the -1 values for the comparison.

**0**

Db2 always chooses the access path based on cost estimates, regardless of the number of data pages that statistics indicate for the table or partition.

**Related reference**

[SYSTABLES catalog table \(Db2 SQL\)](#)

[SYSTABSTATS catalog table \(Db2 SQL\)](#)

## OFFLOAD in macro DSN6LOGP

The OFFLOAD subsystem parameter specifies whether active log records are offloaded to archive logs.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>Online changeable:</b>	No
<b>DSNZPxxx:</b>	DSN6LOGP OFFLOAD
<b>Security parameter</b>	No

**YES**

Active log records are offloaded to archive logs. You should always choose this option for a production Db2 system, or for any Db2 subsystem where data recovery is essential.

**NO**

Active log records are not offloaded to archive logs.

**Related tasks**

[Managing the log \(Db2 Administration Guide\)](#)

## OPT1ROWBLOCKSORT in macro DSN6SPRM

Specifies whether Db2 explicitly blocks sort operations when the OPTIMIZE FOR 1 ROW clause is specified on a query.

**Deprecated subsystem parameter:** Non-default settings for OPT1ROWBLOCKSORT are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value DISABLE.

<b>Acceptable values:</b>	DISABLE, ENABLE
<b>Default:</b>	DISABLE
<b>DSNZPxxx:</b>	DSN6SPRM OPT1ROWBLOCKSORT

<b>Security parameter:</b>	No
----------------------------	----

### DISABLE

when OPTIMIZE FOR 1 ROW is specified, Db2 avoids access paths that involve sorts. If an access path that avoids a sort exists, it is possible, although unlikely, that an access path that involves a sort is chosen instead. This behavior was always used in DB2 9 and earlier releases.

### ENABLE

When OPTIMIZE FOR 1 ROW is specified, Db2 chooses access paths that avoid sorts whenever such a path is available. For example, Db2 must choose between two index access paths. One index is very selective and filters two rows, but it requires a sort. The other index does not filter any rows, but it does not require a sort. If the OPT1ROWBLOCKSORT subsystem parameter is set to ENABLE, Db2 chooses the path that does not require a sort.

### Related concepts

[Optimization for large and small result sets \(Introduction to Db2 for z/OS\)](#)

### Related tasks

[Minimizing the cost of retrieving few rows \(Db2 Performance\)](#)

[Optimizing retrieval for a small set of rows \(Db2 Application programming and SQL\)](#)

### Related reference

[optimize-clause \(Db2 SQL\)](#)

## PREVENT\_NEW\_IXCTRL\_PART in macro DSN6SPRM

The PREVENT\_NEW\_IXCTRL\_PART subsystem parameter determines whether Db2 disallows the creation of new index-controlled partitioned tables. This subsystem parameter ensures that new partitioned tables use table-controlled partitioning, which is the preferred partitioning method for non-universal table spaces.

**Deprecated subsystem parameter:** Non-default settings for PREVENT\_NEW\_IXCTRL\_PART are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is likely to be removed eventually. For best results, use the default value YES.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>DSNZPxxx:</b>	DSN6SPRM PREVENT_NEW_IXCTRL_PART

### YES

Specifies that new partitioned table spaces must use table-controlled partitioning. A CREATE INDEX statement must not attempt to create an index-controlled partitioned table.

### NO

Specifies that new index-controlled partitioned tables can be created.

**Learn more:** For comprehensive background, how-to information, and examples for various paths for converting your deprecated "classic" partitioned (non-UTS) table spaces to partition-by-range table spaces, see the white paper [Conversion from index-controlled partitioning to Universal Table Space \(UTS\)](#).

### Related tasks

[Converting partitioned \(non-UTS\) table spaces to partition-by-range universal table spaces \(Db2 Administration Guide\)](#)

[Converting table spaces to use table-controlled partitioning \(Db2 Administration Guide\)](#)

[Creating tables partitioned by data value ranges \(Db2 Administration Guide\)](#)

## PRIVATE\_PROTOCOL in macro DSN6FAC

Private protocol is no longer supported; however, this subsystem parameter controls package EXECUTE authorization behavior related to remote Db2 requester applications.

<b>Acceptable values:</b>	NO, AUTH
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6FAC PRIVATE_PROTOCOL
<b>Security parameter:</b>	No

### NO

When a remote Db2 requester application accesses the Db2 subsystem through DRDA protocol, package EXECUTE authority must be explicitly granted at this subsystem. The authority must be granted to the primary ID or an associated secondary ID for packages that the requester application executes as part of the plan

### AUTH

When a remote Db2 requester application accesses the Db2 subsystem through DRDA protocol, package EXECUTE authority must be explicitly granted to the plan owner at this subsystem. This plan owner must have EXECUTE authority at this subsystem for packages that the requester application executes as part of the plan. The plan owner needs no other privilege to execute the package.

When a remote Db2 requester application accesses the server Db2 subsystem through DRDA protocol, a plan owner is associated with the remote Db2 requester application plan. For packages that are executed as part of this plan by a remote Db2 requester application using DRDA protocol, the PRIVATE\_PROTOCOL parameter has the following effects. This parameter is online updatable, and valid values are NO and AUTH.

## PTASKROL in macro DSN6SYSP

Indicates whether to roll up accounting trace records from a parallel query task into the originating task's accounting trace.

<b>Acceptable values:</b>	YES, NO
<b>Default:</b>	YES
<b>DSNZPxxx:</b>	DSN6SYSP PTASKROL
<b>Security parameter:</b>	No

### YES

The originating task is to generate an additional accounting trace record with all the roll-up values from parallel tasks.

### NO

Each parallel task produces its own accounting trace record.

## REALSTORAGE\_MAX in macro DSN6SPRM

Specifies the maximum GB of real and auxiliary storage that Db2 can consume.

<b>Acceptable values:</b>	NOLIMIT, 1–65535.
<b>Default:</b>	NOLIMIT
<b>DSNZPxxx:</b>	DSN6SPRM REALSTORAGE_MAX
<b>Security parameter:</b>	No

## NOLIMIT

Real and auxiliary storage consumption for Db2 is not bounded.

## 1-65535

If the total real and auxiliary storage in GB reaches or exceeds the specified limit, Db2 enters contraction mode.

In *contraction mode*, Db2 discards every 30 commits. Db2 indicates when it enters contraction mode by issuing console messages DSNV516I and DSNS005I with reason LOW ON AVAILABLE FRAMES. When Db2 leaves contraction mode, it issues message DSNV517I.

In most cases, set this parameter to twice the amount of real and auxiliary storage that the Db2 subsystem might reasonably consume.

### Related concepts

[DSNS messages \(Db2 Messages\)](#)

[Db2 subsystem storage requirements](#)

You must configure storage sizes for your Db2 subsystem.

### Related tasks

[Calculating real storage requirements](#)

Db2 can use real storage to reduce I/O and processor times and to improve response time and throughput. The amount of real storage that Db2 needs varies greatly.

### Related reference

[MANAGE REAL STORAGE field \(REALSTORAGE\\_MANAGEMENT subsystem parameter\)](#)

The REALSTORAGE\_MANAGEMENT subsystem parameter specifies whether Db2 should manage real storage consumption.

### Related information

[DSNV516I \(Db2 Messages\)](#)

[DSNV517I \(Db2 Messages\)](#)

## RESTRICT\_ALT\_COL\_FOR\_DCC in macro DSN6SPRM

Specifies whether restrictions apply to ALTER TABLE ALTER COLUMN statements for target tables that are defined with the DATA CAPTURE CHANGES attribute. Valid values are NO and YES.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM RESTRICT_ALT_COL_FOR_DCC
<b>Security parameter:</b>	No

### NO

Restrictions do not apply to altering column data types or default values of tables that are defined with the DATA CAPTURE CHANGES attribute. For such tables, ALTER TABLE ALTER COLUMN statements with the SET DATA TYPE, SET DEFAULT, or DROP DEFAULT options are allowed.

### YES

restrictions apply to altering column data types or default values of tables that are defined with the DATA CAPTURE CHANGES attribute. ALTER TABLE ALTER COLUMN statements that are issued with the SET DATA TYPE, SET DEFAULT, or DROP DEFAULT options for such tables result in SQLCODE -148.

### Related tasks

[Altering a table to capture changed data \(Db2 Administration Guide\)](#)

### Related information

[-148 \(Db2 Codes\)](#)

## SECADM1\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM1 setting is a character string or a hexadecimal string.

<b>Acceptable values:</b>	CHAR, HEX
<b>Default:</b>	CHAR
<b>DSNZPxxx</b>	DSN6SPRM SECADM1_INPUT_STYLE
<b>Online changeable:</b>	Yes
<b>Security parameter:</b>	<u>Security-related</u>

### CHAR

The SECADM1 value is a standard character string. SECADM1 must be a 1–8 character authorization ID. If SECADM1\_TYPE=ROLE, SECADM1 must be a 1–128 character ordinary SQL identifier.

### HEX

The SECADM1 values is a hexadecimal character string that represents a Unicode-encoded role name. HEX is valid only when SECADM1\_TYPE=ROLE. SECADM1 must be an even number of bytes in the range 2–256 , consisting entirely of 0–9 and A–F.

### Related reference

SEC ADMIN 1 TYPE field (SECADM1\_TYPE subsystem parameter)

The SECADM1\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 1 field is an authorization ID or a role.

SECURITY ADMIN 1 field (SECADM1 subsystem parameter)

The SECADM1 subsystem parameter specifies the first of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 1 TYPE field, specify whether this entry is an authorization ID or a role.

## SECADM2\_INPUT\_STYLE in macro DSN6SPRM

Specifies whether the SECADM2 setting is a character string or a hexadecimal string.

<b>Acceptable values:</b>	CHAR, HEX
<b>Default:</b>	CHAR
<b>DSNZPxxx</b>	DSN6SPRM SECADM2_INPUT_STYLE
<b>Online changeable:</b>	Yes
<b>Security parameter:</b>	<u>Security-related</u>

### CHAR

The SECADM2 value is a standard character string. SECADM2 must be a 1–8 character authorization ID. If SECADM2\_TYPE=ROLE, SECADM2 must be a 1–128 character ordinary SQL identifier.

### HEX

The SECADM2 values is a hexadecimal character string that represents a Unicode-encoded role name. HEX is valid only when SECADM2\_TYPE=ROLE. SECADM2 must be an even number of bytes in the range 2–256, consisting entirely of 0–9 and A–F.

### Related reference

SECURITY ADMIN 2 field (SECADM2 subsystem parameter)

The SECADM2 subsystem parameter specifies the second of two authorization IDs or roles that are to have Db2 security administrator authority. In the SEC ADMIN 2 TYPE field, specify whether this entry is an authorization ID or a role.

SEC ADMIN 2 TYPE field (SECADM2\_TYPE subsystem parameter)



The SECADM2\_TYPE subsystem parameter specifies whether the entry in the SECURITY ADMIN 2 field is an authorization ID or a role.

## **SIMULATED\_CPU\_COUNT in macro DSN6SPRM**

Specifies the number of CPUs that are being simulated. This parameter is to be used for Db2 optimization modeling only.

<b>Acceptable values:</b>	OFF, 1–255
<b>Default:</b>	OFF
<b>DSNZPxxx:</b>	DSN6SPRM SIMULATED_CPU_COUNT
<b>Security parameter:</b>	No

### **OFF**

Db2 optimizes for the number of CPUs that it runs on.

### **1–255**

Specifies the simulated number of CPUs.

### **Related tasks**

[Modeling a production environment on a test subsystem \(Db2 Performance\)](#)

## **SIMULATED\_CPU\_SPEED in macro DSN6SPRM**

Specifies the microseconds of execution time for tasks or service request blocks (SRBs) per service unit for the CPU that is being simulated. This parameter is used only for Db2 optimization modeling.

<b>Acceptable values:</b>	OFF, 1–2147483647
<b>Default:</b>	OFF
<b>Online changeable:</b>	YES
<b>DSNZPxxx:</b>	DSN6SPRM.SIMULATED_CPU_SPEED

### **OFF**

Db2 optimizes for the CPU that it runs on. Use this setting in production environments.

### **1–2147483647**

Microseconds of execution time for tasks or service request blocks (SRBs) per service unit for the CPU that is being simulated. If the specified value is 1–27, Db2 uses a value of 27

### **Related tasks**

[Modeling a production environment on a test subsystem \(Db2 Performance\)](#)

## **SJTABLES in macro DSN6SPRM**

Specifies whether Db2 enables star join processing.

<b>Acceptable values:</b>	0–32767
<b>Default:</b>	10
<b>DSNZPxxx:</b>	DSN6SPRM SJTABLES
<b>Security parameter:</b>	No

### **0**

Star join processing is considered for a query block that has 10 or more tables.

### **1–3**

Star join processing is always considered.

#### 4-225

Star join processing is considered for a query block that has at least the specified number of tables.

#### 226-32767

Star join processing is disabled.

#### Related concepts

[Star schema access \(Db2 Performance\)](#)

#### Related reference

[STAR JOIN QUERIES field \(STARJOIN subsystem parameter\)](#)

The STARJOIN subsystem parameter specifies whether star join processing is to be enabled.

### SMF89 in macro DSN6SYSP

Specifies whether Db2 is to do detailed tracking for measured usage pricing. If you select YES, Db2 does detailed measured usage tracking if SMF type 89 records are activated.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SYSP SMF89
<b>Security parameter:</b>	No

#### NO

Db2 does not do detailed measured usage tracking. If the SMF type 89 record is activated, only high-level tracking is recorded in the SMF type 89 record. Selecting NO reduces CPU usage, but also increases the amount of time spent in Db2 as measured by SMF 89.

#### YES

Db2 invokes a z/OS service on every entry into or exit out of Db2 to ensure accurate tracking.

**Recommendation:** Select SMF89 YES only if you use measured usage pricing.

### SUBQ\_MIDX in macro DSN6SPRM

Specifies whether to enable or disable multiple index access on some non-Boolean uncorrelated subquery predicates.

**Deprecated subsystem parameter:** Non-default settings for SUBQ\_MIDX are deprecated. Db2 12 supports these settings, but their use is discouraged, and support is removed in Db2 13 or later. For best results, use the default value ENABLE.

<b>Acceptable values:</b>	ENABLE, DISABLE
<b>Default:</b>	ENABLE
<b>DSNZPxxx:</b>	DSN6SPRM SUBQ_MIDX
<b>Security parameter:</b>	No

#### ENABLE

Multiple index access is allowed for queries that have subquery predicates.

#### DISABLE

Multiple index access is not allowed for queries that have subquery predicates.

The following example query contains such non-Boolean uncorrelated subquery predicates:

```
SELECT *
  FROM T1
 WHERE (T1.C1= ? )
        OR (T1.C2 >= T1.C3
           AND T1.C4 = (SELECT T2.C1
                       FROM T2
```

WHERE T2.c2 = ?)

)

### Related concepts

[Boolean term predicates \(Db2 Performance\)](#)

[Multiple index access \(ACCESSTYPE='M', 'MX', 'MI', 'MU', 'DX', 'DI', or 'DU'\) \(Db2 Performance\)](#)

## SUPPRESS\_HINT\_SQLCODE\_DYN in macro DSN6SPRM

Specifies whether Db2 suppresses SQLCODE +394 and SQLCODE +395 when specified access paths are applied for dynamic SQL statements.

<b>Acceptable values:</b>	NO, STMT, ALL
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM SUPPRESS_HINT_SQLCODE_DYN
<b>Security parameter:</b>	No

### NO

Db2 issues +394 and +395 for statement-level access paths and PLAN\_TABLE access paths.

### STMT

Db2 suppresses +394 and +395 for statement-level access paths for dynamic SQL statements.

### ALL

Db2 suppresses +394 and +395 for statement-level access paths and PLAN\_TABLE access paths for dynamic SQL statements.

The SUPPRESS\_HINT\_SQLCODE\_DYN subsystem parameter does not apply to static SQL statements or dynamic EXPLAIN statements.

### Related tasks

[Specifying access paths at the statement level \(Db2 Performance\)](#)

[Specifying access paths in a PLAN\\_TABLE instance \(Db2 Performance\)](#)

### Related information

[+394 \(Db2 Codes\)](#)

[+395 \(Db2 Codes\)](#)

## UNION\_COLNAME\_7 in macro DSN6SPRM

Specifies the behavior for result column names in UNION queries.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM UNION_COLNAME_7
<b>Security parameter:</b>	No

### NO

If the column name is the same across all sub-queries in the UNION query, the result column name is that column name. Otherwise, the result column is unnamed. DB2 version 8 introduced this behavior.

### YES

The column name that is returned in the SQLNAME field of an SQLDA following a DESCRIBE statement, where the result table that is described is the result of a union, is the column name from the first subquery of the union operation. Db2 used this behavior in DB2 version 7 and earlier.

### Related reference

[DESCRIBE statement \(Db2 SQL\)](#)

[The included SQLDA \(Db2 SQL\)](#)

## XML\_RESTRICT\_EMPTY\_TAG in DSN6SPRM

Specifies whether Db2 always serializes an empty XML element using a start-element tag followed by an end-element tag.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM XML_RESTRICT_EMPTY_TAG
<b>Security parameter:</b>	No

### NO

Db2 serializes an empty XML element in either of the following ways:

- As a start-element tag followed by an end-element tag. For example:

```
<emptyElement></emptyElement>
```

- As an empty-element tag. For example:

```
<emptyElement/>
```

### YES

Db2 always serializes an empty XML element as a start-element tag followed by an end-element tag. For example:

```
<emptyElement></emptyElement>
```

### Related concepts

[Best practices for XML performance in Db2 \(Db2 Performance\)](#)

## ZOSMETRICS in macro DSN6SPRM

Enables Db2 to gather z/OS metrics, including CPU usage and storage metrics, by using the z/OS Resource Measurement Facility (RMF) interface.

<b>Acceptable values:</b>	NO, YES
<b>Default:</b>	NO
<b>DSNZPxxx:</b>	DSN6SPRM ZOSMETRICS
<b>Security parameter:</b>	No

### NO

Db2 does not use RMF to gather z/OS metrics.

### YES

Db2 uses RMF to gather z/OS metrics, including CPU usage and storage.

The following actions are required to make the RMF interface operational:

- Verify that the DSNWVRMF module is placed in a LINKLIST library. If the Db2 subsystem is in a data sharing group, ensure that DSNWVRMF is available in a LINKLIST library on all z/OS systems in the Parallel Sysplex®, regardless of whether a z/OS system contains a Db2 data sharing member.

After installation, refresh the LINKLIST by issuing the following MVS command:

```
f 11a,refresh
```

- Start the RMF and RMF Monitor III Sysplex Data Retrieval Service.

In some cases, the z/OS metrics might not be provided, or they might be only partially provided in the Db2 trace. This lack of metrics is likely caused by setup problems that are related to RMF. If support is required, provide the incomplete trace data.

## Job DSNTIJUZ: define the Db2 data-only subsystem parameter module

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You run job DSNTIJUZ as part of the following Db2 installation, migration tasks, and Db2 12 function-level activation tasks:

- [“Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL” on page 437](#)
- [“Defining Db2 initialization parameters for enabling data sharing” on page 668](#)
- [“Defining Db2 initialization parameters for new data sharing members” on page 680](#)
- [“Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM” on page 505](#)
- [“Defining Db2 12 initialization parameters for migrating data sharing members” on page 711](#)
- [“Updating subsystem parameter and application default values” on page 373](#)
- [Updating Db2 initialization parameters for function level activation \(Db2 for z/OS What's New?\)](#)

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

The subsystem parameter module consists of the expansion of the following macros that contain the Db2 run-time parameters that you selected by using the ISPF panels:

- DSN6ARVP
- DSN6FAC
- DSN6GRP
- DSN6LOGP
- DSN6SPRM
- DSN6SYSP

You might also be directed by IBM to run it when applying service to Db2. In Db2 data sharing, each member of the group must have its own subsystem parameter module and therefore its own DSNTIJUZ job.

DSNTIJUZ also contains a disabled job step, DSNTIMQ, that can be enabled to set up GENASM entries in SMP/E for the Db2 system parameter (DSN6xxxx) macros. The GENASM entries cause service to any of these macros to trigger SMP/E to initiate a reassembly of the Db2 system parameter module. Advanced SMP/E skills are recommended for using GENASM entries. See the warnings in the comment block for job step DSNTIMQ before enabling it.

### Adjustments to job DSNTIJUZ

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix.SDSNEXIT* and *prefix.SDSNLOAD*, you can move the SYSLMOD output to that library.

### Related concepts

[Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

### Related reference

[APPL COMPAT LEVEL field \(APPLCOMPAT subsystem parameter\)](#)

The APPLCOMPAT subsystem parameter specifies the default value to use when the APPLCOMPAT bind option is not specified in a BIND command, or the APPLCOMPAT value is not specified or stored in the Db2 catalog for a REBIND command. Its value does not prevent specific applications from running at higher application compatibility levels.

## Job DSNTIJUA: define data-only application defaults module

Job DSNTIJUA defines the Db2 data-only application defaults module.

Run this job when installing Db2 or migrating to Db2 12, and optionally to change the default SQL processing level (SQLLEVEL) for the precompiler/coprocessor after activating a new Db2 function level.

You run job DSNTIJUA as part of the following tasks:

- [“Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL” on page 437](#)
- [“Defining Db2 initialization parameters for enabling data sharing” on page 668](#)
- [“Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM” on page 505](#)
- [“Updating subsystem parameter and application default values” on page 373](#)
- [Updating Db2 initialization parameters for function level activation \(Db2 for z/OS What's New?\)](#)

You might also be directed by IBM to run it when applying service to Db2.

In Db2 data sharing, each member of the group can use a single application defaults module or have its own. The Db2 installation and migration process assumes one module for the whole group and provides a DSNTIJUA job only for the first member.

The default SQL processing level (SQLLEVEL) for the precompiler/coprocessor can be changed anytime, such as after activating a higher Db2 function level. For more information, see [“PRECOMPILER SQL LEVEL field \(SQLLEVEL DECP value\)” on page 90](#).

**Important:** With the exception of SQLLEVEL, updates to application defaults parameters are generally not recommended. In general, you must restart Db2 for changes to any application programming parameters to take effect.

DSNTIJUA also contains a disabled job step, DSNTIMQ, that can be enabled to set up a GENASM entry in SMP/E for the Db2 application programming (DSNHDECM) macro. The GENASM entry causes service to DSNHDECM to trigger SMP/E to initiate a reassembly of the Db2 application defaults module. Advanced SMP/E skills are recommended for using GENASM entries. See the warnings in the comment block for job step DSNTIMQ before enabling it.

### Adjustments to job DSNTIJUA

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

#### Related concepts

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Application defaults parameters](#)

An application defaults load module, *dsnhdecpl*, is generated as part of installing or migrating Db2. In a data sharing environment, this module is generated only for the first member that is installed or migrated.

## Job DSNTIJUM: define Db2 data-only offline message generator CCSID (DSNHMCID) module

Job DSNTIJUM defines the Db2 data-only offline message generator CCSID (DSNHMCID) module which is needed for message conversion by Db2 applications and utilities.

You run job DSNTIJUM as part of the following tasks Db2 12 installation and migration tasks:

- [“Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL” on page 437](#)
- [“Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM” on page 505](#)
- [“Defining Db2 initialization parameters for enabling data sharing” on page 668](#)

DSNHMCID is link-edited into both the *prefix.SDSNEXIT* and *prefix.SDSNLOAD* libraries.

Run this job when installing or migrating to Db2 12.

DSNTIJUM also contains a disabled job step, DSNTIMQ, that can be enabled to set up a GENASM entry in SMP/E for the offline message generator CCSID (DSNHMCIM) macro. The GENASM entry causes service to DSNHMCIM to trigger SMP/E to initiate a reassembly of the DB2 offline message generator CCSID module. Advanced SMP/E skills are recommended for using GENASM entries. See the warnings in the comment block for job step DSNTIMQ before enabling it.

### Related tasks

[Specifying subsystem CCSIDs \(Db2 Internationalization Guide\)](#)

## Job DSNTIJUL: update DDF related BSDS information

Job DSNTIJUL runs the Db2 change log inventory (DSNJU003) to update DDF-related information in the BSDS.

You run job DSNTIJUL as part of the following Db2 12 installation tasks:

- [“Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL” on page 437](#)
- [“Defining Db2 initialization parameters for enabling data sharing” on page 668](#)
- [“Updating subsystem parameter and application default values” on page 373](#)

In Db2 data sharing, you need to run it once for each member of the group. Also, the DDF information must be recorded into the BSDS for each member of the group and therefore each member must have its own DSNTIJUL job.

For updates, the Db2 installation CLIST generates job DSNTIJUL only for changes to any of the following parameters:

- [“DB2 LOCATION NAME field” on page 302](#)
- [“DB2 VTAM LUNAME field” on page 302](#)
- [“DB2 GENERIC LUNAME field” on page 304](#)
- [“DB2 VTAM PASSWORD field” on page 303](#)
- [“DB2 TCP/IP IPNAME field” on page 304](#)
- [“TCP/IP PORT field” on page 305](#)
- [“SECURE PORT field” on page 306](#)
- [“RESYNC PORT field” on page 306](#)

## Related concepts

Bootstrap data set (Introduction to Db2 for z/OS)

## Related reference

DSNJU003 (change log inventory) (Db2 Utilities)

# Directory of subsystem parameters, panel fields, and application default values

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

The following table lists subsystem parameters and macro names, installation panel fields and panel names, and whether each parameter can be updated online. "Yes" in the Update online column means that the parameter can be updated online.

Table 37. Directory of subsystem parameters and application default values

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">ABEXP</a>	EXPLAIN PROCESSING	DSN6SPRM	<a href="#">DSNTIPO</a>	Yes	M	ABEXP
<a href="#">ABIND</a>	AUTO BIND	DSN6SPRM	<a href="#">DSNTIPO</a>	Yes	M	ABIND
<a href="#">ACCEL</a>	ACCELERATION STARTUP	DSN6SPRM	<a href="#">DSNTIP82</a>		M	ACCEL
<a href="#">ACCELMODEL</a>	—	DSN6SPRM	—	Yes	M	ACCELMODEL
<a href="#">ACCESS_CNTL_MODULE</a>	ACCESS CONTROL	DSN6SYSP	<a href="#">DSNTIPO3</a>		G	ACCTLMOD
<a href="#">ACCUMACC</a>	DDF/RRSAF ACCUM	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	ACCUMAC
<a href="#">ACCUMUID</a>	AGGREGATION FIELDS	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	ACCUMUID
<a href="#">ADMTPROC</a>	ADMIN SCHEDULER	DSN6SPRM	<a href="#">DSNTIPX</a>		M	ADMTPROC
<a href="#">AEXITLIM</a>	AUTH EXIT LIMIT	DSN6SPRM	<a href="#">DSNTIPP</a>	Yes	M	AEXITLIM
<a href="#">AGCCSID</a>	ASCII CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	AGCCSID
<a href="#">ALL</a>	START NAMES	DSN6SPRM	<a href="#">DSNTIPS</a>		—	—
<a href="#">ALLOW_UPD_DEL_INS_WITH_UR</a>	—	DSN6SPRM	—	Yes	G	AUDIWU
<a href="#">ALTERNATE_CP</a>	ALTERNATE COPY POOL	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	G	BSACP
<a href="#">AMCCSID</a>	ASCII CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	AMCCSID
<a href="#">APPENSCH</a>	APPLICATION ENCODING	DSNHDECP	<a href="#">DSNTIPF</a>		G	APPENSCH
<a href="#">APPLCOMPAT</a>	APPL COMPAT LEVEL	DSN6SPRM	<a href="#">DSNTIP00</a>	Yes	G	APPLCOMPAT
<a href="#">ARCPFX1</a>	Archive logs: COPY 1 PREFIX	DSN6ARVP	<a href="#">DSNTIPH</a>	Yes	U	ARCHPRE1
<a href="#">ARCPFX2</a>	Archive logs: COPY 2 PREFIX	DSN6ARVP	<a href="#">DSNTIPH</a>	Yes	U	ARCHPRE2
<a href="#">ARCRETN</a>	RETENTION PERIOD	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCRETN
<a href="#">ARCWRTC</a>	WTOR ROUTE CODE	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHWRTC
<a href="#">ARCWTOR</a>	WRITE TO OPER	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHWTOR
<a href="#">ARC2FRST</a>	READ COPY2 ARCHIVE	DSN6LOGP	<a href="#">DSNTIPO</a>	Yes	M	ARC2FRST
<a href="#">ASCCSID</a>	ASCII CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	ASCCSIDE



Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<u>AUDITST</u>	AUDIT TRACE	DSN6SYSP	<u>DSNTIPN</u>	No "3" on page 424	M	AUDIT
<u>AUTH</u>	USE PROTECTION	DSN6SPRM	<u>DSNTIPP</u>	No "3" on page 424	M	PROTAUTH
<u>AUTHCACH</u>	PLAN AUTH CACHE	DSN6SPRM	<u>DSNTIPP</u>	Yes "3" on page 424	M	AUTHCACH
<u>AUTHEXIT_CACHEREFRESH</u>	AUTH EXIT CACHE REFR	DSN6SPRM	<u>DSNTIPP</u>	No "3" on page 424	G	AECR
<u>AUTH_COMPATIBILITY</u>	—	DSN6SPRM	—	Yes	M	AUTCMPAT
<u>AUTHEXIT_CHECK</u>	AUTH EXIT CHECK	DSN6SPRM	<u>DSNTIPP</u>	No "3" on page 424	G	RACK
<u>BACKODUR</u>	BACKOUT DURATION	DSN6SYSP	<u>DSNTIPL1</u>		M	BACKODUR
<u>BIF_COMPATIBILITY</u>	BIF COMPATIBILITY	DSN6SPRM	<u>DSNTIPX</u>	Yes	—	BIFCP
<u>BINDNV</u>	BIND NEW PACKAGE	DSN6SPRM	<u>DSNTIPP1</u>	Yes "3" on page 424	M	BINDNV
<u>BLKSIZE</u>	BLOCK SIZE	DSN6ARVP	<u>DSNTIPA</u>	Yes	M	ARCHSIZE
<u>BMPTOUT</u>	IMS BMP TIMEOUT	DSN6SPRM	<u>DSNTIPI</u>	Yes	M	BMPTOUT
<u>CACHEDYN</u>	CACHE DYNAMIC SQL	DSN6SPRM	<u>DSNTIP8</u>	Yes	M	CACHEDUM
<b>█</b> <u>CACHEDYN_STABILIZATION</u>	CACHE DYN STABILITY	DSN6SPRM	<u>DSNTIP8</u>	Yes	G	CDST
<u>CATALOG</u>	CATALOG ALIAS	DSN6SPRM	<u>DSNTIPA2</u>		G	VCATALOG
<u>CATDDACL</u>	DIRECTORY AND CATALOG DATA	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATDDACL
<u>CATDMGCL</u>	DIRECTORY AND CATALOG DATA	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATDMGCL
<u>CATDSTCL</u>	DIRECTORY AND CATALOG DATA	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATDSTCL
<u>CATXDACL</u>	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATXDACL
<u>CATXMGCL</u>	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATXMGCL
<u>CATXSTCL</u>	DIRECTORY AND CATALOG INDEXES	DSN6SPRM	<u>DSNTIPA2</u>	Yes	M	CATXSTCL
<b>█</b> <u>CDDS_MODE</u>	—	DSN6LOGP	—		G	CDDSMOD
<b>█</b> <u>CDDS_PREFIX</u>	—	DSN6LOGP	—		G	CDDSPFX
<u>CDSSRDEF</u>	CURRENT DEGREE	DSN6SPRM	<u>DSNTIP81</u> <u>DSNTIP8</u>	Yes	M	CDSSRDEF
<b>█</b> <u>CHECK_FASTREPLICATION</u>	FAST REPLICATION	DSN6SPRM	—	Yes	M	CHKFASRP
<u>CHKFREQ</u>	CHECKPOINT FREQ	DSN6SYSP	<u>DSNTIPL1</u>	Yes	M	CHKFREQ
<u>CHKLOGR</u>	RECORDS/CHECKPOINT	DSN6SYSP	<u>DSNTIPL1</u>	Yes	M	CHKLOGR

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">CHKMINS</a>	MINUTES/CHECKPOINT	DSN6SYSP	<a href="#">DSNTIPL1</a>	Yes	M	CKPTTIME
<a href="#">CHKTYPE</a>	CHECKPOINT TYPE	DSN6SYSP	<a href="#">DSNTIPL1</a>	Yes	M	CHKTYPE
<a href="#">CMTSTAT</a>	DDF THREADS	DSN6FAC	"DSNTIP5: Distributed data facility panel 2" on page 307		M	CMTSTAT
<a href="#">COMCRIT</a>	—	DSN6SPRM	—	Yes	M	COMCRIT
<a href="#">COMPACT</a>	COMPACT DATA	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHCOMP
<a href="#">COMPRESS_DIRLOB</a>	COMPRESS DB2 DIR LOBS	DSN6SPRM	<a href="#">DSNTIPA2</a>	Yes	G	CDRL
<a href="#">CONDBAT</a>	MAX REMOTE CONNECTED	DSN6SYSP	<a href="#">DSTIPE</a>	Yes	M	CONDBAT
<a href="#">COPY_FASTREPLICATION</a>	COPY FAST REPLICATION	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	R	CYFR
<a href="#">CTHREAD</a>	MAX USERS	DSN6SYSP	<a href="#">DSNTIPE</a>	Yes	M	NUMCONCR
<a href="#">DBACRVW</a>	DBADM CREATE AUTH	DSN6SPRM	<a href="#">DSNITPP1</a>	Yes "3" on page 424	G	DBACRVW
<a href="#">DATE</a>	DATE FORMAT	DSNHDECP	<a href="#">DSNTIP4</a>		G	DEFDATE
<a href="#">DATELEN</a>	LOCAL DATE LENGTH	DSNHDECP	<a href="#">DSNITP4</a>		G	DEFDATEL
<a href="#">DB2SUPLD</a>	—	DSNHDECP	—		—	DB2SUPLD
<a href="#">DDF</a>	DDF STARTUP OPTION	DSN6FAC	<a href="#">DSNTIPR</a>		M	DDSTART
<a href="#">DDF_COMPATIBILITY</a>	—	DSN6FAC	—	Yes	M	DDFCMPAT
<a href="#">DDL_MATERIALIZATION</a>	DDL MATERIALIZATION	DSN6SPRM	<a href="#">DSNTIP71</a>	Yes	G	DDLML
<a href="#">DDLTOX</a>	DATA DEF TIMEOUT	DSN6SPRM	<a href="#">DSNTIPE1</a>	Yes	M	DDLTOX
<a href="#">DEALLCT</a>	DEALLOC PERIOD	DSN6LOGP	<a href="#">DSNTIPA</a>	Yes	M	ARCHDEAP
<a href="#">DECARTH</a>	DECIMAL ARITHMETIC	DSNHDECP	<a href="#">DSNTIP4</a>		G	DECARTH
<a href="#">DECDIV3</a>	MINIMUM DIVIDE SCALE	DSN6SPRM	<a href="#">DSNTIP4</a>		G	DECDIV3
<a href="#">DECIMAL</a>	DECIMAL POINT IS	DSNHDECP	<a href="#">DSNTIPF</a>		G	DECPOINT
<a href="#">DEF_DECFLOAT_ROUND_MODE</a>	DECFLOAT ROUNDING MODE	DSNHDECP	<a href="#">DSNTIPF</a>		G	DEFDFPRM
<a href="#">DEFAULT_INSERT_ALGORITHM</a>	DEFAULT INSERT ALGORITHM	DSN6SPRM	<a href="#">DSNTIP71</a>	Yes	G	DINA
<a href="#">DEFLANG</a>	LANGUAGE DEFAULT	DSNHDECP	<a href="#">DSNTIPF</a>		G	DEFLANG
<a href="#">DEFLTID</a>	UNKNOWN AUTHID	DSN6SPRM	<a href="#">DSNTIPP1</a>		M	PROTUNKN
<a href="#">DEL_CFSTRUCTS_ON_RESTART</a>	DEL CF STRUCTS	DSN6SYSP	<a href="#">DSNTIPK</a>		G	DCFS
<a href="#">DELIM</a>	STRING DELIMITER	DSNHDECP	<a href="#">DSNTIPF</a>		G	DEFSTRNG
<a href="#">DESCSTAT</a>	DESCRIBE FOR STATIC	DSN6SPRM	<a href="#">DSNTIP4</a>	Yes	G	DECSTAT
<a href="#">DISABLE_EDMRTS</a>	DISABLE EDM RTS	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	DEDR
<a href="#">DISALLOW_SEL_INTO_UNION</a>	—	DSN6SPRM	—	Yes	G	—
<a href="#">DISALLOW_SSARAUTH</a>	—	DSN6SPRM	—	Yes "3" on page 424	M	DSSAR

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">DLDFREQ</a>	LEVELID UPDATE FREQ	DSN6SYSP	<a href="#">DSNTIPL1</a>	Yes	M	DLDFREQ
<a href="#">DLITOUT</a>	DL/I BATCH TIMEOUT	DSN6SPRM	<a href="#">DSNTIPI</a>	Yes	M	DLITOUT
<a href="#">DPSEGSZ</a>	DEFAULT PARTITION SEGSIZE	DSN6SYSP	<a href="#">DSNTIP71</a>	Yes	G	DPSEGSZ
<a href="#">DSHARE</a>	DATA SHARING	DSN6GRP	<a href="#">DSNTIPA1</a>		—	DSHARE
<a href="#">DSMAX</a>	DSMAX	DSN6SPRM	<a href="#">DSNTIPC</a>	Yes	M	OPNDS
<a href="#">DSQLDELI</a>	DIST SQL STR DELIMTR	DSNHDECP	<a href="#">DSNTIPF</a>		G	DECPDSSD
<a href="#">DSSTIME</a>	DATASET STATS TIME	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	DSSTIME
<a href="#">DSVCI</a>	VARY DS CONTROL INTERVAL	DSN6SYSP	<a href="#">DSNTIP7</a>	Yes	—	DSVCI
<a href="#">DYNRULS</a>	USE FOR DYNAMICRULES	DSNHDECP	<a href="#">DSNTIP4</a>		G	DYNRULS
<a href="#">EDM_SKELETON_POOL</a>	EDM SKELETON POOL SIZE	DSN6SPRM	<a href="#">DSNTIPC</a>	Yes	M	EDMSKP
<a href="#">EDMDBDC</a>	EDM DBD CACHE	DSN6SPRM	<a href="#">DSNTIPC</a>	Yes	M	EDMDBDC
<a href="#">EDMSTMTC</a>	EDM STATEMENT CACHE	DSN6SPRM	<a href="#">DSNTIPC</a>	Yes	M	EDMSTMTC
<a href="#">EN_PJSJ</a>	—	DSN6SPRM	—	Yes	M	ENPJSJ
<a href="#">ENCRYPTION_KEYLABEL</a>	—	DSN6SPRM	—	Yes "3" on page 424, "4" on page 424	G	ENKL
<a href="#">ENSCHHEME</a>	DEF ENCODING SCHEME	DSNHDECP	<a href="#">DSNTIPF</a>		G	ENSHCEME
<a href="#">EVALUNC</a>	EVALUATE UNCOMMITTED	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	EVALUNC
<a href="#">EXTRAREQ</a>	EXTRA BLOCKS REQ	DSN6SYSP	<a href="#">DSNTIP5</a>	Yes	—	EXTRAREQ
<a href="#">EXTRASRV</a>	EXTRA BLOCKS SRV	DSN6SYSP	<a href="#">DSNTIP5</a>	Yes	—	EXTRSRV
<a href="#">EXTSEC</a>	EXTENDED SECURITY	DSN6SYSP	"DSNTIP5: Distributed data facility panel 2" on page 307	Yes "3" on page 424	G	EXTSEC
<a href="#">FCCOPYDDN</a>	DEFAULT TEMPLATE	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCCDTEMP
<a href="#">FLASHCOPY_COPY</a>	COPY	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCCP
<a href="#">FLASHCOPY_LOAD</a>	LOAD	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCLP
<a href="#">FLASHCOPY_PPRC</a>	FLASHCOPY PPRC	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCPPRC
<a href="#">FLASHCOPY_REBUILD_INDEX</a>	REBUILD INDEX	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCROT
<a href="#">FLASHCOPY_REORG_INDEX</a>	REORG INDEX	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCRBI
<a href="#">FLASHCOPY_REORG_TS</a>	REORG TABLESPACE	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	FCROI
<a href="#">FLASHCOPY_XRCP</a>	FLASHCOPY XRCP	DSN6SPRM	<a href="#">DSNTIP61</a>	Yes	M	—
<a href="#">FTB_NON_UNIQUE_INDEX</a>	FTB NON UNIQUE INDEX		<a href="#">DSNTIP71</a>	Yes	G	FTBUO
<a href="#">GCCSID</a>	EBCDIC CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	GCCSID
<a href="#">GET_ACCEL_ARCHIVE</a>	GET ACCEL ARCHIVE	DSN6SPRM	<a href="#">DSNTIP82</a>	Yes	M	CGAA
<a href="#">GRPNAME</a>	GROUP NAME	DSN6GRP	<a href="#">DSNTIPK</a>		G	GRPNAME

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<u>HONOR_KEEPPDICTIONARY</u>	—	DSN6SPRM	—	Yes	—	HNRKPDIC
<u>IDAUTH_MODULE</u>	IDENTIFY/AUTH	DSN6SYSP	<u>DSNTIPO3</u>		G	IDAUTMOD
<u>IDBACK</u>	MAX BATCH CONNECT	DSN6SYSP	<u>DSNTIPE</u>	Yes	M	NUMCONBT
<u>IDFORE</u>	MAX TSO CONNECT	DSN6SYSP	<u>DSNTIPE</u>	Yes	M	NUMCONTS
<u>IDTHTOIN</u>	IDLE THREAD TIMEOUT	DSN6FAC	"DSNTIP5: Distributed data facility panel 2" on page 307	Yes	M	IDTHTOIN
<b>I</b> <u>IDXBPOOL</u>	DEFAULT BUFFER POOL FOR USER INDEXES	DSN6SYSP	<u>DSNTIP2</u>	Yes	M	IDXBPOOL
<u>IGNSORTN</u>	IGNORE SORTNUM STMT	DSN6SPRM	<u>DSNTIP6</u>	Yes	M	IGNSORTN
<u>IMMEDWRI</u>	IMMEDIATE WRITE	DSN6GRP	<u>DSNTIP8</u>	Yes	—	IMMEDWRI
<b>I</b> <u>IMPDSDEF</u>	DEFINE DATA SETS	DSN6SYSP	<u>DSNTIP72</u>	Yes	M	IMPDSDEF
<u>IMPSSIZE</u>	—	DSN6SYSP	—	Yes	M	IMPSSIZE
<u>IMPLICIT_TIMEZONE</u>	IMPLICIT TIME ZONE	DSNHDECP	<u>DSNTIP4</u>		G	IMTZ
<u>IMPTKMOD</u>	—	DSN6SYSP	—	Yes	M	IMPTKMOD
<b>I</b> <u>IMPTSCMP</u>	USE DATA COMPRESSION	DSN6SYSP	<u>DSNTIP72</u>	Yes	M	IMPTSCMP
<u>INDEX_CLEANUP_THREADS</u>	INDEX CLEANUP THREADS	DSN6SPRM	<u>DSNTIPE1</u>	Yes	M	IXCU
<b>I</b> <u>INDEX_MEMORY_CONTROL</u>	INDEX MEMORY CONTROL	DSN6SPRM	<u>DSNTIP71</u>	Yes	G	IXMC
<u>INLISTP</u>	—	DSN6SPRM	—	Yes	M	INLISTP
<u>IRLMPRC</u>	PROC NAME	DSN6SPRM	<u>DSNTIPI</u>		U	IRLMPROC
<u>IRLMRWT</u>	RESOURCE TIMEOUT	DSN6SPRM	<u>DSNTIPI</u>		M	IRLMWAIT
<u>IRLMSID</u>	SUBSYSTEM NAME	DSN6SPRM	<u>DSNTIPI</u>		U	IRLMSSID
<b>I</b> <u>IX_TB_PART_CONV_EXCLUDE</u>	EXCLUDE PART KEY COLUMNS	DSN6SPRM	<u>DSNTIP72</u>	Yes	—	XPKE
<u>IXQTY</u>	INDEX SPACE ALLOCATION	DSN6SYSP	<u>DSNTIP7</u>	Yes	G	IXQTY
<u>LBACKOUT</u>	LIMIT BACKOUT	DSN6SYSP	<u>DSNTIPL1</u>		M	LBACKOUT
<u>LC_TYPE</u>	LOCALE LC_CTYPE	DSNHDECP	<u>DSNTIPF</u>		G	LCCTYPE
<b>I</b> <u>LA_SINGLESEL_ISOCS_CDY</u>	—	DSN6SPRM	—	Yes	G	LSSIC
<b>I</b> <u>LIKE_BLANK_INSIGNIFICANT</u>	—	DSN6SPRM	—	Yes	G	LBIN
<b>I</b> <u>LOAD_DEL_IMPLICIT_SCALE</u>	LOAD FORMAT DELIMITED IMPLICIT DECIMAL SCALE	DSN6SPRM	<u>DSNTIP63</u>	Yes	M	LDISCALE
<b>I</b> <u>LOAD RO OBJECTS</u>	LOAD RO OBJECTS	DSN6SPRM	<u>DSNTIP6</u>		M	LIRO
<u>LOB_INLINE_LENGTH</u>	LOB INLINE LENGTH	DSN6SYSP	<u>DSNTIPD</u>	Yes	M	LOBINLEN
<u>LRDRTHLD</u>	LONG-RUNNING READER	DSN6SPRM	<u>DSNTIPE</u>	Yes	M	LRDRTHLD
<u>MAINTYPE</u>	CURRENT MAINT TYPES	DSN6SPRM	<u>DSNTIP81</u>	Yes	M	MAINTYPE
<u>MATERIALIZE_NODET_SQLTUDF</u>	—	DSN6SPRM	—	Yes	M	MNSU
<u>MAXSORT_IN_MEMORY</u>	MAX IN-MEMORY SORT SIZE	DSN6SPRM	<u>DSNTIPC</u>	Yes	M	ARHCMAX

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<u>MAX_CONCURRENT_PKG_OPS</u>	—	DSN6SPRM	—	Yes	M	MXCONPKG
<u>MAX_NUM_CUR</u>	MAX OPEN CURSORS	DSN6SPRM	<u>DSNTIPX</u>	Yes	M	MXNUMCUR
<u>MAX_ST_PROC</u>	MAX STORED PROCS	DSN6SPRM	<u>DSNTIPX</u>	Yes	M	MXSTPROC
<u>MAX_UDF</u>	MAX UDFS	DSN6SPRM	<u>DSNTIPX</u>	Yes	M	MXUDF
<u>MAXARCH</u>	RECORDING MAX	DSN6LOGP	<u>DSNTIPA</u>	—	—	ARCHMAXV
<u>MAXCONQN</u>	CONN QUEUE MAX DEPTH	DSN6FAC	<u>DSNTIP5</u>	Yes	M	MAXCONQN
<u>MAXCONQW</u>	CONN QUEUE MAX WAIT	DSN6FAC	<u>DSNTIP5</u>	Yes	M	MAXCONQW
<u>MAXDBAT</u>	MAX REMOTE ACTIVE	DSN6SYSP	<u>DSNTIPE</u>	Yes	M	NUMCONRM
<u>MAXKEEPD</u>	MAX KEPT DYN STMTS	DSN6SPRM	<u>DSNTIPE</u>	Yes	M	MAXKEEPD
<u>MAXOFILR</u>	MAX OPEN FILE REFS	DSN6SYSP	<u>DSNTIPE</u>	Yes	M	MAXOFILR
<u>MAXRBLK</u>	RID POOL SIZE	DSN6SPRM	<u>DSNTIPC</u>	Yes	—	RIDPOOL
<u>MAXRTU</u>	READ TAPE UNITS	DSN6LOGP	<u>DSNTIPA</u>	Yes	M	ARCHMRTU
<u>MAXTEMPS</u>	MAX TEMP STG/AGENT	DSN6SPRM	<u>DSNTIP91</u>	Yes	M	MAXTEMPS
<u>MAXTEMPS_RID</u>	MAX TEMP RID	DSN6SPRM	<u>DSNTIP91</u>	Yes	M	MXTMPRID
<u>MAXTYPE1</u>	MAX INACTIVE DBATS	DSN6FAC	"DSNTIP5: Distributed data facility panel 2" on page 307	Yes	—	MAXTYPE1
<u>MCCSID</u>	EBCDIC CCSID	DSNHDECP	<u>DSNTIPF</u>	—	G	MCCSID
<u>MEMBNAME</u>	MEMBER NAME	DSN6GRP	<u>DSNTIPK</u>	—	U	MEMBNAME
<u>MFA_AUTHCACHE_UNUSED_TIME</u>	MFA AUTH UNUSED TIME	DSN6SPRM	"DSNTIPP: Protection panel " on page 264	Yes "3" on page 424	G	MFAT
<u>MINDVSCL</u>	—	DSN6SPRM	—	Yes	—	MINDVSCL
<u>MIXED</u>	MIXED DATA	DSNHDECP	<u>DSNTIPF</u>	—	G	DEFMIXED
<u>MON</u>	MONITOR TRACE	DSN6SYSP	<u>DSNTIPN</u>	—	M	MON
<u>MONSIZE</u>	MONITOR SIZE	DSN6SYSP	<u>DSNTIPN</u>	—	M	MONSIZE
<u>MOVE_TO_ARCHIVE_DEFAULT</u>	—	DSN6SPRM	—	Yes	G	MOVE_TO_ARCHIVE_DEFAULT
<u>MXDTCACH</u>	MAX DATA CACHING	DSN6SPRM	<u>DSNTIP81</u>	Yes	M	MXDCACH
<u>NPGTHRS</u>	—	DSN6SPRM	—	Yes	M	NPGTHRS
<u>NUMLKTS</u>	LOCKS PER TABLE(SPACE)	DSN6SPRM	<u>DSNTIPJ</u>	Yes	M	IRMLKTS
<u>NUMLKUS</u>	LOCKS PER USER	DSN6SPRM	<u>DSNTIPJ</u>	Yes	M	IRMLKUS
<u>OFFLOAD</u>	—	DSN6LOGP	—	No	M	OFFLOAD
<u>OPT1ROWBLOCKSORT</u>	—	DSN6SPRM	—	Yes	—	OP1RBSRT
<u>OPTHINTS</u>	OPTIMIZATION HINTS	DSN6SPRM	<u>DSNTIP8</u>	Yes	M	OPTHINTS
<u>OTC_LICENSE</u>	OTC LICENSE USAGE	DSN6SYSP	<u>DSNTIPO2</u>	—	—	OTC_LICENSE
<u>OUTBUFF</u>	OUTPUT BUFFER	DSN6LOGP	<u>DSNTIPL</u>	—	M	OUTBUFF

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<u>PADIX</u>	PAD INDEXES BY DEFAULT	DSN6SPRM	<u>DSNTIP71</u>	Yes	G	PADIX
<u>PADNTSTR</u>	PAD NUL-TERMINATED	DSNHDECP	<u>DSNTIP4</u>		M	PADNSTSR
<u>PAGESET_PAGENUM</u>	PAGE SET PAGE NUMBERING	DSN6SPRM	<u>DSNTIP71</u>	Yes	M	PSPN
<u>PARA_EFF</u>	PARALLELISM EFFICIENCY	DSN6SPRM	<u>DSNTIP81</u>	Yes	—	PARAEFF
<u>PARAMDEG</u>	MAX DEGREE	DSN6SPRM	<u>DSNTIP81</u>	Yes	M	PARAMDEG
<u>PARAMDEG_DPSI</u>	MAX DEGREE FOR DPSI	DSN6SPRM	<u>DSNTIP81</u>	Yes	M	DEGD
<u>PARAMDEG_UTIL</u>	MAX UTILS PARALLELISM	DSN6SPRM	<u>DSNTIP6</u>	Yes	G	UMD
<u>PCTFREE_UPD</u>	PERCENT FREE FOR UPDATE	DSN6SPRM	<u>DSNTIP71</u>	Yes	G	PFUP
<u>PCLOSET</u>	RO SWITCH TIME	DSN6SYSP	<u>DSNTIPL1</u>	Yes	M	PKRC
<u>PEER_RECOVERY</u>	PEER RECOVERY	DSN6GRP	<u>DSNTIPK</u>	Yes	M	PEERRRECO
<u>PKGREL_COMMIT</u>	PACKAGE RELEASE COMMIT	DSN6SPRM	<u>DSNTIP8</u>	Yes	M	PKRC
<u>PLANMGMT</u>	PLAN MANAGEMENT	DSN6SPRM	<u>DSNTIP8</u>	Yes	M	PLANMGMT
<u>PLANMGMTSCOPE</u>	PLAN MANAGEMENT SCOPE	DSN6SPRM	<u>DSNTIP8</u>	Yes	—	PMSCOPE
<u>POOLINAC</u>	POOL THREAD TIMEOUT	DSN6FAC	<u>DSNTIP5</u>	Yes	M	POOLINAC
<u>PRIQTY</u>	PRIMARY QUANTITY	DSN6ARVP	<u>DSNTIPA</u>	Yes	M	ARCHPRI
<u>PREVENT_ALTERTB_LIMITKEY</u>	PREVENT ALTER LIMITKEY	DSN6SPRM	<u>DSNTIP72</u>	Yes	G	PALK
<u>PREVENT_NEW_IXCTRL_PART</u>	—	DSN6SPRM	—	Yes	G	PCIP
<u>PRIVATE_PROTOCOL</u>	—	DSN6FAC	—	Yes	G	PRIVPRTL
<u>PROFILE_AUTOSTART</u>	PROFILE AUTOSTART	DSN6SYSP	<u>DSNTIPO</u>		M	PFAS
<u>PROTECT</u>	ARCHIVE LOG RACF	DSN6ARVP	<u>DSNTIPP</u>	Yes	M	PROTARAC
<u>PTASKROL</u>	—	DSN6SYSP	—	Yes	M	PTASKROL
<u>QUERY_ACCEL_OPTIONS</u>	ACCELERATION OPTIONS	DSN6SPRM	<u>DSNTIP82</u>	Yes	M	QACO
<u>QUERY_ACCELERATION</u>	CURRENT QUERY ACCEL	DSN6SPRM	<u>DSNTIP82</u>	Yes	M	QCAC
<u>QUERY_ACCEL_WAITFORDATA</u>	WAIT FOR DATA	DSN6SPRM	<u>DSNTIP82</u>	Yes	M	QAWFD
<u>QUIESCE</u>	QUIESCE PERIOD	DSN6ARVP	<u>DSNTIPA</u>	Yes	M	ARCHMQP
<u>RANDOMATT</u>	RANDOM ATTACH	DSN6GRP	<u>DSNTIPK</u>	Yes	M	RANDOMAT
<u>REALSTORAGE_MANAGEMENT</u>	MANAGE REAL STORAGE	DSN6SPRM	<u>DSNTIPE1</u>	Yes	M	RSMGMT
<u>REALSTORAGE_MAX</u>	—	DSN6SPRM	—	Yes	M	RSMAX
<u>REC_FASTREPLICATION</u>	FAST RESTORE	DSN6SPRM	<u>DSNTIP61</u>	Yes	M	RECFASRP
<u>RECALL</u>	RECALL DATABASE	DSN6SPRM	<u>DSNTIPO</u>		M	RECALL
<u>RECALLD</u>	RECALL DELAY	DSN6SPRM	<u>DSNTIPO</u>	Yes	M	RECALLD
<u>REFSHAGE</u>	CURRENT REFRESH AGE	DSN6SPRM	<u>DSNTIP81</u>	Yes	M	REFSHAGE
<u>REMOTE_COPY_SW_ACCEL</u>	REMOTE COPY SW ACCEL	DSN6LOGP	<u>DSNTIPL</u>	Yes	R	RCSA
<u>RENAMETABLE</u>	RENAME TABLE	DSN6SPRM	<u>DSNTIP72</u>	Yes	G	ERTS
<u>REORG_DROP_PBG_PARTS</u>	REORG DROP PBG PARTS	DSN6SPRM	<u>DSNTIP63</u>	Yes	M	RPBG

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">REORG_IC_LIMIT_DASD</a>	REORG IC LIMIT DASD	DSNSPRM	<a href="#">DSNTIP63</a>	Yes	M	RICLD
<a href="#">REORG_IC_LIMIT_TAPE</a>	REORG IC LIMIT TAPE	DSNSPRM	<a href="#">DSNTIP63</a>	Yes	M	RICLT
<a href="#">REORG_INDEX_NOSYSUT1</a>	REORG INDEX NOSYSUT1	DSN6SPRM	<a href="#">DSNTIP63</a>	Yes	M	RINSU
<a href="#">REORG_LIST_PROCESSING</a>	REORG LIST PROCESSING	DSN6SPRM	<a href="#">DSNTIP63</a>	Yes	M	RLPR
<a href="#">REORG_MAPPING_DATABASE</a>	REORG MAPPING DB	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	M	RMDB
<a href="#">REORG_PART_SORT_NPSI</a>	REORG PART SORT NPSI	DSN6SPRM	<a href="#">DSNTIP63</a> <a href="#">DSNTIP62</a>	Yes	M	RPSN
<a href="#">RESTART</a>	RESTART OR DEFER	DSN6SPRM	<a href="#">DSNTIPS</a>		M	RESTART
<a href="#">RESTORE_RECOVER_FROMDUMP</a>	RESTORE/RECOVER	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	M	RESRECFD
<a href="#">RESTORE_TAPEUNITS</a>	MAXIMUM TAPE UNITS	DSN6SPRM	<a href="#">DSNTIP62</a> <a href="#">DSNTIP6</a>	Yes	M	RESTORTU
<a href="#">REORG_TS_NOPAD_DEFAULT</a>	REORG TS NOPAD DEFAULT	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	M	REONOPAD
<a href="#">RESTRICT_ALT_COL_FOR_DCC</a>	—	DSN6SPRM	—	Yes	M	RACFD
<a href="#">RESYNC</a>	RESYNC INTERVAL	DSN6FAC	<a href="#">DSNTIPR</a>	Yes	M	RESYNC
<a href="#">RETLWAIT</a>	RETAINED LOCK TIMEOUT	DSN6SPRM	<a href="#">DSNTIPI</a>	Yes	M	RETLWAIT
<a href="#">RETRY_STOPPED_OBJECT</a>	RETRY STOPPED OBJECTS	DSN6SPRM	<a href="#">DSTIP72</a>		G	RSO
<a href="#">REVOKE_DEP_PRIVILEGES</a>	REVOKE DEP PRIV	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	REVDPRIV
<a href="#">RGFCOLID</a>	REGISTRATION OWNER	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFCOLID
<a href="#">RGFDBNAM</a>	REGISTRATION DATABASE	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFDBNAM
<a href="#">RGFDEDPL</a>	CONTROL ALL APPLICATIONS	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFDEDPL
<a href="#">RGFDEFLT</a>	UNREGISTERED DDL DEFAULT	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFDEFLT
<a href="#">RGFESCP</a>	ART/ORT ESCAPE CHARACTER	DSN6SPRM	<a href="#">DSNTIPZ</a>		M	RGFESCP
<a href="#">RGFFULLQ</a>	REQUIRE FULL NAMES	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFFULLQ
<a href="#">RGFINSTL</a>	INSTALL DD CONTROL SUPT	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFINSTL
<a href="#">RGFNMORT</a>	OBJT REGISTRATION TABLE	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFNMORT
<a href="#">RGFNMPRT</a>	APPL REGISTRATION TABLE	DSN6SPRM	<a href="#">DSNTIPZ</a>		G	RGFNMPRT
<a href="#">RLF</a>	RLF AUTO START	DSN6SYSP	<a href="#">DSNTIPO4</a>		M	RLFSTART
<a href="#">RLFENABLE</a>	RLF SCOPE	DSN6SYSP	<a href="#">DSNTIPO4</a>	Yes	R	RLFSCOPE
<a href="#">RLFAUTH</a>	RESOURCE AUTHID	DSN6SYSP	<a href="#">DSNTIPP1</a>	Yes	M	PROTRLF
<a href="#">RLFERR</a>	DYNAMIC SQL	DSN6SYSP	<a href="#">DSNTIPO4</a>	Yes	M	RLFERROR
<a href="#">RLFERRD</a>	REMOTE DYNAMIC SQL	DSN6FAC	<a href="#">DSNTIPO4</a>	Yes	M	RLFERRD
<a href="#">RLFERRSTC</a>	STATIC SQL	DSN6SYSP	<a href="#">DSNTIPO4</a>	Yes	M	RLFERRST
<a href="#">RLFERRDSTC</a>	REMOTE STATIC SQL	DSN6FAC	<a href="#">DSNTIPO4</a>	Yes	M	RLFERRST

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">RLFTBL</a>	RLST NAME SUFFIX	DSN6SYSP	<a href="#">DSNTIPO4</a>	Yes	M	RLFSUFF
<a href="#">ROUTCDE</a>	WTO ROUTE CODES	DSN6SYSP	<a href="#">DSNTIPO</a>		M	OPROUTCD
<a href="#">RRULOCK</a>	U LOCK FOR RR/RS	DSN6SPRM	<a href="#">DSNTIPI</a>	Yes	M	RRULOCK
<a href="#">SCCSID</a>	EBCDIC CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	SCCSID
<a href="#">SECADM1</a>	SECURITY ADMIN 1	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	SECADM1
<a href="#">SECADM1_INPUT_STYLE</a>	—	DSN6SPRM	—	Yes	G	SECA1IS
<a href="#">SECADM1_TYPE</a>	SEC ADMIN 1 TYPE	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	SECAMD1T
<a href="#">SECADM2</a>	SECURITY ADMIN 2	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	SECADMN2
<a href="#">SECADM2_INPUT_STYLE</a>	—	DSN6SPRM	—	Yes	G	SECA2IS
<a href="#">SECADM2_TYPE</a>	SEC ADMIN 2 TYPE	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	SECADM2T
<a href="#">SECQTY</a>	SECONDARY QTY	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHSEC
<a href="#">SEPARATE_SECURITY</a>	SEPARATE SECURITY	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	SEPSECUR
<a href="#">SIGNON_MODULE</a>	SIGNON	DSN6SYSP	<a href="#">DSNTIPO3</a>		G	SIGNON
<a href="#">SIMULATED_CPU_COUNT</a>	—	DSN6SPRM	—	Yes	G	SIMCCNT
<a href="#">SIMULATED_CPU_SPEED</a>	—	DSN6SPRM	—	Yes	G	SIMCSPD
<a href="#">SITETYP</a>	SITE TYPE	DSN6SPRM	<a href="#">DSNTIPO</a>		G	SITETYP
<a href="#">SJTABLES</a>	—	DSN6SPRM	—	Yes	M	SJTABLES
<a href="#">SKIPUNCI</a>	SKIP UNCOMM INSERTS	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	SKIPUNCI
<a href="#">SMF89</a>	—	DSN6SYSP	—	Yes	—	SMF89
<a href="#">SMFACCT</a>	SMF ACCOUNTING	DSN6SYSP	<a href="#">DSNTIPN</a>		M	OPSMFACT
<a href="#">SMFCOMP</a>	COMPRESS SMF RECS	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	SMFCOMP
<a href="#">SMFSTAT</a>	SMF STATISTICS	DSN6SYSP	<a href="#">DSNTIPN</a>		M	OPSMFSTA
<a href="#">SQLDELI</a>	SQL STRING DELIMITER	DSNHDECP	<a href="#">DSNTIPF</a>		G	DEFSQSTR
<a href="#">SQLLEVEL</a>	PRECOMPILER SQL LEVEL	DSNHDECP	<a href="#">DSNTIPO0</a>	Yes "5" on page 424	G	SQLL
<a href="#">SRTPOOL</a>	SORT POOL SIZE	DSN6SPRM	<a href="#">DSNTIPC</a>	Yes	M	SRTPOOL
<a href="#">SSID</a>	SUBSYSTEM NAME	DSNHDECP	<a href="#">DSNTIPM</a>		U	MVSSNAME
<a href="#">STARJOIN</a>	STAR JOIN QUERIES	DSN6SPRM	<a href="#">DSNTIP81</a>	Yes	M	STARJOIN
<a href="#">STATCLGSRT</a>	STATISTICS COLGROUP DATA SORT	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	M	STCS
<a href="#">STATFDBK_PROFILE</a>	STATISTICS PROFILE FEEDBACK	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	SFPR



Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">STATFDBK_SCOPE</a>	STATISTICS FEEDBACK	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	SFBS
<a href="#">STATHIST</a>	STATISTICS HISTORY	DSN6SPRM	<a href="#">DSNTIP6</a> <a href="#">DSNTIP61</a>	Yes	G	STATHIST
<a href="#">STATIME</a>	STATISTICS TIME	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	OPSTATIM
<a href="#">STATIME_DDF</a>	DDF STATS TIME	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	OPSTATMD
<a href="#">STATIME_MAIN</a>	MAIN STATS TIME	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	OPSTATMM
<a href="#">STATPGSAMP</a>	PAGE-LEVEL SAMPLING	DSN6SPRM	<a href="#">DSNTIP6</a>	No	M	STPGSAM
<a href="#">STATROLL</a>	STATISTICS ROLLUP	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	G	STATROLL
<a href="#">STATSINT</a>	REAL TIME STATS	DSN6SPRM	<a href="#">DSNTIP8</a>	Yes	G	STATSINT
<a href="#">STDSQL</a>	STD SQL LANGUAGE	DSNHDECP	<a href="#">DSNTIP4</a>		G	DEFSQLVL
<a href="#">STORMXAB</a>	MAX ABEND COUNT	DSN6SYSP	<a href="#">DSNTIPX</a>	Yes	M	STORMXAB
<a href="#">STORTIME</a>	TIMEOUT VALUE	DSN6SYSP	<a href="#">DSNTIPX</a>	Yes	M	STORTIME
<a href="#">SUBQ_MIDX</a>	—	DSN6SPRM	—	Yes	—	SUBQ_MIDX
<a href="#">SUBSTR_COMPATIBILITY</a>	SUBSTR COMPATIBILITY	DSN6SPRM	<a href="#">DSNTIPX</a>	Yes	G	SUBSTRCP
<a href="#">SUPERRS</a>	SUPPRESS SOFT ERRORS	DSN6SPRM	<a href="#">DSNTIPM</a>	Yes	M	SUPERRS
<a href="#">SUPPRESS_HINT_SQLCODE_DYN</a>	—	DSN6SPRM	—	Yes	M	SHSD
<a href="#">SVOLARC</a>	SINGLE VOLUME	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	SVOLARC
<a href="#">SYNCVAL</a>	STATISTICS SYNC	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	M	SYNCVAL
<a href="#">SYSADM</a>	SYSTEM ADMIN 1	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	PROTADMN
<a href="#">SYSADM2</a>	SYSTEM ADMIN 2	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	PROTADM2
<a href="#">SYSOPR1</a>	SYSTEM OPERATOR 1	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	PROTOPR1
<a href="#">SYSOPR2</a>	SYSTEM OPERATOR 2	DSN6SPRM	<a href="#">DSNTIPP1</a>	Yes "3" on page 424	G	PROTOPR2
<a href="#">SYSTEM_LEVEL_BACKUPS</a>	SYSTEM-LEVEL BACKUPS	DSN6SPRM	<a href="#">DSNTIP62</a> <a href="#">DSNTIP6</a>	Yes	M	SYSLVLBK
<a href="#">TBSBP8K</a>	DEFAULT 8-KB BUFFER POOL FOR USER DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBP8K
<a href="#">TBSBP16K</a>	DEFAULT 16-KB BUFFER POOL FOR USER DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBP16K
<a href="#">TBSBP32K</a>	DEFAULT 32-KB BUFFER POOL FOR USER DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBP32K
<a href="#">TBSBPLOB</a>	DEFAULT BUFFER POOL FOR USER LOB DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBPLOB
<a href="#">TBSBPOOL</a>	DEFAULT 4-KB BUFFER POOL FOR USER DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBPOOL
<a href="#">TBSBPXML</a>	DEFAULT BUFFER POOL FOR USER XML DATA	DSN6SYSP	<a href="#">DSNTIP2</a>	Yes	M	TBSBPXML

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">TCPALVER</a>	TCP/IP ALREADY VERIFIED	DSN6FAC	<a href="#">DSNTIP5</a>	Yes "3" on page 424	G	TCPALVER
<a href="#">TCPKPALV</a>	TCP/IP KEEPALIVE	DSN6FAC	<a href="#">DSNTIP5</a>	Yes "3" on page 424	M	TCPKPALV
<a href="#">TEMPLATE_TIME</a>	TEMPLATE TIME	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	G	TPTM
<a href="#">TIME</a>	TIME FORMAT	DSNHDECP	<a href="#">DSNTIP4</a>		G	DEFTIME
<a href="#">TIMELEN</a>	LOCAL TIME LENGTH	DSNHDECP	<a href="#">DSNTIP4</a>		G	DEFTIMEL
<a href="#">TRACSTR</a>	TRACE AUTO START	DSN6SYSP	<a href="#">DSNTIPN</a>		M	OPTRCAUT
<a href="#">TRACTBL</a>	TRACE SIZE	DSN6SYSP	<a href="#">DSNTIPN</a>		M	CALC/ OPTRCSIZ
<a href="#">TRKRSITE</a>	TRACKER SITE	DSN6SPRM	<a href="#">DSNTIPO</a>		G	TRKRSITE
<a href="#">TS_COMPRESSION_TYPE</a>	TS COMPRESSION TYPE	DSN6SPRM	<a href="#">DSNTIP7</a>	Yes	G	--
<a href="#">TSQTY</a>	TABLE SPACE ALLOCATION	DSN6SYSP	<a href="#">DSNTIP7</a>	Yes	G	TSQTY
<a href="#">TSTAMP</a>	TIMESTAMP ARCHIVES	DSN6ARVP	<a href="#">DSNTIPH</a>	Yes	M	ARCHTS
<a href="#">TWOACTV</a>	NUMBER OF COPIES	DSN6LOGP	<a href="#">DSNTIPH</a>		M	CALC/ LOGSTWO
<a href="#">TWOARCH</a>	NUMBER OF COPIES	DSN6LOGP	<a href="#">DSNTIPH</a>		M	CALC/ ARCHTWO
<a href="#">TWOBSDS</a>	—	DSN6LOGP	—		—	TWOBSDS
<a href="#">UGCCSID</a>	UNICODE CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	UGCCSID
<a href="#">UIFCIDS</a>	UNICODE IFCIDS	DSN6SYSP	<a href="#">DSNTIPN</a>	Yes	G	UIFCIDS
<a href="#">UMCCSID</a>	UNICODE CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	UMCCSID
<a href="#">UNION_COLNAME_7</a>	—	DSN6SPRM	—	Yes	M	UNCOLN7
<a href="#">UNIT</a>	DEVICE TYPE 1	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHDEVT
<a href="#">UNIT2</a>	DEVICE TYPE 2	DSN6ARVP	<a href="#">DSNTIPA</a>	Yes	M	ARCHDEV2
<a href="#">URCHKTH</a>	UR CHECK FREQ	DSN6SYSP	<a href="#">DSNTIPL1</a>	Yes	M	URCHKTH
<a href="#">URLGWTH</a>	UR LOG WRITE CHECK	DSN6SYSP	<a href="#">DSNTIPL1</a>	Yes	M	URLGWTH
<a href="#">USCCSID</a>	UNICODE CCSID	DSNHDECP	<a href="#">DSNTIPF</a>		G	USCCSID
<a href="#">UTIL_DBBSG</a>	DB BACKUP STG GROUP	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	G	UDBSG
<a href="#">UTIL_LGBSG</a>	LOG BACKUP STG GRP	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	G	ULBSG
<a href="#">UTIL_TEMP_STORCLAS</a>	UTIL TEMP STORCLAS	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	G	UTTEMPSC
<a href="#">UTILS_HSM_MSGDS_HLQ</a>	HSM MESSAGE DS HLQ	DSN6SPRM	<a href="#">DSNTIP62</a>	Yes	G	UHMDH
<a href="#">UTILS_BLOCK_FOR_CDC</a>	UTILS BLOCK FOR CDC	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	M	UBCDC
<a href="#">UTILS_DUMP_CLASS_NAME</a>	DUMP CLASS NAME	DSN6SPRM	<a href="#">DSNTIP62</a> <a href="#">DSNTIP61</a>	Yes	M	UTDUMPCL
<a href="#">UTILS_USE_ZSORT</a>	UTILS USE ZSORT	DSN6SPRM	<a href="#">DSNTIP63</a>	Yes	M	UZSORT
<a href="#">UTIMOUT</a>	UTILITY TIMEOUT	DSN6SPRM	<a href="#">DSNTIP6</a> <a href="#">DSNTIP61</a>	Yes	M	UTIMOUT
<a href="#">VOLTDEVT</a>	TEMP DS UNIT NAME	DSN6SPRM	<a href="#">DSNTIP6</a>	Yes	M	VOLTDEVT

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
<a href="#">WFDBSEP</a>	SEPARATE WORK FILES	DSN6SPRM	<a href="#">DSNTIP91</a>		M	WFDBSEP
<a href="#">WFSTGUSE_AGENT_THRESHOLD</a>	AGENT LEVEL THRESHOLD	DSN6SPRM	<a href="#">DSNTIP91</a>	Yes	M	WFSAT
<a href="#">WFSTGUSE_SYSTEM_THRESHOLD</a>	SYSTEM LEVEL THRESHOLD	DSN6SPRM	<a href="#">DSNTIP91</a>	Yes	M	WFSST
<a href="#">WLMENV</a>	WLM ENVIRONMENT	DSN6SYSP	<a href="#">DSNTIPX</a>	Yes	M	WLMENV
<a href="#">XLKUPDLT</a>	X LOCK FOR SEARCHED U/D	DSN6SPRM	<a href="#">DSNTIPI</a>	Yes	M	XLKUPDLT
<a href="#">XML_RANDOMIZE_DOCID</a>	RANDOMIZE XML DOCID	DSN6SYSP	<a href="#">DSNTIP8</a>	Yes	G	XRDI
<a href="#">XML_RESTRICT_EMPTY_TAG</a>	—	DSN6SPRM	—	Yes	—	NOET
<a href="#">ZOSMETRICS</a>	—	DSN6SPRM	—	Yes	M	ZOSMETRI
<a href="#">ZHYPERLINK</a>	DB2 zHyperLinks SCOPE	DSN6SPRM	<a href="#">DSNTIPA3</a>	Yes	M	ZHYPL
—	<a href="#">ADVANCED CONFIGURATION OPTIONS</a>	—	<a href="#">DSNTIPR1</a>		—	—
—	<a href="#">APPL DEFAULTS</a>	—	<a href="#">DSNTIPO3</a>		—	—
—	<a href="#">APPLICATION DBRM</a>	—	<a href="#">DSNTIPT</a>		M	DBRMLIB
—	<a href="#">APPLICATION LOAD</a>	—	<a href="#">DSNTIPT</a>		M	RUNLIB
—	<a href="#">ARCHIVE LOG FREQ</a>	—	<a href="#">DSNTIPL</a>		M	NUMHRARC
—	<a href="#">AUTH MEMBER</a>	—	<a href="#">DSNTIPM</a>		M	MVSAMEMB
—	<a href="#">AUTH SEQUENCE</a>	—	<a href="#">DSNTIPM</a>		M	MVSASEQN
—	<a href="#">BP0 - BP49</a>	—	<a href="#">DSNTIP1</a>		M	BP0 - BP29
—	<a href="#">BP8K0 - BP32K9</a>	—	<a href="#">DSNTIP2</a>		M	BP30 - BP32K9
—	<a href="#">BSDS AND ACTIVE LOG ICF CATALOG ALIAS</a>	—	" <a href="#">DSNTIPA4: BSDS and active log panel</a> " on page 83		G	VBSDSLOG
—	<a href="#">BUFFER POOL SIZE</a>	—	<a href="#">DSNTIPC</a>		—	—
—	<a href="#">BYTE-BASED STRING FUNCTIONS</a>	—	<a href="#">DSNTIP8A</a>	Yes	—	—
—	<a href="#">C LE PRELINKER PHASE</a>	—	<a href="#">DSNTIPU</a>		M	—
—	<a href="#">CICS and IMS transaction invocation routines (DSNTIPRN)</a>	—	<a href="#">DSNTIPRA</a>		—	—
—	<a href="#">CICS COBOL LIBRARY</a>	—	<a href="#">DSNTIPW</a>		G	CICSCOB
—	<a href="#">CICS EXCI LIBRARY</a>	—	<a href="#">DSNTIPW</a>		G	CICSEXC
—	<a href="#">CICS LOAD LIBRARY</a>	—	<a href="#">DSNTIPW</a>		G	CICSMOD
—	<a href="#">CICS MACRO LIBRARY</a>	—	<a href="#">DSNTIPW</a>		G	CICSMAC
—	<a href="#">CICS PL/I LIBRARY</a>	—	<a href="#">DSNTIPW</a>		G	CICSPLI
—	<a href="#">C/CPP COMPILER LIBRARY&gt;</a>	—	<a href="#">DSNTIPU</a>		M	CCOMP
—	<a href="#">C/CPP COMPILER MODULE</a>	—	<a href="#">DSNTIPU</a>		M	CPROG
—	<a href="#">C/CPP HEADER LIBRARY</a>	—	<a href="#">DSNTIPU</a>		M	CHDRS

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<a href="#">C/370 COMPILER MESSAGES</a>	–	<a href="#">DSNTIPU</a>	M		CMSG5
–	<a href="#">CLIST ALLOCATION</a>	–	<a href="#">DSNTIPA2</a>	M		VOLSDAT1
–	<a href="#">CLIST LIBRARY</a>	–	<a href="#">DSNTIPT</a>	M		OUTCL
–	<a href="#">COBOL COMPILER LIBRARY</a>	–	<a href="#">DSNTIPU1</a>	M		ICOBCOMP
–	<a href="#">COBOL LE PRELINKER PHASE</a>	–	<a href="#">DSNTIPU1</a>	M		ICOBPRK
–	<a href="#">COLUMNS</a>	–	<a href="#">DSNTIPD</a>	M		–
–	<a href="#">COMMAND PREFIX</a>	–	<a href="#">DSNTIPM</a>	U		MVSSPREF
–	<a href="#">COMMAND SCOPE</a>	–	<a href="#">DSNTIPM</a>	M		CMDSCOPE
–	<a href="#">COPY 1 NAME</a>	–	<a href="#">DSNTIPH</a>	U		BSDSNAM1
–	<a href="#">COPY 2 NAME</a>	–	<a href="#">DSNTIPH</a>	U		BSDSNAM2
–	Active logs: <a href="#">COPY 1 PREFIX</a>	–	<a href="#">DSNTIPH</a>	U		LOGSPRE1
–	Active logs: <a href="#">COPY 2 PREFIX</a>	–	<a href="#">DSNTIPH</a>	U		LOGSPRE2
–	<a href="#">CPP AUTO CALL LIBRARY</a>	–	<a href="#">DSNTIPU</a>	M		CPPAUTCL
–	<a href="#">CPP CLASS LIB HEADERS</a>	–	<a href="#">DSNTIPU</a>	M		CPPHDRS
–	<a href="#">CPP CLASS LIBRARY</a>	–	<a href="#">DSNTIPU</a>	M		CPPCLASS
–	<a href="#">CPP LE PRELINKER PHASE</a>	–	<a href="#">DSNTIPU</a>	M		–
–	<a href="#">CPP PROCEDURE LIBRARY</a>	–	<a href="#">DSNTIPU</a>	M		CPPPROC
–	<a href="#">CURRENT FUNCTION LEVEL</a>	–	<a href="#">DSNTIP00</a>	–		–
–	<a href="#">DATA SET NAME PREFIX</a>	–	<a href="#">DSNTIPA1</a>	–		DSNILIBP
–	<a href="#">DATA SET NAME SUFFIX</a>	–	<a href="#">DSNTIPA1</a>	–		DSNILIBS
–	<a href="#">DATA SET OR LIBRARY QUALIFIER</a>	–	<a href="#">DSNTIPAP</a>	G		AGNEWIDS
–	<a href="#">DATABASES</a>	–	<a href="#">DSNTIPD</a>	M		–
–	<a href="#">Database metadata routines (DSNTIPRK)</a>	–	<a href="#">DSNTIPRA</a>	–		–
–	<a href="#">DATABASES</a>	–	<a href="#">DSNTIPE</a>	M		–
–	<a href="#">DATABASE AND TABLESPACE STORAGE GROUP</a>	–	<a href="#">DSNTIG1</a>	–		–
–	<a href="#">DBRM LIBRARY</a>	–	<a href="#">DSNTIPT</a>	M		DSNDBRM
–	<a href="#">DB2 administrator routines (DSNTIPRL)</a>	–	<a href="#">DSNTIPRA</a>	–		–
–	<a href="#">DB2 BASE Java DIR</a>	–	<a href="#">DSNTIPX1</a>	G		–
–	<a href="#">DB2 COMMAND PREFIX FIRST CHARACTER</a>	–	<a href="#">DSNTIPAP</a>	G		AGSSIDPX
–	<a href="#">DB2 GENERIC LUNAME</a>	–	<a href="#">DSNTIPR</a>	G		GENLUNM
–	<a href="#">TARGET FUNCTION LEVEL</a>	–	<a href="#">DSNTIP00</a>	–		FUNCLVL
–	<a href="#">DB2 LOCATION NAME</a>	–	<a href="#">DSNTIPR</a>	G		DDLOC

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<a href="#">DB2 optimization routines (DSNTIPRM)</a>	–	<a href="#">DSNTIPRA</a>	–	–	–
–	<a href="#">DB2 security routines (DSNTIPRE)</a>	–	<a href="#">DSNTIPRA</a>	–	–	–
–	<a href="#">DB2 TCP/IP IPNAME</a>	–	<a href="#">DSNTIPR</a>	G	–	IPNAME
–	<a href="#">DB2 VTAM LUNAME</a>	–	<a href="#">DSNTIPR</a>	M	–	DDLUNAM
–	<a href="#">DB2 VTAM PASSWORD</a>	–	<a href="#">DSNTIPR</a>	M	–	DDPASS
–	<a href="#">DD/MM/YYYY LOCAL DATE FORMAT</a>	–	<a href="#">DSNTIP8A</a>	Yes	–	–
–	<a href="#">DEADLOCK CYCLE</a>	–	<a href="#">DSNTIPJ</a>	M	–	–
–	<a href="#">DEADLOCK TIME</a>	–	<a href="#">DSNTIPJ</a>	M	–	–
–	<a href="#">DECLARATION LIBRARY</a>	–	<a href="#">DSNTIPT</a>	M	–	SRCLIB
–	<a href="#">DEFINE CATALOG</a>	–	<a href="#">DSNTIPA2</a>	G	–	–
–	<a href="#">DISCONNECT IRLM</a>	–	<a href="#">DSNTIPJ</a>	M	–	IRLMDISC
–	<a href="#">ENGLISH TASK AND PANELS LIBRARY</a>	–	<a href="#">DSNTIPAP</a>	M	–	DSNPFPE
–	<a href="#">Enter job card information for install and sample jobs</a>	–	<a href="#">DSBNTIPY</a>	M	–	–
–	<a href="#">EXECUTED STMTS</a>	–	<a href="#">DSNTIPD</a>	M	–	NUMSTMTE
–	<a href="#">EXIT LIBRARY</a>	–	<a href="#">DSNTIPT</a>	M	–	DSNEXIT
–	<a href="#">FAVOR NEW ACCELERATOR_TYPE</a>	–	<a href="#">DSNTIP8A</a>	Yes	–	–
–	<a href="#">FOR DB2 REXX ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVR
–	<a href="#">FOR DB2 UTILITIES ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVU
–	<a href="#">FOR DB2 XML PROCESSING ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVX
–	<a href="#">FOR MOST DB2 ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVG
–	<a href="#">FOR MOST DB2 JAVA ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVJ
–	<a href="#">FOR ROUTINES IDENTIFIED TO PROGRAM CONTROL</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVP
–	<a href="#">FOR SERIALIZED ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENV1
–	<a href="#">FOR THE DB2 CICS ROUTINE</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVC
–	<a href="#">FOR DB2 MQSERIES ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVM
–	<a href="#">FOR DB2 WEB SERVICES ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENVW
–	<a href="#">FOR UNIFIED DEBUGGER ROUTINES</a>	–	<a href="#">DSNTIPR1</a>	M	–	WLMENV D
–	<a href="#">GDDM LOAD MODULES</a>	–	<a href="#">DSNTIPW</a>	M	–	GDDMLOAD

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<u>GDDM MACLIB</u>	–	<u>DSNTIPW</u>	M		GDDMMACS
–	<u>GRANT EXECUTE</u> (on many sub-panels)	–	<u>DSNTIPRA</u> (sub-panels)	–		–
–	<u>GROUP ATTACH</u>	–	<u>DSNTIPK</u>	G		GRPATTNM
–	<u>HIGH LEVEL ASSEMBLER LIB</u>	–	<u>DSNTIPU</u>	M		ASMLIB
–	<u>IC DATA SET UNIT NAME</u>	–	<u>DSNTIPG1</u>	G		–
–	<u>IC TEMPLATE DATA CLASS</u>	–	<u>DSNTIPG1</u>	G		–
–	<u>IC TEMPLATE EXPRESSION</u>	–	<u>DSNTIPG1</u>	G		–
–	<u>IC TEMPLATE MGMT CLASS</u>	–	<u>DSNTIPG1</u>	G		–
–	<u>IC TEMPLATE STOR CLASS</u>	–	<u>DSNTIPG1</u>	G		–
–	<u>IBM LE LINK EDIT LIB</u>	–	<u>DSNTIPU</u>	M		LELKED
–	<u>IBM LE PRELINK MSG LIB</u>	–	<u>DSNTIPU</u>	M		LEPLMSG
–	<u>IBM LE RUNTIME LIBRARY</u>	–	<u>DSNTIPU</u>	M		LERUN
–	<u>IBM LE RUNTIME LIBRARY 2</u>	–	<u>DSNTIPU</u>	M		LERUN2
–	<u>IBM Text Search routines</u> (DSNTIPRJ)	–	<u>DSNTIPRA</u>	–		–
–	<u>IMS RESLIB</u>	–	<u>DSNTIPW</u>	M		RESLIB
–	<u>INCLUDE LIBRARY</u>	–	<u>DSNTIPT</u>	M		DSNCHDRS
–	<u>INDEX SPACE STORAGE GROUP</u>	–	<u>DSNTIG1</u>	–		–
–	<u>INIT JAVA HEAP SIZE</u>	–	<u>DSNTIPX1</u>	G		–
–	<u>INPUT MEMBER NAME</u>	–	<u>DSNTIPA1</u>	–		–
–	<u>INSERT FROM SELECT</u>	–	<u>DSNTIP8A</u>	Yes		–
–	<u>INSTALL GRANTEE(S)</u>	–	<u>DSNTIPG</u>	M		INSGRLST
–	<u>INSTALL IC PREFIX</u>	–	<u>DSNTIPG1</u>	M		INSICPRE
–	<u>INSTALL IRLM</u>	–	<u>DSNTIPG</u>	M		–
–	<u>INSTALL DS PREFIX</u>	–	<u>DSNTIPG1</u>	M		INSDSPRE
–	<u>INSTALL PKG OWNER</u>	–	<u>DSNTIPG</u>	G		INSPKOWN
–	<u>INSTALL SQL ID</u>	–	<u>DSNTIPG</u>	G		INSSQLID
–	<u>INSTALL TYPE</u>	–	<u>DSNTIPA1</u>	–		INSTYPE
–	<u>IRLM LOAD LIBRARY</u>	–	<u>DSNTIPT</u>	M		DSNIRLM
–	<u>IRLM XCF GROUP NAME</u>	–	<u>DSNTIPJ</u>	G		IRLMGRPN
–	<u>ISPF COMMAND TABLE LIBRARY</u>	–	<u>DSNTIPAP</u>	M		DSNSPFT
–	<u>ISPF INSTALL TASK AND PANELS LIBRARY</u>	–	<u>DSNTIPAP</u>	M		DSNSPFP
–	<u>ISPF ISPLINK MODULE</u>	–	<u>DSNTIPW</u>	M		ISPLOAD
–	<u>ISPF MESSAGE LIBRARY</u>	–	<u>DSNTIPAP</u>	M		DSNSPFM

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	ISPF SKELETON LIBRARY	–	DSNTIPAP	M		DSNSPFS
–	IVP DATA LIBRARY	–	DSNTIPT	M		DSNIVPD
–	IVP GRANTEE	–	DSNTIPG	M		–
–	IVP PKG OWNER	–	DSNTIPG	M		IVPGRLST
–	IVP SQL ID	–	DSNTIPG	G		IVPPKOWN
–	Java and SQL procedure processing routines (DSNITPRF)	–	DSNTIPRA	G		IVPSQLID
–	Java ENV DATA SET	–	DSNTIPX1	G		–
–	Java ENV VAR FILE	–	DSNTIPX1	G		–
–	JDBC AND SQLJ DLLS	–	DSNTIPT	M		DSNLOD2
–	JDBC/SQLJ ENV VAR DIR	–	DSNTIPX1	G		–
–	JDBC/SQLJ INSTALL ID	–	DSNTIPX1	G		–
–	JSON routines (DSNTIPRQ)	–	DSNTIPRA	–		–
–	JVM ADDRESSING MODE	–	DSNTIPX1	G		–
–	JVM PROPERTIES FILE	–	DSNTIPX1	G		–
–	LIBRARY NAME PREFIX	–	DSNTIPA1	–		DSNTLIBP
–	LIBRARY NAME SUFFIX	–	DSNTIPA1	–		DSNTLIBS
–	LICENSE TERMS ACCEPTED	–	DSNTIPO2	–		–
–	LINK LIST ENTRY	–	DSNTIPM	M		MVSLMEMB
–	LINK LIST LIBRARY	–	DSNTIPT	M		DSNLINK
–	LINK LIST SEQUENCE	–	DSNTIPM	M		MVSLSEQN
–	LOAD LIBRARY	–	DSNTIPT	M		DSNLOAD
–	LOCK ENTRY SIZE	–	DSNTIPJ	M		IRLMLKSZ
–	LOG COPY 1, BSDS 2	–	DSNTIPA4	M		VOLSDAT6 DATACLS6 MGMTCLS6 STORCLS6
–	LOG COPY 2, BSDS 1	–	DSNTIPA4	M		VOLSDAT7 DATACLS7 MGMTCLS7 STORCLS7
–	MBCS EBCDIC	–	DSNTIP8A	Yes	–	–
–	MEMBER IDENTIFIER	–	DSNTIPJ	U		IRLMIDEN
–	NON-VSAM DATA	–	DSNTIPA3	M		VOLSDAT2 DATACLS2 MGMTCLS2 STORCLS2
–	MACRO LIBRARY	–	DSNTIPT	M		DSNMACS
–	MAX APPL HEAP SIZE	–	DSNTIPX1	G		–
–	MAX STORAGE FOR LOCKS	–	DSNTIPJ	M		–

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<a href="#">MQseries routines (DSNTIPRO)</a>	–	<a href="#">DSNTIPRA</a>	–	–	–
–	<a href="#">NUMBER OF LOCK ENTRIES</a>	–	<a href="#">DSNTIPJ</a>	M	IRLMLE	
–	<a href="#">NUMBER OF LOGS</a>	–	<a href="#">DSNTIPL</a>	M	LOGSNUM	
–	<a href="#">NUMBER OF TCBS</a>	–	<a href="#">DSNTIPX</a>	M	STORTCBS	
–	<a href="#">OTC LICENSE USAGE</a>	–	<a href="#">DSNTIPO1</a>	–	–	
–	<a href="#">OUTPUT MEMBER NAME</a>	–	<a href="#">DSNTIPA1</a>	–	–	
–	<a href="#">PACKAGE LISTS</a>	–	<a href="#">DSNTIPD</a>	M	–	
–	<a href="#">GRANT OWNER (on many sub-panels)</a>	–	<a href="#">DSNTIPRA (sub-panels)</a>	–	–	
–	<a href="#">PACKAGE STATEMENTS</a>	–	<a href="#">DSNTIPD</a>	M	–	
–	<a href="#">PACKAGES</a>	–	<a href="#">DSNTIPD</a>	M	–	
–	<a href="#">PAGE PROTECT</a>	–	<a href="#">DSNTIPJ</a>	M	IRLMPGPR	
–	<a href="#">PARAMETER MODULE</a>	–	<a href="#">DSNTIPO3</a>	U	DSNZPARM	
–	<a href="#">PERMANENT UNIT NAME</a>	–	<a href="#">DSNTIPA3</a>	M	VOLSDEVT	
–	<a href="#">PKG APPLCOMPAT</a>	–	<a href="#">DSNTIPG1</a>		JRPMGT	
–	<a href="#">PKG PLANMGMT</a>	–	<a href="#">DSNTIPG1</a>		JRTAPCO	
–	<a href="#">PLAN STATEMENTS</a>	–	<a href="#">DSNTIPD</a>	M	–	
–	<a href="#">PLANS</a>	–	<a href="#">DSNTIPD</a>	M	–	
–	<a href="#">PL/I COMPILER LIBRARY</a>	–	<a href="#">DSNTIPU1</a>	M	PLICOMP	
–	<a href="#">PL/I LE PRELINKER PHASE</a>	–	<a href="#">DSNTIPU1</a>	M	PLIPRLK	
–	<a href="#">PROVISION EXEC ID</a>	–	<a href="#">"DSNTIPG: Installation preferences panel" on page 95</a>	G	AGEXECID	
–	<a href="#">REMOTE LOCATION</a>	–	<a href="#">DSNTIPY</a>	M	–	
–	<a href="#">RESYNC PORT</a>	–	<a href="#">"DSNTIPR: Distributed data facility panel 1 " on page 301</a>	U	RESYNPRT	
–	<a href="#">ROUTINES CREATOR</a>	–	<a href="#">DSNTIPG</a>	G	AUTHID	
–	<a href="#">SAMPLE LIBRARY</a>	–	<a href="#">DSNTIPT</a>	M	NEWSAMP	
–	<a href="#">SECURE PORT</a>	–	<a href="#">"DSNTIPR: Distributed data facility panel 1 " on page 301</a>	G	SECPOR	
–	<a href="#">SEC DEF CREATOR</a>	–	<a href="#">DSNTIPG</a>	G	SECDEFID	
–	<a href="#">START IRLM CTRACE</a>	–	<a href="#">DSNTIPJ</a>	M	–	
–	<a href="#">SOFTWARE SERVICE INSTANCE NAME PREFIX</a>	–	<a href="#">DSNTIPAP</a>	G	–	



Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<a href="#">SORT LIBRARY</a>	–	<a href="#">DSNTIPW</a>		M	SORTLIB
–	<a href="#">SUBGRP ATTACH</a>	–	<a href="#">DSNTIPK</a>		M	SGRPATNM
–	<a href="#">SUBSYSTEM MEMBER</a>	–	<a href="#">DSNTIPM</a>		M	MVSSMEMB
–	<a href="#">SUBSYSTEM SEQUENCE</a>	–	<a href="#">DSNTIPM</a>		U	MVSSSEQN
–	<a href="#">SYSTEM MACLIB</a>	–	<a href="#">DSNTIPW</a>		M	MACLIB
–	<a href="#">SYSTEM PROCEDURES</a>	–	<a href="#">DSNTIPW</a>		M	PROCLIB
–	<a href="#">SYSTEM_TIME TEMPORAL QUERIES</a>	–	<a href="#">DSNTIP8A</a>	Yes	–	–
–	<a href="#">TABLES</a>	–	<a href="#">DSNTIPD</a>		M	–
–	<a href="#">TABLES IN STMT</a>	–	<a href="#">DSNTIPD</a>		M	–
–	<a href="#">TABLESPACES</a>	–	<a href="#">DSNTIPD</a>		M	–
–	<a href="#">TCP/IP PORT</a>	–	"DSNTIPR: Distributed data facility panel 1" on page 301		G	TCPPORT
–	<a href="#">TEMP CLIST LIBRARY</a>	–	<a href="#">DSNTIPT</a>		M	–
–	<a href="#">TEMPORARY UNIT NAME</a>	–	<a href="#">DSNTIPA3</a>		M	TVOLDEVT
–	Trace formatting routines (DSNTIPRB)	–	<a href="#">DSNTIPRA</a>		–	–
–	<a href="#">TS COLS WITH PRECISION OF 12</a>	–	<a href="#">DSNTIP8A</a>	Yes	–	–
–	<a href="#">UPDATE RATE</a>	–	<a href="#">DSNTIPL</a>		M	NUMCOMHR
–	Unified debugger for Java and SQL routines (DSNTIPRH)	–	<a href="#">DSNTIPRA</a>		M	–
–	<a href="#">USE ZOSMF WORKFLOW</a>	–	<a href="#">DSNTIPA1</a>		–	–
–	Utility invocation routines (DSNTIPRC)	–	<a href="#">DSNTIPRA</a>		–	–
–	<a href="#">VSAM CATALOG, DEFAULT AND WORK FILE DATABASE</a>	–	<a href="#">DSNTIPA3</a>		M	VOLSDAT3 DATACLS3 MGMTCLS3 STORCLS3
–	<a href="#">VIEWS</a>	–	<a href="#">DSNTIPD</a>		M	–
–	Web services/SOAP routines (DSNTIPRP)	–	<a href="#">DSNTIPRA</a>		–	–
–	WLM ENV NAME (on many sub-panels)	–	<a href="#">DSNTIPRA</a> (sub-panels)		–	–
–	<a href="#">WLM PROC NAME</a>	–	<a href="#">DSNTIPX</a>		M	STORWLM
–	<a href="#">WORK FILE DB</a>	–	<a href="#">DSNTIPK</a>		U	WKDBNAME
–	XML schema processing routines IVP(DSNTIPRI)	–	<a href="#">DSNTIPRA</a>		–	–
–	<a href="#">Z/OS SDK HOME DIR</a>	–	<a href="#">DSNTIPX1</a>		G	–

Table 37. Directory of subsystem parameters and application default values (continued)

Parameter name	Field name	Macro	Panel	Update online	DS "2" on page 424	DSNTIDxx entry or z/OSMF variable "1" on page 424
–	<a href="#">Z/OS USS Java CLASSES</a>	–	<a href="#">DSNTIPX1</a>	G	–	–
–	<a href="#">Z/OS USS Java RUNTIME</a>	–	<a href="#">DSNTIPX1</a>	G	–	–
–	<a href="#">4K SORT PRIMARY SPACE</a>	–	<a href="#">DSNTIP9</a>	M	S4KSPAC	S4KSPAC
–	<a href="#">4K SORT WORK TS'S</a>	–	<a href="#">DSNTIP9</a>	M	S4KNOTS	S4KNOTS
–	<a href="#">4K SORT WORK SEG SIZE</a>	–	<a href="#">DSNTIP9</a>	M	S4KSGSZ	S4KSGSZ
–	<a href="#">4K TEMP PRIMARY SPACE</a>	–	<a href="#">DSNTIP9</a>	M	T4KSPAC	T4KSPAC
–	<a href="#">4K TEMP WORK TS'S</a>	–	<a href="#">DSNTIP9</a>	M	T4KNOTS	T4KNOTS
–	<a href="#">4K TEMP WORK SEG SIZE</a>	–	<a href="#">DSNTIP9</a>	M	T4KSGSZ	T4KSGSZ
–	<a href="#">32K SORT PRIMARY SPACE</a>	–	<a href="#">DSNTIP9</a>	M	S32KSPAC	S32KSPAC
–	<a href="#">32K SORT WORK TS'S</a>	–	<a href="#">DSNTIP9</a>	M	S32KNOTS	S32KNOTS
–	<a href="#">32K SORT WORK SEG SIZE</a>	–	<a href="#">DSNTIP9</a>	M	S32KSGSZ	S32KSGSZ
–	<a href="#">32K TEMP PRIMARY SPACE</a>	–	<a href="#">DSNTIP9</a>	M	T32KSPAC	T32KSPAC
–	<a href="#">32K TEMP WORK TS'S</a>	–	<a href="#">DSNTIP9</a>	M	T32KNOTS	T32KNOTS
–	<a href="#">32K TEMP WORK SEG SIZE</a>	–	<a href="#">DSNTIP9</a>	M	T32KSGSZ	T32KSGSZ

## Notes

- For use only when migrating or installing Db2 by using z/OSMF workflows. For more information, see [Chapter 7, “Automating Db2 installation or migration with z/OS Management Facility,” on page 569](#).
- The DS column indicates the data sharing scope of each subsystem parameter:

### G

The subsystem parameter has group scope. This means that the subsystem parameter value must be the same for all members of a data sharing group.

### M, U, or R

The subsystem parameter has member scope. Variations of member scope are:

### M

The subsystem parameter value can be the same for all, some, or none of the members of the data sharing group.

### U

The subsystem parameter value must be unique for each member of the data sharing group.

### R

The subsystem parameter value can be different on some members of the data sharing group, but it is recommended to be the same on all members.

- You must use a process with a privilege set that includes installation SYSADM authority or SECADM authority. For more information, see [“Security parameters in Db2 for z/OS” on page 425](#).
- This subsystem parameter can only be changed online. Restarting Db2 has no effect on the setting.
- For online updates the SQLLEVEL, the precompiler and coprocessor begin using the new value immediately. However, the SYSIBM.DEFAULT\_SQLLEVEL global variable value is not updated until Db2 is restarted.

## Related concepts

[The scope and uniqueness of Db2 subsystem parameters in data sharing](#)

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

## Security parameters in Db2 for z/OS

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*Security parameters* in Db2 for z/OS are subsystem parameters that can be updated only by processes with a privilege set that includes installation SYSADM authority or SECADM authority.

To change the following security-related subsystem parameters, the privilege set of the process must include installation SYSADM authority or SECADM authority:

- [AUTH\\_COMPATIBILITY](#)
- [AUTHCACH](#)
- [BINDNV](#)
- [DBACRVW](#)
- [DISALLOW\\_SSARAUTH](#)
- [EXTSEC](#)
- [ENCRYPTION\\_KEYLABEL](#)
- [MFA\\_AUTHCACHE\\_UNUSED\\_TIME](#)
- [REVOKE\\_DEP\\_PRIVILEGES](#)
- [SECADM1](#)
- [SECADM1\\_TYPE](#)
- [SECADM2](#)
- [SECADM2\\_TYPE](#)
- [SEPARATE\\_SECURITY](#)
- [SYSADM](#)
- [SYSADM2](#)
- [SYSOPR1](#)
- [SYSOPR2](#)
- [TCPALVER](#)

### Security-related parameters

The following subsystem parameters are *security-related parameters*, but they do not have the same privilege-set requirements as the security parameters described previously.

- [AUDITST](#)
- [AUTH](#)
- [AUTHEXIT\\_CHECK](#)
- [AUTHCACH](#)
- [AUTHEXIT\\_CACHEREFRESH](#)
- [CACHEDYN](#)
- [SECADM1\\_INPUT\\_STYLE](#)
- [SECADM2\\_INPUT\\_STYLE](#)

### Related tasks

[Updating subsystem parameter and application default values](#)

You can dynamically update the value of some subsystem parameters while Db2 is running. For other subsystem parameters, you must stop and restart Db2 to change the values.

**Related reference**

[Installation SYSADM \(Managing Security\)](#)

[SECADM \(Managing Security\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

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## Chapter 5. Installing Db2 12

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

### Before you begin

Before you begin installing Db2:

- Review the information about Db2 security with your system security administrator, and plan and implement your Db2 security environment. See in particular [Defining RACF user IDs for Db2-started tasks \(Managing Security\)](#) and [Permitting RACF access \(Managing Security\)](#), which can help you plan your security environment even if you use an alternative security product. After initial installation of Db2, subsequent installation tasks and jobs require specific authorization in order to connect to Db2.
- If you plan to have data sharing enabled (Enable option on panel DSNTIPP1), you should save all your jobs from the original installation or migration in a different data set than the enabling jobs. If you save them in *prefix.NEW.SDSNSAMP*, the jobs might be overwritten.
- Use Information/Access or the ServiceLink facility of IBMLink to check the most current information about Db2 and other products. If you do not have access to IBMLink, contact IBM Support. For keyword specifications used for Preventive Service Planning (PSP), see the [Db2 Program Directory](#).

You must not use secondary authorization IDs to perform any of the following installation steps.

### Procedure

1. Estimate storage needs for your Db2 12 environment. For more information, see [“Storage requirements for Db2 for z/OS”](#) on page 6.
2. If you are using distributed data, install TCP/IP, VTAM, or both. For more information, see [“Connecting distributed database systems”](#) on page 867.
3. If you plan to use data sharing, set up a Parallel Sysplex. For more information, see [“Parallel Sysplex requirements for Db2 data sharing”](#) on page 602.
4. Use SMP/E to load the Db2 12 libraries. For more information, see [Chapter 3, “Making the Db2 product code available,”](#) on page 33.

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDNSLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

If you plan to use the callable SQL interface of Db2, see [Configuring Db2 ODBC and running sample applications \(Db2 Programming for ODBC\)](#) for the additional installation jobs that you need to run. If you plan to use Db2 for z/OS Java Edition, you must run more installation jobs. For more information, see [Installing the IBM Data Server Driver for JDBC and SQLJ](#).

5. Provide an SMS environment for managing Db2 catalog and directory data sets.  
The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability. You are not required to convert existing Db2 catalog and directory data sets to the SMS environment before migrating to Db2 12. These data sets will be converted the next time the related table space is reorganized. For information on using sample job DSNTIJSS to define an SMS environment for data sets that are associated with the Db2 catalog and directory, see [“Installation step 1: Define the SMS environment for Db2 catalog and directory data sets: DSNTIJSS”](#) on page 429.
6. Generate tailored JCL jobs for installing Db2 12. For more information, see [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,”](#) on page 43.

**Tip:** Consider automating the remainder of the installation process by using z/OSMF work flows. For more information, see Chapter 7, “Automating Db2 installation or migration with z/OS Management Facility,” on page 569.

7. Edit and run the jobs that install your Db2 Db2 12 subsystem by completing the following tasks:

[“Installation step 1: Define the SMS environment for Db2 catalog and directory data sets: DSNTIJSS” on page 429](#)

[“Installation step 2: Define Db2 to IRLM and MVS: DSNTIJMV” on page 429](#)

[“Installation step 3: Define Db2 address space startup procedures, language procedures, and the Java WLM environment: DSNTIJMA, DSNTIJMW, DSNTIJMP, DSNTIJMJ” on page 432](#)

[“Installation step 4: Define the ICF catalog and alias: DSNTIJCA \(optional\)” on page 435](#)

[“Installation step 5: Define system data sets: DSNTIJIN” on page 435](#)

[“Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL” on page 437](#)

[“Installation step 7: Initialize system data sets: DSNTIJID, DSNTIJIE, and DSNTIJIF” on page 438](#)

[“Installation step 8: Define user authorization exit routines: DSNTIJEX \(optional\)” on page 439](#)

[“Installation step 9: Record Db2 data to SMF \(optional\)” on page 440](#)

[“Installation step 10: Establish subsystem security \(optional\)” on page 441](#)

[“Installation step 11: Connect Db2 to TSO” on page 442](#)

[“Installation step 12: Connect Db2 to IMS \(optional\)” on page 448](#)

[“Installation step 13: Connect CICS to Db2 \(optional\)” on page 448](#)

[“Installation step 14: Define Db2 to z/OS” on page 448](#)

[“Installation step 15: Start the Db2 subsystem” on page 449](#)

[“Installation step 16: Tailor the Db2 catalog: DSNTIJTC” on page 450](#)

[“Installation step 17: Activate Db2 12 function levels: DSNTIJAF \(optional\)” on page 451](#)

[“Installation step 18: Create default storage group, define temporary work files, and bind Db2 REXX Language Support: DSNTIJTM” on page 452](#)

[“Installation step 19: Define and bind Db2 objects: DSNTIJSG” on page 453](#)

[“Installation step 20: Populate the user-maintained databases \(optional\)” on page 455](#)

[“Installation step 21: Configure Db2 for running stored procedures and user-defined functions” on page 455](#)

[“Installation step 22: Set up Db2-supplied routines” on page 466](#)

[“Installation step 23: Back up the Db2 directory and catalog: DSNTIJIC” on page 478](#)

[“Installation step 24: Set up the administrative task scheduler” on page 479](#)

[“Installation step 25: Verify successful installation of Db2 12” on page 481](#)

8. Enable more capabilities in your Db2 environment. For more information, see Chapter 10, “Configuring additional capabilities for Db2 for z/OS,” on page 819.

## What to do next

You might want to activate new capabilities that are introduced by higher Db2 12 function levels. For more information about continuous delivery and function levels in Db2 12, see the following topics:

- [Db2 12 function levels \(Db2 for z/OS What's New?\)](#)
- [Adopting new capabilities in Db2 12 continuous delivery \(Db2 for z/OS What's New?\)](#)

## Related concepts

[Making the Db2 product code available](#)

IBM distributes the product code for Db2 for z/OS in various ways. However you obtain the product code, you use System Modification Program Extended (SMP/E) to create Db2 distribution libraries, Db2 target libraries, and SMP/E control data sets, and to control of subsequent software maintenance.

## Related tasks

[Strategy for creating a Db2 data sharing group](#)

When you create a data sharing group, add one member at a time. You can install a new Db2 for the first member (the *originating member*), or you can enable an existing Db2 subsystem as the originating member.

#### Generating tailored Db2 12 installation, migration, or function level activation jobs

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

#### Automating Db2 migration by using z/OS Management Facility

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

#### **Related information**

[IBM Db2 12 for z/OS Technical Overview \(IBM Redbooks\)](#)

## Installation step 1: Define the SMS environment for Db2 catalog and directory data sets: DSNTIJSS

---

All data sets for the Db2 catalog and directory must reside on SMS-managed storage and belong to a SMS data class that is defined with the extended addressability attribute.

### **About this task**

To define a data class with the extended addressability attribute, specify EXT in the DATA SET NAME TYPE field of the DATA SET CLASS DEFINE panel of ISMF and ensure that the automatic class selection (ACS) routine associates the Db2 catalog and directory data sets with this data class. Job DSNTIJSS shows how to create a stand-alone SMS environment for the Db2 catalog and directory data sets. DSNTIJSS is designed for use on systems that do not already have a SMS environment, but it can also be used as a reference for adapting an existing one. In particular, job step STEP061 shows an example of defining a data class with the extended addressability attribute, and job step STEP071 shows example ACS routines that associate the Db2 catalog and directory data sets with the data class and a storage class.

### **Procedure**

To create the stand-alone SMS environment for the Db2 catalog and directory:

1. Customize job DSNTIJSS according to the directions in the job prolog.
2. Run job DSNTIJSS.
3. To activate the SMS environment, use this z/OS command, where *scds-name* is the name of the SMS source control data set that was specified by DSNTIJSS:

```
SETSMS SCDS(scds-name)
```



**Attention:** This command will deactivate any existing SMS environment that is defined from another SCDS.

## Installation step 2: Define Db2 to IRLM and MVS: DSNTIJMV

---

You must update certain z/OS SYS1.PARMLIB members to identify Db2 to IRLM and MVS.

### **Before you begin**

The z/OS operating system must be installed at the prerequisite level.

### **About this task**

Job DSNTIJMV demonstrates how to update the SYS1.PARMLIB members to identify Db2 to IRLM and MVS. Although you might edit and run this job, the more common approach is to examine the changes

that DSNTIJMV makes and use an editor, such as ISPF/PDF, to make the required updates directly to the SYS1.PARMLIB members.

Because DSNTIJMV cannot anticipate all the necessary updates to identify Db2 to MVS and IRLM in your z/OS environment, additional updates might be required for your site. You can complete these updates either by making the updates directly in SYS1.PARMLIB members, or by editing the DSNTIJMV job.

Do not overwrite the entries for Db2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see [Program properties table \(PPT\) \(MVS Initialization and Tuning Reference\)](#).

## Procedure

To define Db2 to IRLM and MVS:

1. Examine the DSNTIJMV job and study the updates that it makes.
2. Update the following SYS1.PARMLIB members by editing them directly, or by tailoring and running job DSNTIJMV:

### **IEFSSNxx**

Contains an entry for every z/OS subsystem. Db2 adds one entry for Db2 and two entries for IRLM in the list. The second IRLM entry, whose subsystem name is JRLM, simplifies adding a second IRLM to your system if the first is damaged. You must provide your own procedure to add JRLM. Unique names must be used for each entry.

z/OS provides subsystem entries for Db2 and IRLM in IEFSSN00. Examine these entries to determine whether they are appropriate for your needs. Make sure that a subsystem name appears only once in the subsystem name list.

Place the SMS line as the first line in an IEFSSNxx member. Place the primary system's record (JES2 or JES3) record next. Other products might affect the position of the entries during system initialization. The Db2 line should come after SMS, the JES subsystem, and other vendor products.

The Db2 entry has the following format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
      INITPARM('DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>')
```

### **ssname**

The Db2 subsystem name.

### **DSN3INI**

The name of the Db2 load module that z/OS invokes during z/OS master scheduler initialization. This module must be located in a link list data set (or in SYS1.LINKLIB).

### **DSN3EPX**

The name of the Db2 load module that responds to Db2 requests that are received from the z/OS subsystem interface. (Db2 can be active or inactive when the requests are received.) This module must be located in a link list data set (or in SYS1.LINKLIB).

### **cmd-prefix**

The one- to eight-character command prefix.

The first character of the command prefix must be one of the following characters: @ # . / ' ) \* + - = < > | & ! ; % \_ ? : ". The remaining characters of the command prefix must be one of the above characters, A-Z, or 0-9. Do not use the JES2 backspace character or command prefix character. The default is the hyphen (-).

Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign ' - ' to one subsystem and '-Db2A' to another. Similarly, you also cannot assign '?DB2' to one subsystem and '?DB2A' to another. You can assign '-DB2A' and '-DB2B' to different Db2 subsystems.



### **scope**

The one-character scope for the command prefix. Db2 registers its command prefix with the operating system. When this is done, the scope of the command prefix is controlled by the value you choose:

#### **S**

Started; and the prefix is registered with sysplex scope at Db2 startup instead of during z/OS IPL. This is the default.

**Recommendation:** Choose S, which allows you to have a single IEFSSNxx PARMLIB member that all z/OS systems in the sysplex can use. Choosing S also simplifies the task of moving a Db2 from one system to another; you can stop Db2 on one z/OS and start it up on another without having to re-IPL the system.

#### **M**

z/OS system scope; the prefix is registered during z/OS IPL.

#### **X**

Sysplex scope; the prefix is registered during z/OS IPL. As a result, this Db2 cannot be restarted on another z/OS without changing the definitions and re-IPLing both z/OS systems.

### **group-attach**

The group attachment name, which is used for data sharing. You can specify this on installation panel DSNTIPK.

### **subgroup-attach**

is the name of the subgroup attachment, which is used in data sharing environments to provide more control over how TSO, CAF, RRSAP, JDBC, ODBC, and Db2 utilities connections find active Db2 subsystems. You can specify this value by entering a subgroup name in the SUBGRP ATTACH field on installation panel DSNTIPK.

### **IEAAPFxx or PROGxx**

Job DSNTIJMV updates IEAAPFxx to include the Db2 program libraries (*prefix*.SDSNEXIT, *prefix*.SDSNLOAD, *prefix*.SDSNLOD2, *prefix*.SDXRRESL, and *prefix*.SDSNLINK) as APF-authorized libraries.

If a program library that contains DFSORT or Db2 Sort for z/OS is not already APF-authorized, you can edit DSNTIJMV to authorize it. To do this, you can include the authorization either in this list or in LNKLSTxx. All libraries that are concatenated with *prefix*.SDSNLOAD in STEPLIB and JOBLIB statements must be APF-authorized. Ensure that the volume serial number in this member is the volume on which the data set resides.

If you are using the PROGxx member instead of the IEAAPFxx member, you must update the member manually—job DSNTIJMV does not edit it.

### **LNKLSTxx**

Job DSNTIJMV updates this member to include the Db2 load module library, *prefix*.SDSNLINK. If you moved the modules from *prefix*.SDSNLINK into another library, edit DSNTIJMV to include that library in the LNKLSTxx member. If you have combined *prefix*.SDSNLINK and *prefix*.SDSNLOAD into one library, edit DSNTIJMV to include the combined library in the LNKLSTxx member.

Any data set that is added to the LNKLSTxx member must be cataloged in the master catalog of the system. This is normally true of *prefix*.SDSNLINK; however, if an alias points to a user catalog when you run DSNALLOC, *prefix*.SDSNLINK is cataloged in a user catalog. In this case, you must either ensure that *prefix*.SDSNLINK is also cataloged in the master catalog or give *prefix*.SDSNLINK a high-level qualifier other than *prefix*, the high-level qualifier for this release. You must give a high-level qualifier other than *prefix* to all release-sensitive data sets that are placed in the LNKLSTxx member.

If you do not include the DFSORT library, the Db2 Sort for z/OS library, or both in the LNKLSTxx member, you must provide a JOBLIB or STEPLIB statement for all utility jobs that include one of those libraries. You can accomplish this by placing a STEPLIB statement in DSNUPROC, which

appears later in this job. If you use customized modules and exits, *prefix*.SDSNEXIT must precede *prefix*.SDSNLOAD in JOBLIB and STEPLIB statements.

3. If necessary, update the NSYSLX option of the z/OS IEASYSxx PARMLIB member to define more z/OS system linkage indexes (LXs).

Each Db2 and each IRLM that you define to z/OS in the IEFSSNxx PARMLIB member requires a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your Db2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs; otherwise, your subsystems might not start.

4. Complete the following steps to enable diagnosis of IRLM problems:
  - a) Specify the IRLM dump formatting modules DXRRLM50, DXRRLM55, and DXRRLS55 in a BLSCUSER member in a data set that is in the system's PARMLIB concatenation.
  - b) Copy the DXRRL186, DXRRLFTB, DXRRLM50, DXRRLM55, and DXRRLS55 modules from the IRLM SDXRRESL data set to a data set in the system's link list. Or, add the SDXRRESL data set to the system's link list in a PROGxx member of a data set in the system's PARMLIB concatenation. If you use more than one level of IRLM, you must use a STEPLIB concatenation when using IPCS to process dumps that are taken for the levels whose modules are not in the link list.

### **Related concepts**

[How Db2 assigns I/O priorities \(Db2 Performance\)](#)

### **Related reference**

[COMMAND PREFIX field](#)

The value of the COMMAND PREFIX field specifies the Db2 subsystem command prefix. When the prefix appears at the beginning of a command that is entered at a z/OS operator's console, z/OS passes the command to Db2 for processing. The command prefix is used in the Db2 entry of member IEFSSNxx of SYS1.PARMLIB.

### **Related information**

[Using the command prefix facility \(z/OS MVS Planning: Operations\)](#)

## **Installation step 3: Define Db2 address space startup procedures, language procedures, and the Java WLM environment: DSNTIJMA, DSNTIJMW, DSNTIJMP, DSNTIJMJ**

---

### **Before you begin**

The authorization ID that runs the jobs must have authority to update the target system PROCLIB. You can enter that library name on installation panel DSNTIPW in the SYSTEM PROCEDURES field. You might want to use a procedure library other than SYS1.PROCLIB for the procedures.

The authorization ID that runs job DSNTIJMJ must have authority to create the data set and HFS files that the job specifies.

Examine the updates from the jobs in this step carefully before you run them. Also, you might have additional procedures of your own to rename.

### **About this task**

Because different sites have different requirements, the jobs in the following steps cannot anticipate all the necessary updates to the target system procedure library in your z/OS environment. You might have additional procedures of your own to rename. You can complete these updates either by making the updates directly in the target system procedure library, or by editing the jobs in the following steps.

### **Procedure**

To update the system procedure library for the target z/OS system for Db2, complete the following steps:

1. Add the Db2 and IRLM address space startup procedures by tailoring and running job DSNTIJMA.

Job DSNTIJMA adds startup procedures in the target system procedure library for the following Db2 address spaces, where *ssnm* is the subsystem name:

- system services address space (*ssnmMSTR*)
- database services address space (*ssnmDBM1*)
- DDF address space (*ssnmDIST*)
- administrative task scheduler stored procedure address space (*ssnmADMT*)
- IRLM address space (*irlmproc*)

Examine the size of the private area on the Db2 startup procedures. If necessary, modify the procedures to satisfy the requirements for environmental descriptor manager (EDM) pool size, buffers, number of data sets open, and amount of available private address space. For more information, see [“Calculating working storage requirements” on page 26.](#)

The STEPLIB concatenation of the database services address space (*ssnmDBM1*) procedure includes a commented-out DD for the IBM Language Environment data sets SCEERUN and SCEERUN2. If your system does not include SCEERUN and SCEERUN2 in the system link list, you must uncomment this DD.

2. Add the address space startup procedures for the Db2-supplied WLM environments to by tailoring and running job DSNTIJMW.

Job DSNTIJMW adds the following procedures to the system PROCLIB for WLM environments:

- *ssnmWLM* for the sample WLM environment
- *ssnmWLMC* for DSNWLM\_DSNACICS
- *ssnmWLMD* for DSNWLM\_DEBUGGER
- *ssnmWLMG* for DSNWLM\_GENERAL
- *ssnmWLMJ* for DSNWLM\_JAVA
- *ssnmWLMM* for DSNWLM\_MQSERIES
- *ssnmWLMP* for DSNWLM\_PGM\_CONTROL
- *ssnmWLMR* for DSNWLM\_REXX
- *ssnmWLM1* for DSNWLM\_NUMTCB1
- *ssnmWLMU* for DSNWLM\_UTILS
- *ssnmWLMW* for DSNWLM\_WEBSERVICES
- *ssnmWLMX* for DSNWLM\_XML

3. Copy the Db2 language procedures by running job DSNTIJMP.

Job DSNTIJMP adds the following Db2- supplied language procedures to the target system procedure library:

- DSNHASM for preparing Db2 assembler language programs
- DSNHC for preparing Db2 C programs
- DSNHCPP for preparing Db2 C++ programs
- DSNHCPP2 for preparing Db2 object-oriented C++ programs
- DSNHICOB for preparing Db2 COBOL programs
- DSNHPLI for preparing Db2 PL/I programs
- DSNHFOR for preparing Db2 FORTRAN programs
- DSNHSQL for preparing Db2 external SQL procedures
- DSNUPROC for running Db2 Utilities

Change any data set names that differ at your site. If you specified a data set name suffix in the DATA SET NAME SUFFIX field of DSNTIPA1, that suffix is appended to data sets &USER . . DBRMLIB . DATA,

&USER . . RUNLIB . LOAD, and &USER . . SRCLIB . DATA. To override these data set names, you must edit the updates to the target system procedure library.

The language preparation procedures in job DSNTIJMP use the DISP=OLD parameter to enforce data integrity. However, when the installation CLIST runs, the DISP=OLD parameter for the DBRM library data set is modified to DISP=SHR. This might cause data integrity problems when you run multiple precompiler jobs. To avoid these data integrity problems, if you are not using DFSMSdfp partitioned data set extended (PDSE), you must change the language preparation procedures (DSNHICOB, DSNHICB2, DSNHFOR, DSNHC, DSNHCPP, DSNHCPP2, DSNHPLI, DSNHASM, and DSNHSQL) to specify the DISP=OLD parameter instead of the DISP=SHR parameter.

If compiler STEPLIB statements are needed, add them.

4. Create environment files for the Db2-supplied Java WLM environment by tailoring and running job DSNTIJMJ.

Job DSNTIJMJ has the following steps that create environment files for the Db2-supplied WLM environment, DSNWLM\_JAVA:

- a. Job step DSNTIJJ creates a Language Environment run-time options (JAVAENV) data set for the *ssnmWLMJ* address space procedure. This data set is allocated by the JAVAENV DD of the *ssnmWLMJ* address space procedure that is created in job DSNTIJMW.

In this job step, review the *JAVA\_HOME* path, which is the path where the JDK is located, and update if necessary. If you are using a 64-bit JVM, use the following path:

```
JAVA_HOME=/usr/lpp/java160/J6.0_64
```

If you are using a 31-bit JVM, use the following path for Java 5:

```
JAVA_HOME=/usr/lpp/java150/J5.0
```

Or use the following path for Java 6:

```
JAVA_HOME=/usr/lpp/java160/J6.0
```

You cannot specify two JDKs in a single *JAVA\_HOME* path.

- *\_CEE\_ENVFILE* if present, must be set to the name and path of the environment variable file that was created by job step DSNTIJR.
- *JVMPROPS* needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
- *DB2\_BASE* and *JCC\_HOME* need to be set to the names of the HFS directories that you selected for the Db2 for z/OS and JCC product classes.

You cannot specify two JDKs in a single *JAVA\_HOME* path.

- b. Job step DSNTIJR creates an environment variable file in HFS.
  - c. Job step DSNTIJS creates a JVM startup options file in HFS.
  - d. The absolute path and name of a HFS or zFS file is passed to DSNTJMJX.
  - e. DSNTJMJX checks whether the directory where this file is located exists or not. If the directory does not exist, it is created.
5. After running job DSNTIJMJ, review the content of the Language Environment options data set and adjust the following environment variables as needed.

The data set is created by DSNTIJMJ and must be allocated by the JAVAENV DD of the address space procedure for the Db2 core WLM environment for Java routines.

- If *\_CEE\_ENVFILE* is present, set it to the name and path of the environment variable file that was created by job step DSNTIJR.
- Set *JVMPROPS* the name and path of the JVM startup options file that was created by job step DSNTIJS.

- Set DB2\_BASE and JCC\_HOME to the names of the HFS directories that you selected for the Db2 for z/OS and JCC product classes.

## Installation step 4: Define the ICF catalog and alias: DSNTIJCA (optional)

---

The ICF catalog is the VSAM object in which Db2 records the data sets that you create during installation. Db2 uses the catalog alias as the prefix for your Db2 VSAM data sets.

### About this task

Creating the catalog is optional. If you specified YES for the DEFINE CATALOG option on installation panel DSNTIPA2, you must create the catalog. Do not run this job if you want to use an existing ICF catalog and alias (that is, you specified NO for the DEFINE CATALOG parameter on installation panel DSNTIPA2). However, ensure that the ICF catalog that you are going to use is created and that you defined an ICF catalog alias.

### Procedure

To create the ICF catalog and its alias:

1. Before running job DSNTIJCA, examine the DEFINE UCAT statement carefully to ensure that the parameters are appropriate for your needs.
2. Run job DSNTIJCA.

If DSNTIJCA runs successfully, it produces return codes of 0.

3. If DSNTIJCA fails or abends, delete the ICF catalog (if it was created) and run the job again.

### Related tasks

[Installation step 1: Define the SMS environment for Db2 catalog and directory data sets: DSNTIJSS](#)

All data sets for the Db2 catalog and directory must reside on SMS-managed storage and belong to a SMS data class that is defined with the extended addressability attribute.

### Related reference

DEFINE CATALOG field

The value of the DEFINE CATALOG field determines whether Db2 is to create a new ICF catalog.

## Installation step 5: Define system data sets: DSNTIJIN

---

Use job DSNTIJIN to define the VSAM and non-VSAM data sets for Db2.

### Before you begin

Before you define the system data sets, ensure that you have defined an SMS environment for data sets that are associated with the Db2 catalog and directory. Data sets for the Db2 catalog and directory are managed by Db2 and must be SMS-managed. The SMS environment that you use for Db2 catalog and directory data sets must be established before you begin installation or migration to Db2 12. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability.

### Procedure

To define system data sets:

1. Check the DEFINE CLUSTER statements in job DSNTIJIN to ensure that they allocate adequate disk space for your system.

**Recommendation:** For recovery purposes, place system data sets such as the Db2 recovery log and the VSAM catalog on different disk volumes. Because these data sets are used frequently, do not migrate them by using DFSMSshm.

## 2. Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0 for all DEFINE statements and steps. Check any VSAM messages carefully.

## 3. If job DSNTIJIN fails or abends, complete the following steps:

- a) Remove the z/OS catalog delete statements from job DSNTIJDE.
- b) Run job DSNTIJDE. This job deletes the previously created data sets for the Db2 directory and Db2 catalog.
- c) Run DSNTIJIN again.

### Related concepts

[Allocating and extending data sets \(Db2 Performance\)](#)

### Related tasks

[Installation step 1: Define the SMS environment for Db2 catalog and directory data sets: DSNTIJSS](#)

All data sets for the Db2 catalog and directory must reside on SMS-managed storage and belong to a SMS data class that is defined with the extended addressability attribute.

## Job DSNTIJIN

During installation, job DSNTIJIN defines VSAM and non-VSAM data sets for Db2.

DSNTIJIN performs the following tasks:

- Defines three non-VSAM data sets for the Db2 sample objects:

- *prefix*.DBRMLIB.DATA
- *prefix*.SRCLIB.DATA
- *prefix*.RUNLIB.LOAD

- Defines the VSAM clusters for the bootstrap data sets.

Each bootstrap data set (BSDS) consists of a VSAM key-sequenced data set. You defined the BSDS names during the ISPF tailoring session

- Defines the VSAM clusters for the active log data sets.

You specified up to 93 primary active log data sets during the ISPF tailoring session (NUMBER OF LOGS field on installation panel DSNTIPL). You might also have requested dual logging to generate two copies of each active log data set. Consequently, job DSNTIJIN can define up to 186 active log data sets. If you specified that DSNTIJIN is to create fewer active log data sets, then after installation, you can run the DSNJU003 utility to add additional active log data sets to the BSDS.

- Defines the VSAM clusters for the task list data set of the administrative task scheduler.
- Defines the VSAM clusters for the Db2 directory.
- Defines the VSAM clusters for the Db2 catalog.
- Invokes the LISTCAT command of access method service so that you can verify that the VSAM definitions were successful.
- Creates control intervals based on the value you specified in VARY DS CONTROL INTERVAL on panel DSNTIP7. If you specified YES, Db2 creates 4-KB, 8-KB, 16-KB, and 32-KB control intervals as appropriate in the AMS DEFINE CLUSTER commands for the Db2 catalog and directory data sets. If you specified NO, these data sets are created using a fixed control interval of 4-KB.

## Job DSNTIJDE

Job DSNTIJDE deletes the Db2 system data sets that are defined by job DSNTIJIN. If a job fails or abends, you might need to run DSNTIJDE job before restarting the Db2 installation process.

Job DSNTIJDE is not part of the normal installation process; use this job only for rerunning part of the process. Do not run this job during migration or fallback.

In most cases, you must remove or comment out the delete statement in this job for the ICF catalog (if the statement is present). The ICF catalog probably does not need to be deleted and redefined.

Deletes might fail for data sets that do not exist. This does not necessarily indicate that the job failed. If you receive other messages, check them carefully.

Job DSNTIJDE does not work properly if job DSNTIJSG or job DSNTIJTM has been executed. Job DSNTIJDE does not delete the resource limit specification table, the data sets that are used by the distributed data facility, or the data sets that are created for work file table spaces.

If job DSNTIJDE fails or abends, correct the error conditions and rerun the job. If you want to delete the ICF catalog, first list its contents and delete the data sets that are cataloged there. This could include sample data sets, user-defined data sets, or subsystem data sets that were not deleted properly. You can use a FORCE command to delete the user catalog. If you delete the catalog using FORCE before deleting all the data sets, you can use the RECATALOG option of DEFINE CLUSTER and delete the data sets.

## Installation step 6: Define Db2 initialization parameters: DSNTIJUZ, DSNTIJUA, DSNTIJUM, and DSNTIJUL

For Db2 12 installation, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdcep*), define the offline message generator CCSID (DSNHMCID), and update DDF related information in the BSDS.

### About this task

The subsystem parameter module (DSNZPxxx) and application defaults module (*dsnhdcep*) names are specified in the following DSNTIPO3 installation panel fields:

- “PARAMETER MODULE field” on page 187
- “APPL DEFAULTS field” on page 187

### Procedure

To define the Db2 12 initialization parameters, complete the following steps:

#### 1. Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see “[Job DSNTIJUZ: define the Db2 data-only subsystem parameter module](#)” on page 403.

#### 2. Run job DSNTIJUA.

Job DSNTIJUA defines the Db2 data-only application defaults module.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

For more information, see [“Job DSNTIJUA: define data-only application defaults module” on page 404.](#)

3. Run job DSNTIJUM.

Job DSNTIJUM defines the Db2 data-only offline message generator CCSID (DSNHMCID) module which is needed for message conversion by Db2 applications and utilities. For more information, see [“Job DSNTIJUM: define Db2 data-only offline message generator CCSID \(DSNHMCID\) module ” on page 405.](#)

4. Run job DSNTIJUL.

Job DSNTIJUL runs the Db2 change log inventory (DSNJU003) to update DDF-related information in the BSDS. For more information, see [“Job DSNTIJUL: update DDF related BSDS information” on page 405.](#)

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## Installation step 7: Initialize system data sets: DSNTIJID, DSNTIJIE, and DSNTIJIF

After you define your system data sets and Db2 initialization parameters, you must initialize your system data sets.

### Procedure

Run the following jobs in the specified order:

- a. DSNTIJID
- b. DSNTIJIE
- c. DSNTIJIF

- If the jobs run successfully, they produce return codes of 0. Otherwise, check for and resolve error conditions that might be reported by VSAM messages.
- If any of the jobs fail or abend, remove the ICF catalog delete statements (job step DSNTIVC) from job DSNTIJDE, run job DSNTIJDE, and then rerun the following jobs:

- DSNTIJIN
- DSNTIJUZ
- DSNTIJUA
- DSNTIJUM
- DSNTIJUL
- DSNTIJID
- DSNTIJIE
- DSNTIJIF

### Results

Job DSNTIJID records the active log data set names to the BSDS, formats the active log data sets, and initializes the Db2 directory table spaces and indexes.



Job DSNTIJIE initializes the Db2 catalog table spaces and indexes (through the SYSGRTNS table space).

Job DSNTIJIF initializes the remaining Db2 catalog table spaces and indexes.

### **Related concepts**

[Installation step 8: Define user authorization exit routines: DSNTIJEX \(optional\)](#)

Job DSNTIJEX builds sample authorization exit routines from the source code in *prefix*.SDSNSAMP. These sample authorization exit routines are DSN3@SGN and DSN3@ATH, and the user version of the access control authorization exit routine, DSNX@XAC.

## **Installation step 8: Define user authorization exit routines: DSNTIJEX (optional)**

---

Job DSNTIJEX builds sample authorization exit routines from the source code in *prefix*.SDSNSAMP. These sample authorization exit routines are DSN3@SGN and DSN3@ATH, and the user version of the access control authorization exit routine, DSNX@XAC.

Job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. Then DSNTIJEX places the exit routines in the *prefix*.SDSNEXIT library. The Db2 CLIST tailors the JCL in DSNTIJEX to match your site's environment.

The sample authorization exit routines are not the same as the default authorization exit routines that are supplied by Db2. By implementing the sample authorization exit routines, you can provide group names as secondary authorization IDs. By modifying the sample authorization exit routines, you can tailor authorization processing for your subsystem.

DSNXSXAC is a copy of the default access control authorization exit routine that users can modify. This exit routine allows you to bypass some or most of Db2 authorization checking to specify your own authorization checking. If you do not modify it, this step is not needed and you should delete it.

DSNACICS is a stored procedure that invokes user exit routine DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. If you do not need to modify the caller's parameter values, you can use the default DSNACICX exit routine. However, if you need to modify the caller's parameter values, you need to perform the following tasks:

1. Write a user exit routine in assembler, COBOL, C, or PL/I
2. Assemble or compile the source code
3. Link-edit the object code into the Db2 exit routine library

Installation job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX. You can use this step as a model for your program preparation job.

You have the following options regarding exit routines:

- To use the sample authorization exit routines, run job DSNTIJEX.
- To use the default authorization exit routines, skip job DSNTIJEX.
- To use the modified sample authorization exit routines, modify DSNTIJEX to reference the correct library before you run it.

If you will use the RACF/Db2 external security module (DSNXRXAC) as your Db2 access control authorization exit routine, modify DSNTIJEX to refer to DSNRXAC instead of DSNXSXAC.

If job DSNTIJEX runs successfully, it produces return codes of 4.

If job DSNTIJEX fails or abends, correct the problem and rerun the job.

### **Related concepts**

[Db2 data access control \(Managing Security\)](#)

[The default Db2 exit routine \(RACF Access Control Module Guide\)](#)

### **Related reference**

[DSNTIPO3: Default startup modules panel](#)

The DSNTIPO3 panel enables you to specify the default member names of certain modules that are to be loaded at Db2 startup. These modules are the subsystem parameter module, the application defaults module, and the exit modules.

### Related information

[Exit routines \(Db2 Administration Guide\)](#)

## Installation step 9: Record Db2 data to SMF (optional)

When you install Db2, you can specify whether Db2 statistical, accounting, and audit trace data is to be collected.

### Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
<b>To have Db2 collect statistical information</b>	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
<b>To have Db2 collect accounting information</b>	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
<b>To have Db2 collect auditing information</b>	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, Db2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

Db2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. Db2 can also record other performance data. After you complete the installation process, you can use commands to have Db2 record performance data for subsystem events.

2. If, during installation, you requested that Db2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

### What to do next

During Db2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other Db2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:

```
SYS(TYPE(100:102))
```

For Db2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if Db2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for Db2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks

[Controlling traces \(Db2 Administration Guide\)](#)

### Related reference

[-START TRACE command \(Db2\) \(Db2 Commands\)](#)

[z/OS MVS Initialization and Tuning Guide](#)

### Related information

[z/OS MVS Initialization and Tuning Reference](#)

## Installation step 10: Establish subsystem security (optional)

Db2 can control access to data within a Db2 subsystem. Db2 also works with outside security systems, such as RACF, that control access to the Db2 subsystem.

### Before you begin

Your system security administrator should have provided a Db2 for z/OS security environment as outlined in the information about [managing Db2 security](#), including user IDs and resource profiles for batch connections. If you are using RACF, ensure that the system security administrator also [defined your Db2 resources to RACF](#).

The following IDs should have been specified on installation panel DSNTIPP1:

- Two system administrator (installation SYSADM) authorization IDs
- Two system operator (installation SYSOPR) authorization IDs
- Two security administrator (installation SECADM) authorization IDs or roles
- One authorization ID (installation IBMUSER) if RACF is not available for batch access and USER= is not specified in the JOB statement

### Procedure

To establish subsystem security:

- Ensure that the specified installation SYSADM IDs are defined in your TSO and RACF systems before attempting to access Db2. You can also define installation SYSOPR IDs, SECADM IDs, and the installation IBMUSER ID.
- To enable primary and secondary user IDs to issue Db2 commands from the z/OS console or TSO SDSF, define RACF classes to authorize Db2 commands. Use the following RACF commands:

```
SETR CLASSACT(DSNADM)
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)
SETR RACLIST(DSNADM) REFRESH
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)
SETR RACLIST(DSNADM) REFRESH
```

You can grant SYSOPR authority to all primary and secondary user IDs that issue Db2 commands from the z/OS console or TSO SDSF, but only after Db2 can process SQL.

- To separate security tasks from system administration tasks, use the SEPARATE SECURITY field on the DSNTIPP1 panel. Before setting the SEPARATE SECURITY field to YES, set at least one SECADM system parameter to an authorization ID, or create the necessary trusted contexts and roles. If you specify YES for SEPARATE SECURITY, system administrator authority cannot be used to perform security tasks, and the SECADM authority is required to manage trusted contexts and roles. If both SECADM system parameters are set to roles and those roles have not been created, no one will have the authority to manage trusted contexts and roles.
- Run job DSNTIJRA to complete the following tasks:
  - Define the administrative task scheduler started task module to RACF program control

- Define the administrative task scheduler as a trusted context in RACF

If you are using a Db2 data sharing environment, customize and run DSNTIJRA for each member of the group.

### Related concepts

[Getting started with Db2 security \(Managing Security\)](#)

## Installation step 11: Connect Db2 to TSO

---

Although you can eventually connect Db2 to IMS, CICS, or both, connecting initially only to TSO is recommended for a first-time installation.

### About this task

For a first-time installation, you can run the sample applications that do not require CICS or IMS, allowing your database and system administrators to gain familiarity with the administrative facilities of this version of Db2.

If you have previously installed Db2 and are performing that task again, your database and system administrators are probably already familiar with Db2. In this case, you can connect IMS, CICS, or both, at the same time that you connect TSO. You can then run the sample applications that require CICS and IMS at the same time that you run the sample applications for TSO and batch.

### Procedure

To attach Db2 to TSO:

1. Make Db2 load modules available to TSO and batch users.
2. Make Db2 CLISTs available to TSO and batch users.
3. Make PL/I options available (if applicable).
4. Make panels, messages, and load modules available to ISPF and TSO.
5. Connect the DB2I panels to the ISPF Main Panel.

## Make Db2 load modules available to TSO and batch users

As part of installation, you must make Db2 load modules available to TSO and batch users. If *prefix.SDSNEXIT* and *prefix.SDSNLOAD* are included in your LNKLISTxx, you can skip this step.

### Procedure

If you have not included *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in your LNKLISTxx, you must add STEPLIB statements to your logon procedures and to the JCL for jobs to ensure that you access the Db2 12 load modules. If *prefix.SDSNEXIT* is not in your LINKxx, add it to your STEPLIB and JOBLIB concatenations before *prefix.SDSNLOAD*.

### Related tasks

[Choosing link list options](#)

Before you run the SMP/E jobs to load the Db2 libraries, you can choose your link list options.

## Make Db2 CLISTs available to TSO and batch users (DSNTIJVC)

To connect Db2 to TSO, you must make Db2 CLISTs available to TSO and batch users by running the DSNTIJVC job.

### About this task

From *prefix.SDSNCLST*, the CLIST reads and edits these four CLISTs: DSNEMC01, DSNH, DSNU, and DSNHC. It then places those CLISTs in *prefix.NEW.SDSNTEMP*. You might want to modify the default

values. The DSNEMC01 CLIST provides installation default values for the DB2I Default panels (option D on panel DSNEPRI). The first time that a TSO user executes DB2I on a specific ISPF application such as DSNE (NEWAPPL), the DSNEMC01 CLIST sets the defaults based on the values that are specified on installation panel DSNTIPF. DSNEMC01 stores the values in the ISPF profile member DSNEPROF.

Job DSNTIJVC merges the tailored CLISTs from *prefix*.NEW.SDSNTEMP with unchanged CLISTs and REXX execs from *prefix*.SDSNCLST. Then job DSNTIJVC places all CLISTs and REXX execs in *prefix*.NEW.SDSNCLST. It also converts the record format of the Db2 CLISTs from fixed-block to variable-block format with a record length of 84 and a block size of 3120. A CLIST that has been converted from fixed-block to variable-block format cannot be used as input to the DSNTINST CLIST; use the unedited version of the SDSNCLST data set, as created by SMP/E.

## Procedure

To make the CLISTs available to TSO and batch users:

1. If you use fixed-block format for your CLIST libraries, modify job DSNTIJVC as follows:
  - Change the SYSIN DD statement to DUMMY.
  - Change the allocation of *prefix*.NEW.SDSNCLST to match the data control block (DCB) attributes of your other CLIST libraries.
2. Run job DSNTIJVC.
3. Either concatenate *prefix*.NEW.SDSNCLST with your existing CLIST libraries or copy *prefix*.NEW.SDSNCLST into an existing CLIST library.

## What to do next

If you need to rerun job DSNTIJVC, first delete data set *prefix*.NEW.SDSNCLST, which is created by this job.

When corrective service is applied to a CLIST, SMP/E changes only the *prefix*.SDSNCLST data set. You need to redo any record format changes and reapply any special tailoring that is required. You also need to move the CLIST to *prefix*.NEW.SDSNCLST. Corrective service (program temporary fixes) for these CLISTs is sent with ++HOLD statements, calling to your attention the possibility of additional work.

### Related concepts

[The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

### Related tasks

[Generating tailored Db2 12 installation, migration, or function level activation jobs](#)

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## Ensure that PL/I options are available

If you are using PL/I, ensure that the options that your Db2 programmers use are included in the compiler.

### Procedure

To ensure that PL/I options are included in the compiler:

1. Ensure that the following options that are used by the program preparation function are available:

FLAG	OBJECT	SOURCE	TERMINAL	XREF
------	--------	--------	----------	------

Restrictions that are imposed by your site on PL/I compiler options affect how you can use Db2 program preparation.

2. If the macro pass is used, ensure that the following options are also available:

MACRO MDECK SYNTAX

## Make DB2I panels, messages, and load modules available to ISPF and TSO

During installation, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

### About this task

DB2I uses the ISPF PROFILE and SHARED variable pools for most panel variable fields. As a result, you can easily re-enter a panel when panel variables have previously been specified. For the Db2 subcommands that permit lists of plan names, package names, DBRMs, and ENABLE and DISABLE statements, DB2I provides ISPF to contain all the user-specified variables for these subcommand keywords.

DB2I creates and maintains a set of ISPF tables in a user-defined TSO data set that is allocated to a data set with a ddname of DSNETBLS. The DB2I-generated tables in this library are DSNCONNS, DSNDBRMS, and DSNPLPKN. The following table shows the Db2 ISPF table library member names and their contents.

<b>DSNCONNS</b>	ENABLE or DISABLE connection type and connection name variables that are referenced by plan or package name
<b>DSNDBRMS</b>	Subcommand DBRM member and LIBRARY name variables that are referenced by plan name
<b>DSNPLPKN</b>	Package list variables that are referenced by package name
<b>DSNPATHS</b>	Schema name variables that are referenced by plan or package name and that are to be included in the PATH keyword

DB2I uses ISPF table services to maintain individual ISPF tables within the DSNETBLS data set. For performance reasons, ISPF keeps this table library in an open state once an individual table has been updated. Attempts to close this data set by using the TSO FREE command results in error message IKJ56861I.

### Procedure

To make panels, messages, and load modules available to ISPF and TSO:

1. If you added the DB2I libraries as part of Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43, you can skip this step. Otherwise, concatenate the Db2 ISPF libraries with the ISPLLIB, ISPTLIB, ISPSLIB, and ISPMLIB DD statements in your logon procedures. You must also concatenate the Db2 ISPF libraries with these DD statements in any of your CLISTs where the libraries might be allocated. These libraries are *prefix.SDSNSPFP*, *prefix.SDSNSPFM*, *prefix.SDSNSPFS*, and *prefix.SDSNPFPE* or *prefix.SDSNPFPP*. If you use English DB2I panels, concatenate SDSNPFPE to ISPLLIB. If you use Kanji DB2I panels, concatenate SDSNPFPP instead of SDSNPFPE.

```
PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE
```

2. Create the DSNETBLS data set.

When allocating this data set, you should assign the following DCB attributes, where *n* is any integer:

```
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE(n*LRECL)
```

The following example shows how to set up an ALLOCATE statement to create the data set:

```
ALLOC DA(DSNSPFT) NEW SP(1 1) TR DIR(10) +  
DSORG(P0) RECFM(F B) LRECL(80) BLKSIZE(800)  
F(DSNETBLS) REUSE
```

The following example shows how to allocate an existing data set to the data set with the DSNETBLS ddname:

```
ALLOC DA(DSNSPFT) F(DSNETBLS) REUSE
```

3. If you want to run the ISPF/CAF sample application that is provided with Db2, ensure that the data set *prefix*.RUNLIB.LOAD is included in the logon procedures or in the ISPLLIB concatenation. If you chose IBMCOB for your LANGUAGE DEFAULT on panel DSNTIPF, you should also include the data set *prefix*.CEE.SCEERUN.

### Related concepts

[Dynamic SQL and the ISPF/CAF application](#)

The Phase 3 jobs of the installation or migration verification process install the ISPF/CAF sample application. This sample consists of an assembler or COBOL call attachment facility (CAF) interface, a connection manager program, and the phone application. The sample also includes the distributed application that uses DRDA access.

### Related reference

[z/OS ISPF Messages and Codes](#)

## Connect DB2I panels to the ISPF main panel

You can connect the DB2I panels to the standard ISPF panels that are already installed on your system.

### About this task

**Recommendation:** Use the following panels for establishing the connection. See your TSO administrator for other possibilities.

- Use panel ISP@MSTR, ISR@PRIM, or ISRFPA for the connection to Db2 Interactive services.
- Use panel ISR00003 for the tutorial menu update.

Two example panels are provided. Their names are DSN8ISPM (the Db2 version of an ISPF primary options panel) and DSN8ISPT (the Db2 version of a tutorial table of contents).

If the Db2 panel library is concatenated before the standard ISPF library, the connection is made.

### Procedure

To connect DB2I panels to the ISPF main panel:

1. Using the TSO RENAME command, give DSN8ISPM an alias of ISR@PRIM, and give DSN8ISPT an alias of ISR00003. For example:

```
RENAME 'prefix.SDSNSPFP(DSN8ISPM)' (ISR@PRIM) ALIAS  
RENAME 'prefix.SDSNSPFP(DSN8ISPT)' (ISR00003) ALIAS
```

2. Modify the panels as shown in the following examples. If your site has made changes to either of these panels, change your existing panels rather than using the examples.

## Examples

```

)ATTR
/*****
/* COPYRIGHT = 5740-XYR (C) COPYRIGHT IBM CORP 1982, 1985, 1990, 2003 */
/* REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083 */
/* STATUS = VERSION 8, LEVEL 0 */
*****/
)BODY
%----- ISPF/PDF PRIMARY OPTION MENU -----
%OPTION ==>_ZCMD +USERID - &ZUSER .
% 0 +ISPF PARMS - Specify terminal and user parameters +TIME - &ZTIME .
% 1 +BROWSE - Display source data or output listings +TERMINAL - &ZTERM .
% 2 +EDIT - Create or change source data +PF KEYS - &ZKEYS .
% 3 +UTILITIES - Perform utility functions
% 4 +FOREGROUND - Invoke language processors in foreground
% 5 +BATCH - Submit job for language processing
% 6 +COMMAND - Enter TSO command or CLIST
% 7 +DIALOG TEST - Perform dialog testing
% 8 +DB2I - Perform DATABASE 2 Interactive functions
% C +CHANGES - Display summary of changes for this release
% T +TUTORIAL - Display information about ISPF/PDF
% X +EXIT - Terminate ISPF using log and list defaults
%
+Enter%END+command to terminate ISPF.
%
)INIT
.HELP = ISR00003
&ZPRIM = YES /* ALWAYS A PRIMARY OPTION MENU */
&ZHTOP = ISR00003 /* TUTORIAL TABLE OF CONTENTS */
&ZHINDEX = ISR91000 /* TUTORIAL INDEX - 1ST PAGE */
)PROC
&ZSEL = TRANS( TRUNC (&ZCMD'.')
0, 'PANEL(ISPOPTA)'
1, 'PGM(ISRBRO)'
2, 'PGM(ISREDIT)'
3, 'PANEL(ISRUTIL)'
4, 'PANEL(ISRFPA)'
5, 'PGM(ISRJB1) PARM(ISRJPA) NOCHECK'
6, 'PGM(ISRPTC)'
7, 'PGM(ISPYXDR) PARM(&ZTAPPLID) SCRNAME(DTEST) NOCHECK'
8, 'CMD(DSNECPRI) NEWAPPL(DSNE)'
C, 'PGM(ISPTUTOR) PARM(ISR00005)'
T, 'PGM(ISPTUTOR) PARM(ISR00000)'
,
,
,
,
X, 'EXIT'
*, '?' )
&ZTRAIL = .TRAIL
)END

```

Figure 76. ISPF primary option panel (DSN8ISPM), edited to include Db2I

The figure above shows panel DSN8ISPM. Notice the added lines in boldface type. Adding these lines allows you to invoke the Db2 Interactive (Db2I) functions. The added lines include one displayed line:

```
% 8 +DB2I - Perform DATABASE 2 Interactive functions
```

You can also choose to add one of these undisplayed lines:

```
8, 'CMD(DSNECPRI) NEWAPPL(DSNE) '
8, 'CMD(DSNECPRI SSID(XXXX)) NEWAPPL(DSNE) '
```

The displayed line lets the user choose DB2I. Both of the undisplayed lines invoke the Db2I main panel (DSNEPRI). If you use the first undisplayed line, you accept the default for the subsystem identifier (SSID) parameter. If you use the second undisplayed lines, you can specify a different SSID parameter.

DSNECPRI is a CLIST and can be invoked directly from another user CLIST. It is an alternative way to invoke DSNEPRI without updating the primary ISPF panel.

By specifying NEWAPPL(DSNE), you define DSNE as the ISPF application that DB2I uses. ISPF uses the name DSNE to create the ISPF profile pool member name (DSNEPROF) in the TSO\_userid.ISPPROF data set, which contains all ISPF panel variables defined during DB2I execution. Any customized DSNEPROF members can be migrated from Db2 12.



**Recommendation:** Examine any new or changed default panel values to ensure that your custom values are still valid, specifically the option values for the subcommands BIND PLAN, REBIND PLAN, BIND PACKAGE, and REBIND PACKAGE.

**Using a NEWAPPL name other than DSNE:** You can define any valid ISPF application name.

```

)ATTR
/*****
/* COPYRIGHT = 5740-XYR (C) COPYRIGHT IBM CORP 1982, 1985, 1990, 2003 */
/* REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083 */
/* STATUS = VERSION 8, LEVEL 0 */
/*****
)BODY
%TUTORIAL ----- TABLE OF CONTENTS ----- TUTORIAL
%OPTION ==>_ZCMD

          | ISPF PROGRAM DEVELOPMENT FACILITY TUTORIAL |
          |             TABLE OF CONTENTS             |
          |-----|

The following topics are presented in sequence, or can be selected by
entering a one-character selection code in the option field on line 2:
%G+ GENERAL      - General information about ISPF
%0+ ISPF PARMS   - Specify terminal and user parameters
%1+ BROWSE       - Display source data or output listings
%2+ EDIT         - Create or change source data
%3+ UTILITIES    - Perform utility functions
%4+ FOREGROUND   - Invoke language processors in foreground
%5+ BATCH        - Submit job for language processing
%6+ COMMAND      - Enter TSO command or CLIST
%7+ DIALOG TEST  - Perform dialog testing
%8+ DB2        - Information about DB2
%X+ EXIT         - Terminate ISPF using log and list defaults
The following topics are presented only if explicitly selected:
%A+ APPENDIX A   - Dynamic allocation interface routine (DAIR) errors
%B+ APPENDIX B   - ISPF listing formats
%I+ INDEX        - Alphabetic index of tutorial topics
)PROC
  &ZSEL = TRANS(&ZCMD
            G,ISR01000
            0,ISP05000
            1,ISR10000
            2,ISR20000
            3,ISR30000
            4,ISR40000
            5,ISR50000
            6,ISR60010
            7,ISR70000
8,DSN4V2DB
            X,ISP90100
            A,*ISP93030
            B,*ISR95000
            I,*ISR91000
            )
)END

```

Figure 77. ISPF program development facility tutorial panel (DSN8ISPT), edited to include Db2 tutorial

The figure above shows panel DSN8ISPT. Notice the two added lines in boldface type. Adding these lines allows you to invoke the Db2 tutorial panels. One of the two added lines is displayed:

```
%8+ DB2      - Information about DB2
```

The other added line is undisplayed:

```
8,DSN4V2DB
```

The displayed line presents the user with a choice for the Db2 tutorial. The undisplayed line actually invokes the Db2 tutorial menu (DSN4V2DB).

### Related reference

[z/OS ISPF Dialog Developer's Guide and Reference](#)  
[ISPF User's Guide Vol I](#)

## Installation step 12: Connect Db2 to IMS (optional)

---

Connecting Db2 to IMS is an optional part of installation. Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. [Make Db2 load modules available to IMS.](#)
2. [Define Db2 to IMS.](#)
3. [Define new programs and transactions to IMS.](#)
4. Prepare IMS applications for Db2.
5. Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications.](#)
  - [Generate a user language interface.](#)

### Related tasks

[Connecting the IMS attachment facility](#)

Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

## Installation step 13: Connect CICS to Db2 (optional)

---

To connect Db2 to CICS, you need to disconnect and connect the CICS region.

### About this task

Coordinate this connection with your CICS support group.

### Related tasks

[Defining the CICS Db2 connection](#)

## Installation step 14: Define Db2 to z/OS

---

After you run job DSNTIJMV to define Db2 in SYS1.PARMLIB, you must activate the definition in z/OS.

### About this task

Job DSNTIJMV makes the following changes to the SYS1.PARMLIB library:

- Creates new subsystem definitions in the IEFSSNxx member
- Creates new APF libraries in the IEAAPFxx member
- Creates new load module libraries in the LNKLSTxx member

The load module library SDSNLINK contains the early code. SDSNLINK contains modules that must be placed in the link list look-aside address space (LLA) because they are loaded at subsystem initialization during the IPL.

### Procedure

IPL z/OS.

During the z/OS IPL, message DSN3100I appears on the z/OS console, stating that Db2 is ready for the START command.

Alternatively, to define Db2 to z/OS until the next IPL, you can use these commands, in the following order:

- a. SETPROG LNKLST, to update the link list concatenations

- b. MODIFY LLA,REFRESH, to rebuild the LLA directory for the entire set of libraries that are managed by the LLA. This action is also known as a complete refresh of the LLA.
- c. SETPROG APF, to update the APF list
- d. SETSSI ADD, to dynamically add the new Db2 and IRLM subsystems

**Example:** Suppose that you want to perform these actions to define a Db2 subsystem to z/OS before the next IPL:

- a. Add the Db2 ERLY code to a link list data set named MY.LNKLST.
- b. Perform a complete refresh of the LLA.
- c. Add the Db2 and IRLM libraries to the dynamic APF list.
- d. Dynamically add a new Db2 subsystem named DSN1, with these characteristics:
  - Command prefix -DSN
  - Command prefix scope S (started)

Use the following commands:

SETPROG LNKLST,ADD,NAME=MY.LNKLST,DSNAME= <i>prefix</i> .SDSNLINK	<b>a</b>
MODIFY LLA,REFRESH	<b>b</b>
SETPROG APF,FORMAT=DYNAMIC,ADD,DSNAME= <i>prefix</i> .SDSNLINK	<b>c</b>
SETPROG APF,FORMAT=DYNAMIC,ADD,DSNAME= <i>prefix</i> .SDSNEXIT	
SETPROG APF,FORMAT=DYNAMIC,ADD,DSNAME= <i>prefix</i> .SDSNLOAD	
SETPROG APF,FORMAT=DYNAMIC,ADD,DSNAME= <i>prefix</i> .SDXRRESL	
SETSSI ADD,SUB=DSN1,INITRTN=DSN3INI,INITPARM='DSN3EPX,-DSN,S'	<b>d</b>

**Related reference**

[z/OS SETPROG Command \(MVS System Commands\)](#)

[z/OS SETSSI Command \(MVS System Commands\)](#)

## Installation step 15: Start the Db2 subsystem

During installation of Db2, start the Db2 subsystem after you IPL z/OS.

### Procedure

To start Db2:

1. Start Db2 from the z/OS console.

The simplest form of the following command is:

```
-DSN1 START DB2
```

where *-DSN1* is the subsystem command prefix that you defined for Db2.

When you issue the START DB2 command with this command format, Db2 uses the subsystem parameter module that is specified in the *ssnmMSTR* start-up JCL procedure in SYS1.PROCLIB.

If you need to change the name of the subsystem parameter module, you can edit the *ssnmMSTR* JCL member in SYS1.PROCLIB. Alternatively, you can override the default subsystem parameter module name by using the PARM option, as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If Db2 starts successfully, some or all of the following address spaces start, where *ssnm* is the Db2 subsystem name.

- The system services address space (*ssnmMSTR*)
- The database services address space (*ssnmDBM1*)
- The IRLM address space (*irlmproc*), where *irlmproc* is the IRLM procedure name
- Possibly, the DDF address space (*ssnmDIST*)
- Possibly, the administrative task scheduler stored procedure address space (*ssnmADMT*)

If Db2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I   RESTART COMPLETED
DSN9022I   DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

When you start Db2 12 for the first time, Db2 issues message DSNT501I with reason code 00C900A6. This message is expected. When you run job DSNTIJTC, which is required to complete the tailoring of the Db2 catalog, the cause of this message is corrected. Job DSNTIJTC is described in a later installation step.

After you start Db2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If Db2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIE, DSNTIJIF, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started Db2 is the one that is built by job DSNTIJUZ. Check the JCL for the Db2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

## 2. Optional: Start TSO.

After Db2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

## Installation step 16: Tailor the Db2 catalog: DSNTIJTC

Job DSNTIJTC invokes the CATMAINT utility to tailor your Db2 12 catalog, which you must do to fully install Db2. DSNTIJTC performs site-specific tailoring of the catalog.

### Before you begin

To execute DSNTIJTC, you must have the installation SYSADM or installation SYSOPR authority. The presence of the installation SYSOPR authority in the privilege set allows you to install or migrate Db2 without access to user objects.

Also, SMS must be active on the system where this Db2 subsystem is being installed. SMS must be configured to allocate all data sets for the Db2 catalog and directory in extended format and to use extended addressability.

### About this task

DSNTIJTC contains the following job steps:

- Job step DSNTITC, which creates new catalog and directory objects, adds columns to existing catalog tables, and creates and updates indexes on the catalog tables to accommodate new Db2 12 objects. All IBM-supplied objects are created or updated sequentially during the execution of this step.

- Job step DSNTIRI, which executes only when job step DSNTITC terminates abnormally or with a return code of 8 or greater. DSNTIRI rebuilds catalog indexes that were placed in REBUILD-pending status during execution of DSNTITC.

**Important:** In a data sharing environment, do not run DSNTIJTC after installing non-originating members.

## Procedure

Run job DSNTIJTC. You must ensure that the installation job runs on the same z/OS system on which the appropriate Db2 subsystem is running.

A status message, DSNU777I, is issued at several points to indicate progress. Diagnostic error messages are issued when CATMAINT processing fails. If a problem is found during the SQL processing phase of installation, message DSNU778I is issued. If non-supported functions are encountered, message DSNU776I is issued. All of these messages are written to the SYSPRINT data set.

Because this is the first use of Db2, errors from earlier steps might be detected here.

## Results

If you receive abend reason code 00C200EF, the catalog and directory data sets are not in a compliant SMS environment.

If you receive an abend reason code from the data manager (X'00C9'xxxx) or buffer manager (X'00C2'xxxx), carefully recheck jobs DSNTIJIN, DSNTIJID, DSNTIJIE, and DSNTIJIF.

### Related reference

[DSNTIPY: Job editing panel](#)

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

[CATMAINT \(Db2 Utilities\)](#)

### Related information

[DSNU776I \(Db2 Messages\)](#)

[DSNU777I \(Db2 Messages\)](#)

[DSNU778I \(Db2 Messages\)](#)

## Installation step 17: Activate Db2 12 function levels: DSNTIJAF (optional)

---

By default, new Db2 12 installations are at function level 500. However, you can also activate a higher function level during the installation process.

### Before you begin

You must use a privilege set that includes the installation SYSADM or installation SYSOPR authority. The installation SYSOPR authority enables you to install or migrate to Db2 12 without access to user objects.

## Procedure

To activate V12R1M501 or higher during installation, see the "How to activate" section, for the function level that you want to activate, in [Db2 12 function levels \(Db2 for z/OS What's New?\)](#).

### Related reference

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

[TARGET FUNCTION LEVEL field](#)

The value of the TARGET FUNCTION LEVEL field specifies a Db2 function level to activate.

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

[DSNTIP00: Activate a function level panel](#)

Use the DSNTIP00 panel to specify a target function level and other related settings.

## Installation step 18: Create default storage group, define temporary work files, and bind Db2 REXX Language Support: DSNTIJTM

You must create the default storage group that is for user-defined Db2 tables that are not specifically assigned to a storage group. You must also define the database that is for temporary work files, and bind Db2 REXX Language Support.

### Procedure

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

Table 38. DSNTIJTM return codes

Step	PROCSTEP	Return code
DSNTIAD	PC	0000
	ASM	0000
	LKED	0000
DSNTIAB	(none)	0000
DSNTIAS	(none)	0000
DSNTICR	(none)	0000
DSNTIRX	(none)	0000
DSNTIST	(none)	0000

### Results

DSNTIJTM assembles, link-edits, binds, and runs DSNTIAD, a program that processes certain SQL statements dynamically. It also defines the initial buffer pool sizes that are specified on installation panels DSNTIP1 and DSNTIP2. When you use the ENABLE or MEMBER functions, the steps to prepare and bind the DSNTIAD program are unnecessary and are removed during editing.

DSNTIJTM also provides some cleanup to ease reruns.

The SYSDEFLT storage group is the default storage group, and it is used for your database, table space, and table definitions that are not related to a specific storage group. By default, it is also used for the work file database and for work file table spaces that are created during Db2 installation and migration. When DSNTIJTM creates the SYSDEFLT storage group, it completes the following grants:

- Grants use of the default buffer pool and storage group to PUBLIC or the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG.
- Grants use of the SYSDEFLT storage group to PUBLIC or to the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG. This access is necessary to give users the ability to implicitly create table spaces in the default database.
- Grants authority to create tables and table spaces in the default database to PUBLIC or to the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG.

### What to do next

For non-data-sharing installations, the work file database name is DSNDB07. For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field

on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve Db2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table spaces after you run job DSNTIJTM, use the DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

### Related concepts

[Work file database storage requirements](#)

The work file database is used as storage for processing SQL statements that require working storage.

## Installation step 19: Define and bind Db2 objects: DSNTIJSG

Use job DSNTIJSG to bind Db2-supplied packages and plans, initialize the Db2 communications database, and create user-managed databases for the Db2 resource limit facility (RLF), Data Definition Control support, and query optimization.

### Before you begin

**Important:** In a data sharing environment, you must ensure that the resource limit facility (RLF) is inactive on all members in the data sharing group before running DSNTIJSG. To do this, issue the STOP RLIMIT command for each member.

### Procedure

To use job DSNTIJSG:

1. If you use a product that uses a semicolon as a delimiter, replace the semicolons at the end of each SQL statement in job DSNTIJSG before you run the job.

If you use a product that uses a semicolon as a delimiter, the CLIST adds SQL statements to job DSNTIJSG. Products that use a semicolon as a delimiting character cause semicolons to be removed from the installation CLIST before it is executed.

2. Run job DSNTIJSG.

If the DSNTIJSG job runs successfully, it produces return codes of 0. It might also produce a return code of 4 because a step within this job attempts to delete a row from a table that might not exist at the time that this job runs. Expect the following messages from the BIND statement for each object that Db2 provides:

```
DSNE932I  WARNING, ONLY IBM-SUPPLIED PLAN NAMES SHOULD BEGIN WITH DSN
DSNE932I  WARNING, ONLY IBM-SUPPLIED PACKAGE-IDS SHOULD BEGIN WITH DSN
DSNE932I  WARNING, ONLY IBM-SUPPLIED COLLECTION-IDS SHOULD BEGIN WITH DSN
```

3. If the DSNTIJSG job fails or abends:
  - a) Be sure that the user that is specified on the JOB statement is authorized. Use the same name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.
  - b) Correct any other problems with the DSNTIJSG job, and run it again. If you do not have enough resources to run the job, review the values that you specified for the Db2 installation parameters.

(See job DSNTIJUZ.) Use the standard update procedure to make any necessary modifications. Then stop Db2, run the DSNTIJUZ job, start Db2, and run the DSNTIJSG job again.

## What to do next

During the ISPF tailoring session, you named one or two IDs to have installation SYSADM authority. One of these users can now grant various levels of authority to other users. You can use SPUFI or a job similar to DSNTIJSG to perform the authorization. To grant SYSOPR authority to all primary and secondary user IDs that issue Db2 commands from the z/OS console or TSO SDSF, issue the following statement in SPUFI:

```
GRANT SYSOPR TO userid
```

### Related concepts

[Data definition control support database \(Introduction to Db2 for z/OS\)](#)

[The resource limit facility \(Introduction to Db2 for z/OS\)](#)

### Related tasks

[Populating the communications database for use with TCP/IP](#)

If you plan to use Db2 only as a server, you do not need to populate the CDB.

[Updating subsystem parameter and application default values](#)

You can dynamically update the value of some subsystem parameters while Db2 is running. For other subsystem parameters, you must stop and restart Db2 to change the values.

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

### Related reference

[DSNTIP5: Distributed data facility panel 2](#)

The entries on the DSNTIP5 panel are used to configure the distributed data facility (DDF).

## Job DSNTIJSG

During installation, job DSNTIJSG binds Db2-supplied packages and plans.

When you run job DSNTIJSG during installation, it binds Db2 plans, including the plans for SPUFI and DCLGEN. DSNTIJSG also binds a package for a message routine that is used by SPUFI and DCLGEN, and binds that package into the plans for SPUFI and DCLGEN. If you use SPUFI to access remote sites, you might need to bind different packages and plans for SPUFI. You also might need to bind different packages and plans for SPUFI if some users need to run SPUFI under different terminal CCSIDs.

Job DSNTIJSG also binds the package and plan for the DSNTXAZP program, which updates a specified CLIST defaults input member (DSNTIDxx) with the current subsystem parameter and buffer pool settings that are defined in the subsystem.

The DSNTIJSG job also completes the following tasks for user-maintained database activity:

- Creates the resource limit facility database.
- Within the resource limit facility database, creates a new resource limit facility table, DSNRLMTnn, and a new resource limit facility index, DSNMRLnn. By default, the step that creates this new table and index is commented out in the JCL. To have Db2 create DSNRLMTnn and DSNMRLnn, uncomment the step.
- Creates the data definition control support database.
- Creates the program authorization database, table space, table, and index.

The SYSIBM.DSNPROG AUTH program authorization table is used to verify that a program is authorized to use a plan. A sample INSERT statement is provided, which you can uncomment, customize, and execute to populate the table.

The DSNTIJSG job inserts a blank row into the communication database (CDB) table SYSIBM.LUNAME. The CDB holds tables that contain information about your connection with remote Db2 subsystems, and a blank row allows all SNA clients to access DDF. TCP/IP remote clients cannot be controlled by using the



CDB. If you run DSNTIJSJG again, SQLCODE -803 is issued after an INSERT request because the blank row already exists.

The TCP/IP ALREADY VERIFIED field of panel DSNTIP5 defines the minimum security requirements for all TCP/IP clients because inbound security requirements cannot be established on individual clients.

## Installation step 20: Populate the user-maintained databases (optional)

---

Job DSNTIJSJG creates user-maintained databases that you might need to populate.

### Procedure

Populate the user-maintained databases, including the resource limit specification table, and the data definition control support tables.

Although Db2 automatically creates the user-maintained databases, you must complete this step if you plan to use data definition control or the resource limit facility (RLF).

## Installation step 21: Configure Db2 for running stored procedures and user-defined functions

---

Before you can use user-defined functions or the following types of stored procedures, you need to perform some set-up tasks:

- External stored procedures
- Native SQL procedures that satisfy any of the following conditions:
  - Calls at least one external stored procedure, external SQL procedure, or user-defined function.
  - Defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE.
- External SQL procedures (deprecated)
- Db2-supplied stored procedures

All routines, except native SQL procedures, must run in an environment that is established by the z/OS Workload Manager (WLM). A set of Db2-supplied routines are installed by job DSNTIJRT and validated by job DSNTIJRV as part of the installation process. You can also define your own routines or use routines that are provided by a non-IBM vendor. Before you can use any stored procedures and user-defined functions, however, you need to set up WLM environments for these routines. If you plan to use certain Db2-supplied stored procedures or user-defined functions, you need to perform some additional steps.

### Related concepts

[Stored procedures \(Db2 Application programming and SQL\)](#)

[Functions \(Db2 SQL\)](#)

### Related tasks

[Installing the IBM Data Server Driver for JDBC and SQLJ on Db2 for z/OS \(Db2 Application Programming for Java\)](#)

## Tailoring Db2 subsystem parameters for stored procedures during installation (optional)

Several subsystem parameters should be tailored to your Db2 environment before you use stored procedures. These parameters were set when you installed or migrated Db2. If you are satisfied with those values, you do not need to complete this step.

### About this task

The subsystem parameters for stored procedures are:

- MAX\_NUM\_CUR
- MAX\_ST\_PROC
- STORMXAB
- STORTIME

## Procedure

To modify the values of these subsystem parameters, complete one of the following tasks:

- Run the installation CLIST again in INSTALL or MIGRATE mode. On the installation panels, leave most of the existing values and change the following fields on their respective panels:
  1. On panel DSNTIPA1, specify the input member that contains field values for your current installation.
  2. On panel DSNTIPT, specify different names for the TEMP CLIST LIBRARY and SAMPLE LIBRARY fields to avoid overwriting your original libraries.
  3. On panel DSNTIPX, add or change the values of the MAX ABEND COUNT, TIMEOUT VALUE, MAX OPEN CURSORS, and MAX STORED PROCS fields as appropriate.
  4. On panel DSNTIPY, specify a name for the REMOTE LOCATION field. Db2 uses this name for the stored procedure sample applications.
- Edit job DSNTIJUZ to add or change values for the subsystem parameters for routines.

This method has the following disadvantages:

- Db2 does not use these new values for any future migrations because your DSNTIDxx member and DSNTIJUZ parameters are not saved for future input.
- Db2 does not generate the sample jobs for stored procedure and user-defined functions because you are not running the DSNTINST CLIST.

## Related reference

DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

DSNTIPT: Db2 data set names panel

The entries on the DSNTIPT panel establish data set names for the libraries that are used in the Db2 CLIST and JCL that Db2 provides. The values that you enter on this panel are edited into all pertinent sample and installation jobs.

DSNTIPX: Routine parameters panel

The entries on this panel are used to start the stored procedures address space so that it can run stored procedures or user-defined functions.

DSNTIPY: Job editing panel

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

Directory of subsystem parameters, panel fields, and application default values

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## Setting up Language Environment for stored procedures during installation

*Language Environment* (LE) is a component of the z/OS operating system that establishes a common runtime environment for all applications, regardless of programming language. Db2 uses Language

Environment to provide a runtime environment for external stored procedures and external SQL procedures.

## About this task

Language Environment provides a set of essential run time services that are available through a set of interfaces that are consistent across programming languages. These services include routines for run time message handling, condition handling, and storage management.

Language Environment provides the following advantages for Db2 stored procedures:

- Language Environment hides the differences between programming languages.
- Language Environment provides the ability to make a stored procedure resident in the stored procedure address spaces.
- Language Environment supports a large number of run time options, including those options that are needed to use tools to debug your stored procedures.

## Procedure

To set up Language Environment for stored procedures:

1. Customize Language Environment by completing the instructions in [z/OS Language Environment Customization](#).
2. Specify the Language Environment run time library in the JCL startup procedure for each WLM-managed address space for stored procedures.

This library must be the only available run time library. Do not reference any other language run time libraries within the system link list or within the STEPLIB statements. If other language run time libraries are defined in the system link list, use STEPLIB statement overrides to exclude them.

Multiple languages can share the same Language Environment run time library. Therefore, you do not need to specify the language-specific libraries in the JCL startup procedure of each stored procedure address space.

**Restriction:** Do not use compilers (or associated run time libraries) that are no longer supported by IBM.

## What to do next

After you set up Language Environment for stored procedures, you can override the Language Environment run time options for individual stored procedures. You can do this by using the RUN OPTIONS clause in the CREATE PROCEDURE statement or ALTER PROCEDURE statement. The default values for Language Environment run time options are defined by z/OS. You might have overridden some of these default values when you customized Language Environment.

### Related concepts

[External stored procedures \(Db2 Application programming and SQL\)](#)

[SQL procedures \(Db2 Application programming and SQL\)](#)

### Related reference

[CREATE PROCEDURE statement \(external procedure\) \(Db2 SQL\)](#)

[CREATE PROCEDURE statement \(SQL - external procedure\) \(deprecated\) \(Db2 SQL\)](#)

[Customizing Language Environment run-time options \(z/OS Language Environment Customization\)](#)

### Related information

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

## Implementing RRS for stored procedures during installation

To use some Db2 stored procedures, you must implement Resource Recovery Services (RRS). RRS is a sync point manager program that coordinates two-phase commit processing. Db2 requires that RRS be active because WLM-managed stored procedure address spaces use the RRS attachment facility (RRSAF).

### About this task

RRS records events for protected resources in log streams that are managed by a z/OS component called the system logger. The following table identifies the log streams that RRS uses, where *gname* can be your Sysplex name or any name in a non-Sysplex environment:

Table 39. Log streams that RRS uses

Log stream type	Log stream name	Content
Main unit-of-recovery log state stream	ATR. <i>gname</i> .MAIN.UR	The state of active units of recover (URs). RRS periodically moves this information into the RRS delayed UR state log when UR completion is delayed.
Delayed unit-of-recovery log state stream	ATR. <i>gname</i> .DELAYED.UR	The state of active URs, when UR completion is delayed.
Resource manager data log stream	ATR. <i>gname</i> .RM.DATA	Information about the resource managers that use RRS services.
Restart log stream	ATR. <i>gname</i> .RESTART	Information, which is needed during restart, about incomplete URs. This information enables a functioning RRS instance to assume remaining incomplete work from an RRS instance that failed.
Archive log stream	ATR. <i>gname</i> .ARCHIVE	Information about completed URs. This log stream is optional, but recommended.

All of these log streams are required except for the archive log stream. RRS does not start if it is not able to connect to the required log streams.

In a sysplex environment, these log streams are shared by the systems of the Sysplex.

### Procedure

To implement RRS for stored procedures:

1. Define the RRS log streams that are to be written, either on disk or in the coupling facility by completing the following actions:

- a) If you are using the coupling facility, add definitions for the RRS structures in the CFRM policy.

When you are using coupling facility log streams, each log stream needs to be mapped to a coupling facility structure.

The following example shows JCL that updates the CFRM policy to add the RRS structures:

```
//DEF CFRM1 JOB MSGCLASS=X,TIME=10,MSGLEVEL=(1,1),NOTIFY=&SYSUID
//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//SYSIN DD *
DATA TYPE(CFRM) REPORT(YES)
```

```

DEFINE POLICY NAME(CFRM18) REPLACE(YES)
CF NAME(CF01)
  TYPE(009672)
  MFG(IBM)
  PLANT(02)
  SEQUENCE(000000040104)
  PARTITION(1)
  CPCID(00)
  DUMPSPACE(2048)
  CF NAME(CF02)
  TYPE(009672)
  MFG(IBM)
  PLANT(02)
.....
.....
STRUCTURE NAME(RRS_ARCHIVE_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RMDATA_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_MAINUR_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_DELAYEDUR_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RESTART_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)

```

- b) Define the log streams in the system logger policy by using the IXCMIAPU utility. This utility program is provided in the SYS1.MIGLIB system library.

If you are using the coupling facility, also define the structures in the system logger policy. You can map each log stream to a single structure or you can map log streams of like data types to the same structure.

#### Example: Defining coupling facility log streams

The following example JCL shows definitions for coupling facility structures and RRS log streams. In this case, each RRS log stream is mapped to a structure.

```

//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(LOGR) REPORT(YES)

  DEFINE STRUCTURE NAME(RRS_ARCHIVE_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(262)

  DEFINE STRUCTURE NAME(RRS_RMDATA_1) LOGSNUM(1)
    MAXBUFSIZE(1024) AVGBUFSIZE(252)

  DEFINE STRUCTURE NAME(RRS_MAINUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

  DEFINE STRUCTURE NAME(RRS_DELAYEDUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

  DEFINE STRUCTURE NAME(RRS_RESTART_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.ARCHIVE) STRUCTNAME(RRS_ARCHIVE_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)

```

```

RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RM.DATA) STRUCTNAME(RRS_RMDATA_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.MAIN.UR) STRUCTNAME(RRS_MAINUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.DELAYED.UR) STRUCTNAME(RRS_DELAYEDUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RESTART) STRUCTNAME(RRS_RESTART_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)
/*

```

### Example: Defining disk log streams

The following example JCL shows definitions for RRS log streams on disk.

```

/DEFSTREXECPGM=IXCMIAPU
//SYSPRINT DDSYSOUT=A
//SYSINDD *
DATA TYPE(LOGR)

DEFINE LOGSTREAM NAME(ATR.PLEX1.MAIN.UR)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(1024)
LS_DATACLAS(VSAMLS)
STG_SIZE(1024)

DEFINE LOGSTREAM NAME(ATR.PLEX1.DELAYED.UR)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(960)
LS_DATACLAS(VSAMLS)
STG_SIZE(960)

DEFINE LOGSTREAM NAME(ATR.PLEX1.ARCHIVE)
LOWOFFLOAD(0)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(960)
LS_DATACLAS(VSAMLS)
AUTODELETE(YES)
RETPD(2)
STG_SIZE(2000)

DEFINE LOGSTREAM NAME(ATR.PLEX1.RM.DATA)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(192)
LS_DATACLAS(VSAMLS)
STG_SIZE(192)

DEFINE LOGSTREAM NAME(ATR.PLEX1.RESTART)
LOWOFFLOAD(60)
HIGHOFFLOAD(80)

```

```
DASDONLY(YES)
HLQ(TEST)
LS_SIZE(960)
LS_DATACLAS(VSAMLS)
STG_SIZE(960)
```

- c) If you are using coupling facility log streams, compile and link-edit the changed CFRM policy.
- d) If you are using coupling facility log streams, activate the updated CFRM policy in your Sysplex by using the following operator command:

```
SETXCF START,POLICY,TYPE=CFRM,POLNAME=polname
```

2. Establish the priority for RSS within the WLM policy.

The RRS priority needs to be equal to or higher than the dispatching priority of Db2. You can use the SYSSTC service class for the RRS address space to achieve a higher dispatching priority.

3. Move the ATRRRS procedure that is supplied by IBM from SYS1.SAMPLIB to your SYS1.PROCLIB as member RRS, and make any necessary changes.

This JCL procedure is used to start RRS.

You can use a member name other than RRS, but the first four characters of this name must match the subsystem name that you specify in the IEFSSNxx member of SYS1.PARMLIB in the next step.

The GNAME value in the procedure must match the *gname* that you specified when defining the log streams. The default value for *gname* at RRS startup is the Sysplex name.

The following example shows a sample procedure to start RRS.

```
//RRS PROC GNAME=' ',CTMEM=' '
//RRS EXEC PGM=ATRIMIKE,REGION=0M,TIME=NOLIMIT,
// PARM='GNAME=&GNAME CTMEM=&CTMEM'
//
```

4. Define RRS as a subsystem to z/OS by editing the active IEFSSNxx member of SYS1.PARMLIB to include the following entry:

```
SUBSYS SUBNAME(RRS) /* RESOURCE RECOVERY SERVICES */
```

The subsystem name can be RRS or any other name that you choose. However, the first four characters (or fewer characters if the name is shorter) must match the name of the JCL procedure to start RRS.

5. Start RRS by using the following operator command:

```
START RRS
```

If you subsequently need to stop RRS, use one of the following operator commands:

- SETRRS CANCEL
- SETRRS SHUTDOWN

If neither of these commands stops RRS, use the FORCE RRS,ARM command. In this command, RRS is the subsystem name that your installation assigned to RRS in PARMLIB member IEFSSNxx.

### Related reference

[z/OS MVS Programming: Resource Recovery](#)

[Configuring and defining RRS logging requirements \(z/OS MVS Programming: Resource Recovery\)](#)

[Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

### Related information

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

# Setting up a WLM application environment for stored procedures during installation

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

## About this task

If you use data sharing, see [“Special considerations for WLM-managed stored procedures in coexistence” on page 694](#) for additional guidance about setting up WLM environments.

**Recommendation:** Use partitioned data set extended (PDSE) for load libraries that contain external modules for stored procedures. Using PDSEs might eliminate your need to stop and start the stored procedures address space due to growth of the load libraries. If a load library grows from additions or replacements, the library might need to be extended.

## Procedure

To set up a WLM application environment for one or more stored procedures:

1. Gather requirements for the WLM environment. These requirements include:

- The name of the Db2 subsystem or data sharing group where the stored procedure or user-defined function is to run.
- The maximum number of task control blocks (TCBs) that can run concurrently in an address space that is initiated by the WLM environment. This setting, referred to as the NUMTCB, is the maximum number of procedures or functions that should run concurrently in that WLM-managed address space. The appropriate setting depends on the requirements or limitations of the individual stored procedure or user-defined function.
  - For recommended NUMTCB values for Db2-supplied stored procedures, see [“Installation information for procedures and functions that are supplied with Db2” on page 819](#).
  - For recommended NUMTCB values for your own stored procedures, see [Assigning stored procedures and functions to WLM application environments \(Db2 Performance\)](#). If a routine allocates a large amount of memory or if the external module for the routine is not re-entrant, the NUMTCB value should be 1. If there is a need for serialization, the NUMTCB value should also be 1.
  - The WLM environment for a REXX stored procedure must have a NUMTCB setting of 1.
- Requirements for Authorized Program Facility (APF).
  - Stored procedures and user-defined functions that execute privileged instructions (for example, WLM\_REFRESH) must run in a WLM environment that has an APF-authorized address space.
  - Db2 REXX stored procedures, such as DSNTPSMP, and other routines that use TSO/E and REXX facilities must run in a WLM environment that does not have an APF-authorized address space.
  - Most stored procedures can run in a WLM environment that either has or does not have an APF-authorized address space. However, running a routine in an APF-authorized environment is recommended only when doing so is necessary.
- Special data sets and DD names that are needed by the stored procedure or user-defined function. For example, all Java stored procedures implicitly require a Language Environment run time options data set to be allocated to DD name JAVAENV. Other routines might also have an explicit requirement for a work file to be allocated to a particular DD name.

2. Create a JCL startup procedure for the WLM application environment.

Use *ssnmWLM* (where *ssnm* is the Db2 subsystem ID) as the basis for creating the new startup procedure. *ssnmWLM* is the default name of the sample JCL procedure for starting WLM-established address spaces. If you specified a name in the WLM PROC NAME field on the DSNTIPX installation panel, the sample procedure has that specified name. The sample procedure is placed in your system



PROCLIB by installation job DSNTIJMV. For the DSNACICS stored procedure, DSNTIJMV also provides sample procedure *ssnmCICS*, where *ssnm* is the subsystem ID. Tailor your new startup procedure as follows:

- Change the APPLENV value to the name of the WLM application environment that you plan to define.
- Change the startup procedure name to an appropriate procedure name.

**Recommendation:** Specify the same name for the application environment name and the procedure name. Using the same name simplifies monitoring the WLM environment definitions.

- Change the value of DB2SSN to your Db2 subsystem name.
- Ensure that the NUMTCB value is appropriate. If the minimum number of address spaces is specified, the NUMTCB value will be the number of task control blocks that are started in an address space.

**Recommendation:** If you want to be able to easily change the NUMTCB value, specify the NUMTCB value here, and do not specify this parameter on the application environment definition panel when you define the WLM application environment. Specifying NUMTCB on the environment definition panel associates this parameter with the WLM application environment definition. Any changes to the JCL startup procedure can be made by refreshing the WLM application environment. However, changes to the WLM application environment require that you reinstall the z/OS service policy at an LPAR or sysplex level. If you specify the NUMTCB parameter for both the WLM application environment and the startup procedure, the value in the WLM application environment overrides the value in the startup procedure.

- If the environment is one in which the cost of starting new address spaces is very high, you can use the MNSPAS parameter. The MNSPAS parameter specifies the minimum number of address spaces that are to be started and maintained. The value can be 0 through 50. The default value is 0, which means that no minimum number of address spaces is specified. If the number of address spaces is at the specified minimum, canceling an address space causes WLM to start another one to maintain the minimum. If you refresh a WLM environment, WLM starts a number of new address spaces as needed (or the specified minimum number) and stops the old address spaces.

If the MNSPAS parameter is specified, the NUMTCB value is the number of task control blocks that are started in an address space. If the MNSPAS parameter is not specified, the NUMTCB value is the maximum number of task control blocks that can be started in an address space.

- Edit the data set names to match your data set names.
- Ensure that the library in which the stored procedure resides is in the STEPLIB concatenation.
- Ensure that the IBM Language Environment run time library is specified in the STEPLIB concatenation, unless your system includes the Language Environment run time library in the system link list.
- If you want to run the stored procedure in a WLM environment that has an APF-authorized address space, ensure that all the libraries in the STEPLIB concatenation are defined to the Authorized Program Facility.
- Add any special DD statements that are required for the stored procedures or user-defined functions that are to run in the WLM environment.
  - If you plan to use stored procedures that use the ODBA interface to access IMS databases, make the following additional changes:
    - Add the data set name of the IMS data set that contains the ODBA callable interface code to the end of the STEPLIB concatenation. The name of this data set is usually IMS.RESLIB.
    - After the STEPLIB DD statement, add a DFSRESLB DD statement that names the IMS data set that contains the ODBA callable interface code.
  - If your routines are defined as PROGRAM TYPE SUB and use z/OS UNIX System Services syscall statements, you might need to add a NOUNDUB DD statement. By default, the z/OS UNIX System Services process and its resources are cleaned up after every stored procedure and user-defined function invocation. If you need the task in this WLM environment to retain the process across subsequent invocations, add a dummy NOUNDUB DD statement. This option specifies that no

cleanup will occur unless the WLM environment is refreshed. To enable this option, add the following statement to the WLM stored procedure address space startup JCL:

```
//NOUNDUB DD DUMMY
```

Use this option with caution because routines use the z/OS UNIX System Services process that was used by the previous routine that was run under the same task. Also note that any open resources such as file descriptors remain open for the next routine that is run under the same task. Consider using this option on new workloads only if reusing the z/OS UNIX System Services process is the desired behavior.

The following example shows a startup procedure for a WLM application environment for external SQL, COBOL, C, C++, PL/I, and assembler stored procedures. This startup procedure for external SQL stored procedures needs one unauthorized data set included in STEPLIB.

```
/******  
/* JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES  
/* ADDRESS SPACE  
/* RGN -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.  
/* DB2SSN -- THE DB2 SUBSYSTEM NAME.  
/* NUMTCB -- THE NUMBER OF TCBS USED TO PROCESS  
/* END USER REQUESTS.  
/* APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT  
/* SUPPORTED BY THIS JCL PROCEDURE.  
/*  
/******  
//DB9AWLM PROC RGN=0K,APPLENV=WLMENV,DB2SSN=DB9A,NUMTCB=40,MNSPAS=3  
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,  
// PARM='&DB2SSN,&NUMTCB,&APPLENV,&MNSPAS'  
//STEPLIB DD DISP=SHR,DSN=DB9AU.RUNLIB.LOAD  
// DD DISP=SHR,DSN=CEE.SCEERUN  
// DD DISP=SHR,DSN=DB9A9.SDSNEXIT  
// DD DISP=SHR,DSN=DB9A9.SDSNLOAD
```

3. Define the application environment to WLM by using one of the following methods.

- Use the WLM administrative application (IWMARINO) to define a new environment or copy or modify an existing one.

a. In the first WLM panel, **Definition Menu**, enter 9 for Application Environments.

The application environment definition panel is displayed.

b. On the application environment definition panel, specify the appropriate action code:

- Create a new WLM application environment.
- Copy an existing WLM application environment.
- Modify an existing WLM application environment.

The appropriate panel for creating, copying or modifying the application environment is displayed.

c. If you are creating or modifying a WLM environment, specify the appropriate options for the WLM application environment definition, using the same application environment name and procedure name that you specified for the startup procedure.

d. After you specify the appropriate options, press Enter to create the application environment definition.

- Modify and run sample job DSNTIJRW. As provided, DSNTIJRW creates the core Db2 WLM environments, but you can modify the job to define your own WLM environments. Job DSNTIJMV copies an address space procedure for each of the Db2 core WLM environments into SYS1.PROCLIB.

4. Install the WLM service definition that contains information about the application environment by opening the WLM **Definition Menu** panel and selecting the **Install** function in the **Utilities** menu bar.

5. Activate the WLM service policy from the installed service definition by completing one of the following actions:

- Issue the VARY WLM command as follows:

```
VARY WLM,POLICY=policy-name
```

- On the WLM **Definition Menu** panel, choose the **Activate service policy** option from **Utilities** menu bar.
6. Set up security for the WLM application environments and for creating stored procedures by completing the following actions:
    - a) Specify which WLM-established address spaces can run stored procedures.  
If you do not complete this step, any WLM-established address space can run stored procedures.
    - b) Grant access to users to create procedures in specific WLM address spaces.
    - c) Grant access to users to create procedures in specific schemas. Use the GRANT statement with the CREATIN option for the appropriate schema.
    - d) Grant access to users to create packages for procedures in specific collections. Use the GRANT statement with the CREATE option for the appropriate collection.  
**Requirement:** For native SQL procedures, the collection name for the package must be the same as the schema name.
    - e) Grant access to refresh the WLM environments to the appropriate people.  
For more detail, see [Managing authorization for stored procedures \(Managing Security\)](#).
  7. Ensure that the ID that is used to run the JCL startup procedure for the WLM application environment has permission to use RRSAF.  
Each time one of the Db2 WLM address spaces is started, it uses RRSAF to attach to Db2.

## What to do next

When you create or alter a stored procedure, specify the WLM application environment that Db2 is to use in the WLM\_ENVIRONMENT option of the CREATE or ALTER PROCEDURE statement. When you specify environments, be aware that:

- Routines that have low memory requirements and that are frequently called should not share an environment with routines that have high memory requirements and are rarely called. Otherwise, storage is wasted.
- Stored procedures can be grouped according to the authorization settings for a WLM environment.
- WLM environments should not be shared among routines that use the same DD name for different purposes.
- WLM environments should not be shared among routines if one routine allocates data sets in the environment and that routine is run only occasionally. If other routines that do not use the data sets use the environment, the data sets are kept artificially allocated, which might interfere with other tasks.

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

### Related tasks

[Managing authorization for stored procedures \(Managing Security\)](#)

[Refreshing WLM application environments for stored procedures \(Db2 Administration Guide\)](#)

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[DSNTWLMB tool](#)

The DSNTWLMB tool provides a batch interface for defining, installing, and activating WLM environments. You can also use DSNTWLMB to remove WLM application environments. This tool is invoked by job DSNTIJRW to create the core Db2 WLM environments.

[GRANT statement \(collection privileges\) \(Db2 SQL\)](#)

[GRANT statement \(schema privileges\) \(Db2 SQL\)](#)

[set\\_dub\\_default \(BPX1SDD, BPX4SDD\) \(z/OS UNIX System Services Programming\): Assembler Callable Services Reference](#)

#### **Related information**

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

[Using Operator Commands for Application Environments \(z/OS MVS Planning: Workload Management\)](#)

## **Installation step 22: Set up Db2-supplied routines**

---

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

### **Setting up the Db2 core WLM environments during installation**

Db2 stored procedures (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

#### **About this task**

For Db2-supplied routines, you can use the provided definitions for core WLM environments as a starting point for defining your environments. You can also manually define the WLM environments by using the IWMARINO application, as described in [“Setting up a WLM application environment for stored procedures during installation”](#) on page 462.

**Exception:** You do not need to complete this configuration task for native SQL procedures unless they call at least one external stored procedure or external SQL procedure. This task also applies to native SQL procedures that call at least one user-defined function or that are defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE. Otherwise, this task applies to only user-defined functions, external stored procedures, external SQL procedures, and Db2-supplied stored procedures

#### **Procedure**

Run job DSNTIJRW.

Job DSNTIJRW invokes the DSNTWLMB tool to create the core WLM environments. The CLIST assigns the core WLM environment names in DSNTIJRW according to the values that are specified on panel DSNTIPR1. For detailed information about the environments that are created by DSNTIJRW, see [“Core WLM environments for Db2-supplied routines”](#) on page 827.

#### **Related concepts**

[WLM management of stored procedures](#)

*Workload Manager (WLM)* is a component of z/OS that manages incoming work requests for the operating system and allocates available system resources to meet these requests. Db2 for z/OS uses WLM to allocate workload requests for Db2 stored procedures.

#### **Related reference**

[DSNTWLMB tool](#)

The DSNTWLMB tool provides a batch interface for defining, installing, and activating WLM environments. You can also use DSNTWLMB to remove WLM application environments. This tool is invoked by job DSNTIJRW to create the core Db2 WLM environments.

[DSNTIPR1: Parameters for Db2-supplied routines panel](#)

The DSNTIPR1 panel enables you to establish default WLM environment names for Db2-supplied routines and to access panels for advanced configuration of these routines.

## Installing Db2-supplied routines during installation

The DSNTIJRT and DSNTIJRV jobs install and validate the installation of Db2-supplied routines. These jobs are configured with the options that you specified on installation panel DSNTIPR1 and panels DSNTIPRA through DSNTIPRP.

### Before you begin

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that runs the DSNTIJRV job requires READ access. To grant READ access to a user, an administrator must submit the following command:

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
```

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that runs the DSNTIJRV job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVfy console that is used in this job. To add a discrete profile for the DSNTRVfy console, an administrator must complete the following steps:

1. Establish a discrete profile for MVS.MCSOPER.DSNTRVfy by issuing the following command:

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNTRVfy UACC(NONE)
```

2. Grant READ access to the user that runs the DSNTIJRV job by issuing the following command:

```
PERMIT MVS.MCSOPER.DSNTRVfy CLASS(OPERCMDS) ID(user) ACCESS(READ)
```

3. Refresh the OPERCMDS class by issuing the following command:

```
SETROPTS RACLIST(OPERCMDS)REFRESH
```

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)” on page 264](#).

Resource Recovery Services (RRS) is also required for these jobs.

### Procedure

To install the Db2-supplied routines:

1. Run job DSNTIJRT to install and configure all Db2-supplied routines.
2. After DSNTIJRT successfully completes, run job DSNTIJRV to validate the installation of the routines.
3. Authorize the appropriate users to use one or more of these stored procedures by issuing the GRANT EXECUTE statement.

As part of the installation process, job DSNTIJRT defines, binds, and grants access to the stored procedures and user-defined functions. Job DSNTIJRT grants EXECUTE authority to the authorization IDs that are specified for the GRANT EXECUTE fields on installation panels DSNTIPRB through DSNTIPRP. The default setting for GRANT EXECUTE is PUBLIC, meaning that anyone who can access Db2 can use these stored procedures.

**Recommendation:** When you run the installation CLIST, use the GRANT EXECUTE fields on panels DSNTIPRB through DSNTIPRP to specify different access lists.

4. Complete additional setup steps for any of the following routines that you plan to use.
  - [The stored procedures for XML schema support](#)
  - [The administrative task scheduler routines and administrative enablement routines](#)

- [The CICS transaction invocation procedure](#)
- [The common SQL API stored procedures](#)
- [The IBM MQ user-defined functions](#)
- [The web service user-defined functions](#)

## What to do next

After installing the Db2-supplied routines, you can choose to disable any of the routines that are unnecessary or unusable on your subsystem.

### Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that Db2 supplies.

### Related tasks

[Granting privileges for executing stored procedures and stored procedure packages \(Managing Security\)](#)

[Disabling Db2-supplied routines for validation](#)

Job DSNTIJRT installs all Db2-supplied routines on your subsystem. After installation or migration, you can disable any routines that are unnecessary or unusable so the validation program can exclude it from processing.

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Job DSNTIJRT

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

DSNTIJRT provides a *configuration control statement* for each Db2-supplied routine and the mode for processing those statements. The configuration control statement specifies the WLM environment, list of authorization IDs that are allowed to execute the routine, and optional package owner for the routine. DSNTRIN reads and validates those statements and uses them to create and customize routines and supporting objects.

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)” on page 264](#).

## Format

DSNTRIN accepts the following parameters:

### DB2SSN

Identifies the Db2 subsystem on which to install and configure the Db2-supplied routines.

### MODE

During SQL processing, DSNTRIN configures each routine with the WLM environment specified in the configuration control statement for that routine. Processing behavior depends on the DSNTRIN run mode, the Db2 catalog mode, and which objects already exist.

### INSTALL

This is the normal operating mode. Use it when installing or migrating to Db2.

Create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the routine already exists, it is updated, if necessary, to use the WLM environment specified in the configuration control statement for that routine. If the package for a routine already exists, it is not bound again unless the DBRM has been updated or the package has been invalidated.

If the package for a routine already exists and the DBRM has not been updated and the package has not been invalidated, the package is rebound if its APPLCOMPAT level does not match the DB2OPT parameter RTN\_PKG\_APPLCOMPAT specified (VvvRrMmmm or V11R1).

Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **REINSTALL**

This mode behaves like INSTALL mode, except that existing Db2-supplied routines and created global temporary tables are dropped ahead of other processing. Existing related databases, table spaces, tables, and indexes are not dropped, except as discussed in the special notices section of the DSNTIJRT job prolog.

Use REINSTALL mode only if you have a specific need to drop and re-create all Db2-supplied routines. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines and any related created global temporary tables are first dropped before they are re-created. Related databases are not dropped if they already exist, but they are created if they do not exist. If a supporting object is used by more than one routine, the object is created when one of those routines is first created. Drop processing of routines and related objects that do not exist is bypassed.

### **REINITIALIZE**

This mode behaves like REINSTALL mode, except that existing databases, table spaces, tables, and indexes used by the Db2-supplied routines are also dropped ahead of other processing.

REINITIALIZE mode drops and reinitializes databases such as the XSR database that may contain information needed by Db2 for other processing. Therefore, use REINITIALIZE mode only when advised to do so by IBM Support. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines, existing related created global temporary tables, and existing related databases are first dropped before they are re-created. After each SQL statement, a COMMIT statement is issued. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **INSTALL-PREVIEW**

Simulate INSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINSTALL-PREVIEW**

Simulate REINSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINITIALIZE-PREVIEW**

Simulate REINITIALIZE mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **AUTHID**

DSNTRIN uses this value as the CURRENT SQLID for creating and configuring most Db2-supplied routines. If DEFPKOWN is not specified, DSNTRIN also uses this value as the default OWNER for binding packages for the Db2-supplied routines that do not have the PKGOWNER specified in the configuration control statement.

When the AUTHID parameter is set to SYSINSTL, and you use the installation SYSADM authority or the installation SYSOPR authority to run this job for Db2 installation, Db2 identifies the Db2-supplied routines created or altered by DSNTRIN as system-defined in the SYSIBM.SYSROUTINES catalog table.

### **SECDEFID**

DSNTRIN uses this value as the CURRENT SQLID setting when creating and configuring Db2-supplied routines that are defined with the SECURITY DEFINER option.

The ID that you specify for SECDEFID must be an ID that can be used as a logon ID, because WLM uses the ID to execute Db2-supplied routines that are defined with SECURITY DEFINER.

### **DEFPKOWN**

Specifies the default OWNER for binding the package for a Db2-supplied routine when the PKOWNER parameter of the routine's configuration control statement is not specified. If DEFPKOWN is not specified, DSNTRIN uses the AUTHID value as the default package owner.

The DEFPKOWN parameter is required only when the AUTHID parameter is set to SYSINSTL. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set DEFPKOWN during the editing of DSNTIJRT. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRT prolog to explain additional requirements.

Specify an installation system administrator ID if you use the installation SYSOPR authority to execute this job for Db2 installation. Specify an authorization ID that is granted the system DBADM and DATAACCESS authorities if you use the installation SYSOPR authority to execute this job for Db2 migration.

## **Input**

DSNTRIN allocates the following DD statements for input:

### **DBRMLIB**

Location of the DBRMs for Db2-supplied routines. This is typically the *prefix.SDSNDBRM* target library.

### **SYSUT1**

Internal work file for the Db2 installation bind interface (DSNTRBI).

### **CFIGIN**

Location of the configuration control statements for Db2-supplied routines.

### **DB2OPT**

This required DD can contain the following optional parameters:

#### **STOGROUP**

Specifies a storage group to use for creating databases and table spaces that are used by the routines that are supplied with Db2. If this parameter is not specified, the default SYSDEFLT storage group is used.

#### **INDEXSTOG**

Specifies a storage group to use for creating indexes instead of the default SYSDEFLT storage group.

#### **BP4K**

Specifies an alternate 4-KB buffer pool for base table spaces that are created by DSNTRIN. The default 4-KB buffer pool is BP0.

#### **BP8K**

Specifies an alternate 8-KB buffer pool for base table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

#### **BP16K**

Specifies an alternate 16-KB buffer pool for base table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.



**BP32K**

Specifies an alternate 32-KB buffer pool for base table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K.

**LOBBP8K**

Specifies an alternate 8-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

**LOBBP16K**

Specifies an alternate 16-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

**LOBBP32K**

Specifies an alternate 32-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K0.

**IMS\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied IMS routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 IMS routines are altered if needed to conform with the SECURITY type that is specified here.

**MQ\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied MQ routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 MQ routines are altered if needed to conform with the SECURITY type that is specified here.

**SOAP\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied web services/SOAP routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 SOAP routines are altered if needed to conform with the SECURITY type that is specified here.

**RTN\_PKG\_APPLCOMPAT**

The APPLCOMPAT bind option (DEFAULT, *Db2-function-level*, V11R1) to be used for binding or rebinding packages for Db2-supplied routines.

**DEFAULT**

Specifies the following actions:

- DSNTIJRT/DSNTRIN omit the APPLCOMPAT bind option from generated BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN bypass checking the APPLCOMPAT level of valid “current” packages for Db2-supplied routines to see if a REBIND is needed, where “current” means that the package CONTOKEN matches that of the current DBRM

The result of this option matches the behavior before [APAR PH50704](#).

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

***Db2-function-level, V11R1***

*Db2-function-level* is a VvvRrMmmm format value equivalent to or lower than the current function level of the Db2 subsystem.

Specifies the following actions.

- DSNTIJRT/DSNTRIN add the APPLCOMPAT bind option, with the valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, to generate BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN generate REBIND statements with the APPLCOMPAT option set to a valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, for “current” packages for Db2-supplied routines because the APPLCOMPAT level of the valid “current” package does not agree with the DB2OPT RTN\_PKG\_APPLCOMPAT, where “current” means that the package CONTOKEN

matches that of the current DBRM. For example, DSNTRIN generates the following REBIND statement with DB2OPT RTN\_PKG\_APPLCOMPAT=V12R1M509:

```
REBIND PACKAGE (DSNADM.DSNADMCD. (V13R1))
        APPLCOMPAT (V12R1M509)
```

RTN\_PKG\_APPLCOMPAT(DEFAULT) is assumed if RTN\_PKG\_APPLCOMPAT is not specified.

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

### RTN\_PKG\_PLANMGMT

The PLANMGMT bind option (DEFAULT, EXTENDED, BASIC, OFF) for rebinding packages for Db2-supplied routines.

#### DEFAULT

DSNTIJRT/DSNTRIN do not add the PLANMGMT rebind option to generated REBIND statements for packages for Db2-supplied routines.

#### EXTENDED, BASIC, OFF

DSNTIJRT and DSNTRIN add the PLANMGMT rebind option, with the valid DB2OPT RTN\_PKG\_PLANMGMT setting, to generated REBIND statements for packages for Db2-supplied routines.

For more information see [PLANMGMT bind option \(Db2 Commands\)](#).

RTN\_PKG\_PLANMGMT(DEFAULT) is assumed if RTN\_PKG\_PLANMGMT is not specified.

**Note:** DSNTRIN does not create or activate this storage group or any of these buffer pools.

## Output

DSNTRIN allocates the following DD statements for output:

### SYSPRINT

Destination for echo of configuration control statements that are read and for messages that are generated during processing. Each processed routine generates at least one status message.

### SYSTSPRT

Internal message file for the Db2 installation bind interface (DSNTRBI).

### CFIGOUT

Destination for configuration control statements that are read by DSNTRIN. This output is useful for diagnostic purposes when DSNTRIN reports an error in a configuration control statement.

### SQLOUT

Destination for DDL statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### BINDOUT

Destination for bind statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### JCLOUT

Destination for a generated sample job that is generated when one of the PREVIEW modes is specified. The job contains steps that process inline DDL and bind statements that are needed to install and configure missing, down-level, or incorrectly configured Db2-supplied routines. This DD is required if you specify a PREVIEW mode.

Example of executing DSNTRIN in INSTALL mode:

```
//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
//          PARM=('DB2SSN(DSN) MODE(INSTALL)',
//          'AUTHID(ADMFO01) SECDEFID(ADMFO02)',
//          'DEFPKOWN(SYSADM)')
```

```

//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
// DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

//...
//*

```

Example of executing DSNTRIN in INSTALL-PREVIEW mode:

```

//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
// PARM=('DB2SSN(DSN) MODE(INSTALL-PREVIEW)',
// ' AUTHID(ADMF001) SECDEFID(ADMF002)',
// ' DEFPKOWN(SYSADM)')

//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
// DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//JCLOUT DD DSN=USER.JCLLIB(DB2INST),DISP=SHR
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
...
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

```

```
//*
```

## Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that Db2 supplies.

[Installation and migration jobs that the CLIST tailors](#)

The installation CLIST uses the values that you specify on the installation panels to tailor and load the installation or migration jobs. Each job is composed of one or more JCL procedures or job steps.

## Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Job DSNTIJRV

Job DSNTIJRV validates the Db2-supplied routines by executing program DSNTRVFY. You should validate these routines after Db2 installation and after each phase of migration.

DSNTRVFY validates a single routine, multiple routines, or all Db2-supplied routines. DSNTRVFY produces a report that identifies routines that passed the validation and possible problem areas for routines that failed.

## Authorizations

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that submits this job requires READ access.

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that submits this job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVFY console that is used in this job.

## Format

DSNTRVFY accepts the following required parameters:

### **DB2SSN(ssid)**

Identifies which Db2 subsystem to connect to for validating the Db2-supplied routines.

### **ROUTINE(name)**

Identifies which Db2-supplied routine needs to be validated. The following values are supported for *name*:

- A routine name in the form of *schema-name.routine-specific-name*.
- The keyword **DD:SYSIN** to specify a list of routines. List the routines in the form of *schema-name.routine-specific-name* under the SYSIN DD statement with one routine per line.
- The keyword **ALL** to specify all Db2-supplied routines.

DSNTRVFY also accepts the following optional parameters:

### **AUTHID(authorization ID)**

DSNTRVFY uses this value as the CURRENT SQLID for issued SQL statements. Also, if PKOWNER(*pkowner*) is not specified, DSNTRVFY uses this value as the OWNER for BIND PACKAGE and BIND PLAN statements. If this value is not specified, the primary authorization ID is used for BIND PACKAGE, BIND PLAN, and issued SQL statements.

### **PKOWNER(pkowner)**

Specifies the default owner for binding the DSNTRVFY plan and package. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set PKOWNER(*pkowner*)

during the editing of DSNTIJRV. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRV prolog to explain additional requirements.

If you use an authorization ID with the installation SYSOPR authority to execute job DSNTIJRV, the ID must be explicitly granted the MONITOR2 system privilege. If you set AUTHID to SYSINSTL for running the SYSPROC.WLM\_REFRESH stored procedure, you must also define SYSINSTL in RACF.

## Output

DSNTRVFY allocates the following required DD statements for output:

### SYSPRINT

Contains messages generated during verification processing. Each processed routine can generate one or more messages.

### SYSTSPRT

DSNTRVFY writes bind output to SYSTSPRT if an error occurs during bind processing.

The following JCL example is for validating a single routine:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,  
//          PARM='DB2SSN(VA1A) ROUTINE(SYSPROC.DSNUTILS) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *
```

The following JCL example is for validating multiple routines:

```
//DSNTJVFY EXEC PGM=DSNTRVFY,  
//          PARM='DB2SSN(VA1A) ROUTINE(DD:SYSIN) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN DD *  
          SYSPROC.DSNWZP  
          SYSPROC.DSNACCOR  
          SYSPROC.DSNUTILS  
          SYSPROC.DSNUTILU
```

The following JCL example is for validating all routines:

```
//DSNTRVFY EXEC PGM=DSNTRVFY,COND=(4,LT),  
//          PARM=('DB2SSN(DSN) AUTHID(SYSINSTL) ',  
//          'PKOWNER(ADMFO01) ROUTINE(ALL) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *
```

## Processing

DSNTRVFY completes the following validation:

- Verifies that the routine is defined to the SYSIBM.SYSROUTINES catalog.
- Verifies that the collection ID defined in the SYSIBM.SYSROUTINES catalog table matches the collection ID used to bind the package.
- Verifies that the routine is currently defined with the Db2-reserved WLM application environment name DSNWLM\_NOT\_ENABLED, indicating that it is not enabled to run on the current Db2 subsystem. If it is, then a warning message is issued and the validation is bypassed.
- Verifies if the routine can be executed on the current Db2 catalog mode.

- Verifies the APF authorization requirements.
- Verifies if the WLM application environment is defined and available for use.
- Verifies if the NUMTCB setting is valid or within the recommended range.
- Verifies if the required DD statements for some of the routines are defined.
- Verifies if the WLM environment assigned to Java routines is enabled for Java.
- Verifies security coexistence requirements (for example, some routines should run on only their own WLM application environment).
- Verifies that the selected routine can be called successfully. Certain routines such as DSNACICS, DSNAIMS, IBM MQ functions, and most debugger routines are restricted to basic validation and are not called.

During the running of this job, the following message might be issued on the system console:

```
IEFC452I DB2UDSMD - JOB NOT RUN - JCL ERROR
```

In most cases, this message is normal and can be disregarded.

If the validation is successful, the following message is issued:

```
DSNT027I DSNTRVFY VALIDATION FOR schema.routine-specific-name SUCCESSFUL
```

If the validation fails, messages are issued to explain the reasons for failure. Examine these messages and make necessary adjustments before running the validation job again.

## Input

DSNTRVFY requires the following DD statements for input:

### **DBRMLIB**

Identifies the library where the DBRM for the DSNTRVFY program is located. This is typically the *prefix.SDSNDBRM* target library.

### **SYSIN**

Contains the list of Db2 routines. This is required when the validation type is for multiple routines (DD:SYSIN).

### **SYSUT1**

Work data set required for bind processing.

## Limitations

The following limitations apply to the DSNTRVFY program:

- The name of the routine in the form *schema-name.routine-specific-name* is limited to 72 characters, the maximum line length in JCL.
- Only Db2 12 Db2-supplied routines are supported for validation.
- Some routines, if enabled, receive basic validation to ensure that they are defined correctly and assigned to a valid WLM application environment. However, validation will not extend to calling these routines for one or more of the following reasons:
  - Optional system support such as CICS, IMS, or IBM MQ is required.
  - External setup on a remote server or workstation is required.
  - A call could introduce or modify data unexpectedly in a production environment.

The Db2-supplied routines that are restricted to basic validation are:

- DB2DEBUG.CREATE\_SESSION
- DB2DEBUG.DESTROY\_SESSION
- DB2DEBUG.GET\_REPORT
- DB2DEBUG.LIST\_SESSION

- DB2DEBUG.PUT\_COMMAND
- SYSFUN.SYSTS\_ENCRYPT
- SYSFUN.XSLTRANSFORM
- SYSPROC.ADMIN\_COMMAND\_UNIX
- SYSPROC.ADMIN\_JOB\_CANCEL
- SYSPROC.ADMIN\_JOB\_FETCH
- SYSPROC.ADMIN\_JOB\_QUERY
- SYSPROC.ADMIN\_JOB\_SUBMIT
- SYSPROC.DBG\_ENDSESSIONMANAGER
- SYSPROC.DBG\_INITIALIZECLIENT
- SYSPROC.DBG\_RECVCLIENTREPORTS
- SYSPROC.DBG\_SENDCLIENTREQUESTS
- SYSPROC.DBG\_SENDCLIENTCOMMANDS
- SYSPROC.DBG\_TERMINATECLIENT
- SYSPROC.DSNACICS
- SYSPROC.DSNAIMS
- SYSPROC.DSNAIMS2
- SYSPROC.DSNLEUSR
- SYSPROC.SET\_MAINT\_MODE\_RECORD\_NO\_TEMPORALHISTORY
- SYSPROC.SYSTS\_ALTER
- SYSPROC.SYSTS\_CREATE
- SYSPROC.SYSTS\_DROP
- SYSPROC.SYSTS\_RESTORE
- SYSPROC.SYSTS\_START
- SYSPROC.SYSTS\_STOP
- SYSPROC.SYSTS\_TAKEOVER
- SYSPROC.SYSTS\_UPDATE
- All IBM MQ, web services, and SOAP functions (those with schema DB2MQ, DB2MQ1C, DB2MQ2C, or DB2XML)

## Notes

### Temporary stored procedures used by DSNTIJR

DSNTRVfy creates, calls, and drops two temporary stored procedures. These temporary stored procedures are SYSPROC.DSNWLM\_INSTALL\_INFOJ and SYSPROC.DSNWLM\_INSTALL\_INFO. Both of these stored procedures exist only when DSNTRVfy is executing. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFOJ to validate the WLM environment that is assigned to each Db2-supplied Java routine. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFO to validate the WLM environment that is assigned to each Db2-supplied non-Java routine that runs in a WLM environment.

### Using DSNTIJR to verify 64-bit Java routines

Java on z/OS has two types of architectures: a 31-bit version and a 64-bit version. If your Java routines run in a 31-bit Java virtual machine (JVM), the startup procedure for the WLM environment in which the routines run must initialize a 31-bit environment. If you are running Java routines in a 64-bit JVM, the startup procedure for the WLM environment in which your Java routines run must initialize a 64-bit environment. The program that initializes a 31-bit WLM environment is DSNX9WLM. The program that initializes a 64-bit WLM environment is DSNX9WJM.

For example, you might use the Db2 core Java WLM environment, DSNWLM\_JAVA, for your Java routines. By default, the DSNWLMJ startup procedure for DSNWLM\_JAVA runs program DSNX9WLM.

If your JAVA\_HOME environment variable specifies the path to a 31-bit JVM, such as /usr/lpp/java/IBM/J8.0, you need to run program DSNX9WLM to initialize the WLM environment. However, if your JAVA\_HOME variable specifies a path to a 64-bit JVM, such as /usr/lpp/java/8.0\_64, you need to run program DSNX9WJM to initialize the WLM environment. If you switch to a 64-bit JVM for your Java stored procedures, but do not update the initialization program to DSNX9WJM, DSNTIJRV fails.

### Related concepts

[WLM address space startup procedure for Java routines \(Db2 Application Programming for Java\)](#)

## Installation step 23: Back up the Db2 directory and catalog: DSNTIJIC

---

For backup purposes, create a copy of the Db2 directory and catalog.

### About this task



**Attention:** If you do not create this copy, Db2 can start. However, if errors that require you to reinstall Db2 occur in the directory or catalog and you do not have backup copies, you lose all your tables and data.

**Recommendation:** Copy the catalog and directory at least daily if you make any changes in them. Recovery time for these databases is longer if the copies are not current, and the entire subsystem is affected.

### Procedure

To create an image copy of the directory and catalog:

1. Examine job DSNTIJIC for the following information:

- The device type or unit name.

The default value is SYSDA. If this is incorrect for your site, correct it.

- Expiration date or retention period. You can add a retention period or an expiration date to the job.
- The user on the JOB statement. Ensure that the user is authorized. If Db2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.

2. Run job DSNTIJIC.

The DSNTIJIC job contains a list of all the Db2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the Db2 image copy utility to copy these table spaces to disk or tape, depending on the value that you select for “[IC DATA SET UNIT NAME field](#)” on [page 102](#). Having copies of table spaces enables you to recover the Db2 catalog and Db2 directory in case of a failure.

3. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape or disk setup for image copy. If you find no problems with the setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

### What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

### Related concepts

[Privileges and authorities \(Managing Security\)](#)

### Related tasks

[Installation step 19: Define and bind Db2 objects: DSNTIJSG](#)



Use job DSNTIJSG to bind Db2-supplied packages and plans, initialize the Db2 communications database, and create user-managed databases for the Db2 resource limit facility (RLF), Data Definition Control support, and query optimization.

Migrating an existing data sharing group to Db2 12

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

## Installation step 24: Set up the administrative task scheduler

You can use the administrative task scheduler to execute administrative tasks according to a time-based or event-based schedule.

### Before you begin

You should have run job DSNTIJRA and job DSNTIJIN before you set up the administrative task scheduler.

### About this task

**Restriction:** After migration to Db2 12, the administrative task scheduler is disabled until you run job DSNTIJRT.

The following figure shows an overview of the steps for installing and configuring the administrative task scheduler.

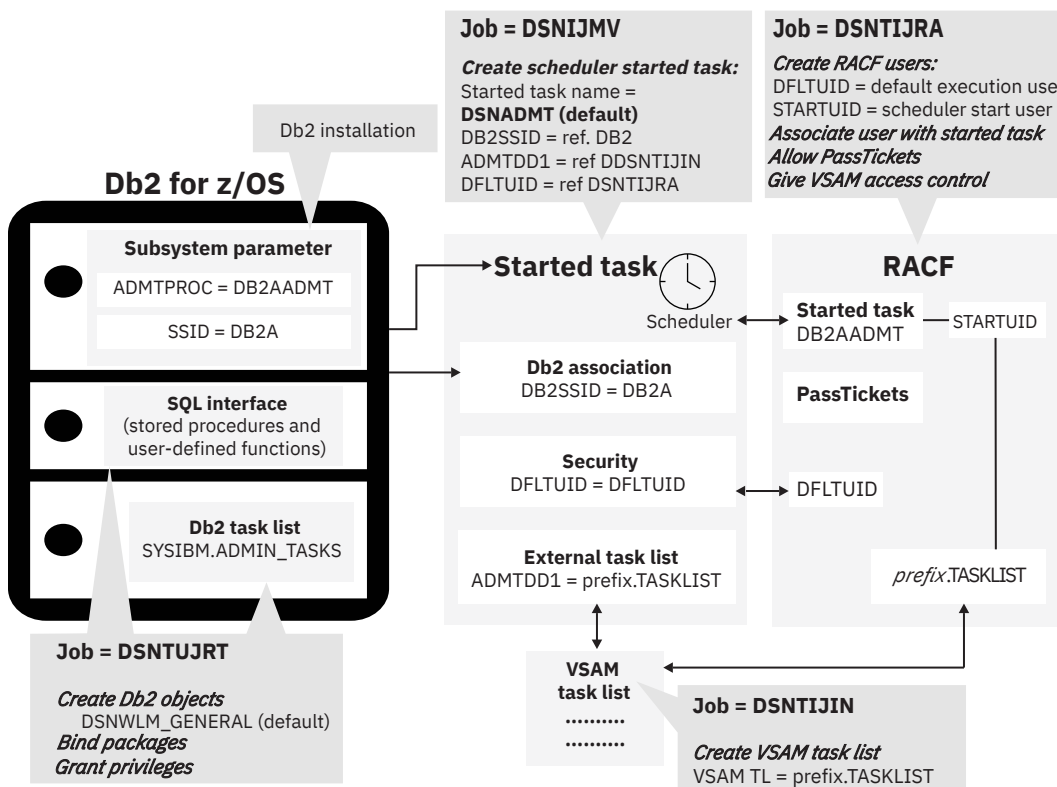


Figure 78. Setting up the administrative task scheduler

### Procedure

To set up the administrative task scheduler:

1. Customize the administrative task scheduler address space startup procedure (xxxxADMT) in job DSNTIJMV.

The name of the startup procedure needs to match the value of the ADMTPROC subsystem parameter. Before using the startup procedure, locate and review the settings for the following parameters:

**DB2SSID**

The name of this Db2 subsystem.

**DFLTUID**

The default ID that is used by the administrative task scheduler to execute its tasks. DFLTUID must be different than the ID that is used to start this address space. DFLTUID must be an ID that can be used as a logon ID and has a password. DFLTUID cannot be a group ID.

**TRACE**

Indicates whether to activate tracing for the administrative task scheduler. The value can be ON or the default value of OFF.

You can specify other parameters, such as ERRFREQ, MAXHIST, MAXTHD, or STOPONDB2STOP in the startup procedure similarly to the three parameters DB2SSID, DFLTUID and TRACE.

**ERRFREQ**

Specifies how frequently message DSN679I displays on the console, indicating that one of the redundant, active copies of the task list is not accessible. By default, this message displays on the console once per minute, for example, when Db2 is offline.

**MAXHIST**

Specifies the number of status entries per task that are stored. This parameter is a positive integer with a default value of 10. When the limit is reached, the oldest status entries are deleted.

**MAXTHD**

Specifies the maximum number of execution threads for an administrative task scheduler. The default value is 99.

**STOPONDB2STOP**

Specifies that the administrative task scheduler will terminate when Db2 is stopped.

Also locate and review the ADMTDD1 DD statement. The VSAM data set that is indicated must match the VSAM task list data set that is defined in job DSNTIJIN.

The following example shows how these parameters can be updated.

```
//DSNADMT PROC LIB='DSN!!0.SDSNLOAD',
//          DB2SSID=DSN,
//          DFLTUID=DFLTUID,
//          TRACE=OFF,
//          MAXTHD=10
// *
//STARTADM EXEC PGM=DSNADMT0,DYNAMNBR=100,REGION=0K,
//          PARM=('DB2SSID=&DB2SSID',
//              'DFLTUID=&DFLTUID',
//              'TRACE=&TRACE',
//              'MAXTHD=&MAXTHD',
//              'ERRFREQ=1440',
//              'STOPONDB2STOP')
//STEPLIB DD DISP=SHR,DSN=&LIB
//ADMTDD1 DD DISP=SHR,DSN=DSNC!!0.TASKLIST
```

2. Ensure that the administrative task scheduler routines were enabled.

They were enabled by job DSNTIJRT.

3. Create a job to make image copies of the administrative task scheduler table spaces. Establish a schedule for making image copies.

In general, you should back up important databases on a regular basis. The database for the administrative task scheduler is no exception and should be copied on the same frequency as the Db2 catalog and directory. The following example shows how to copy the table spaces in this database to stacked data sets on tape with a retention period of 99 days:

```
// *
//DSNTIC EXEC PGM=DSNUTILB,PARM='DSN,IMAGCOPY',COND=(4,LT)
//SYSPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//DSNTRACE DD SYSOUT=*
//SYSLISTD DD *
LISTDEF DSNLDEF
INCLUDE TABLESPACES DATABASE DSNADMDB
```

```
//SYSIN DD *  
  TEMPLATE DSNTPLT  
           DSN(prefix.IMAGCOPY.&DB. .;&TS. ;)  
           DISP (NEW,KEEP,DELETE)  
           UNIT TAPE  
           STACK YES  
           RETPD 99  
  COPY LIST DSNLDEF  
           COPYDDN(DSNTPLT)  
/*
```

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

[Multi-threading in the administrative task scheduler \(Db2 Administration Guide\)](#)

### Related tasks

[Installation step 5: Define system data sets: DSNTIJIN](#)

Use job DSNTIJIN to define the VSAM and non-VSAM data sets for Db2.

[Additional steps for enabling the administrative task scheduler and administrative enablement routines](#)

The administrative task scheduler routines are Db2-supplied routines that enable you to schedule work. The administrative enablement routines are Db2-supplied routines that enable you to execute administrative work immediately.

[Scheduling administrative tasks \(Db2 Administration Guide\)](#)

### Related information

[DSNA677I \(Db2 Messages\)](#)

## Installation step 25: Verify successful installation of Db2 12

---

You can run the sample applications to verify that your installation process was successful.

### Procedure

Tailor and run the jobs for the sample applications, as described in [Chapter 9, “Verifying successful Db2 12 installation or migration with sample applications,”](#) on page 727.

You can select the phases that you need to run based on the attachment facilities you installed, the languages you use, and whether the sample objects exist.

### What to do next

You might want to enable more capabilities in the newly installed Db2 subsystem. For instructions, see [Chapter 10, “Configuring additional capabilities for Db2 for z/OS,”](#) on page 819.



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## Chapter 6. Migrating to Db2 12

*Migration* is the process of upgrading from Db2 11 to Db2 12.

The Db2 12 migration process uses a single catalog level. For more information about catalog levels in Db2 12, see [Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#). Before you begin migration to Db2 12, read all information in [Chapter 2, "Preparing your system to install or migrate to Db2 12,"](#) on page 3.

### Availability of new function and Db2 12 function levels

The availability of new function depends on the type of enhancement, the activated function level, and the application compatibility levels of applications. In the initial Db2 12 release, most new capabilities are enabled only after the activation of function level 500 or higher.

### Virtual storage enhancements

Virtual storage enhancements become available at the activation of the function level that introduces them or higher. Activation of function level 100 introduces all virtual storage enhancements in the initial Db2 12 release. That is, activation of function level 500 introduces no virtual storage enhancements.

### Subsystem parameters

New subsystem parameter settings are in effect only when the function level that introduced them or a higher function level is activated. Many subsystem parameter changes in the initial Db2 12 release take effect in function level 500. For more information about subsystem parameter changes in Db2 12, see [Subsystem parameter changes in Db2 12 \(Db2 for z/OS What's New?\)](#).

### Optimization enhancements

Optimization enhancements become available after the activation of the function level that introduces them or higher, and full prepare of the SQL statements. When a full prepare occurs depends on the statement type:

- For static SQL statements, after bind or rebind of the package
- For non-stabilized dynamic SQL statements, immediately, unless the statement is in the dynamic statement cache
- For stabilized dynamic SQL statements, after invalidation, free, or changed application compatibility level

Activation of function level 100 introduces all optimization enhancements in the initial Db2 12 release. That is, function level 500 introduces no optimization enhancements.

### SQL capabilities

New SQL capabilities become available after the activation of the function level that introduces them or higher, for applications that run at the equivalent application compatibility level or higher. New SQL capabilities in the initial Db2 12 release become available in function level 500 for applications that run at the equivalent application compatibility level or higher. You can continue to run SQL statements compatibly with lower function levels, or previous Db2 releases, including Db2 11 and DB2 10. For details, see [Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

### Function levels in Db2 12

When you initially migrate to Db2 12, Db2 is at function level 100, and you cannot use most new capabilities.

You can use function level 100 to complete migration tasks and verify that the subsystem is stable. In a data sharing environment, you use function level 100 to migrate all members of the group to Db2 12. When the subsystem or data sharing group is stable at function level 100, you can activate a higher function level. After any new function level is activated, fallback to Db2 11 is no longer possible.

## Application compatibility in Db2 12

After migration to Db2 12 is complete, you can resolve application incompatibilities and rebind applications at the appropriate application compatibility so that they can use new SQL capabilities. You can do these steps when you are ready and satisfied that your environment is stable on Db2 12. For details see, [Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#).

### Related tasks

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

[“Automating Db2 migration by using z/OS Management Facility” on page 575](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

### Related reference

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

### Related information

[IBM Db2 12 for z/OS Technical Overview \(IBM Redbooks\)](#)

## Migrating your Db2 subsystem to Db2 12

The migration process for Db2 12 has a single phase. However, most new capabilities and enhancements in Db2 12 remain unavailable until you issue an ACTIVATE command to activate function level 500 or higher.

### Before you begin

Before you begin migration to Db2 12, read all information in [Chapter 2, “Preparing your system to install or migrate to Db2 12,” on page 3](#).



**Attention:** If you do not follow the documented procedures, unpredictable results might occur after migration to Db2 12.

Ensure that your Db2 11 subsystem is running in new-function mode and is at the proper service level. For more information about identifying required service, see [“Required maintenance for Db2 12 installation or migration” on page 3](#).

**Important:** Apply the for fallback SPE ([APAR PI33871](#)) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration” on page 3](#).

### About this task

When you start Db2, the code level of the starting Db2 is compared to the code level that is required by the current Db2 catalog. If the starting Db2 has a code-level mismatch with the catalog, Db2 does not start and a message is issued.

Refer to the [Db2 Program Directory](#) for keyword specifications that are used for Preventive Service Planning (PSP) and for information about the service levels of any coupling facilities. You can use the z/OS DISPLAY CF command to display the service level of coupling facilities. Check Information/Access or the ServiceLink facility of IBMLink for PSP information before you migrate. Or, to help you identify required service, you can instead use enhanced HOLDDATA and fix categories (FIXCATs), which provide a simplified, automated method of identifying and applying missing PTFs that are required for installation or migration. Also, check monthly for current information about Db2.

**Restriction:** After migration to Db2 12, the administrative task scheduler is disabled until you run job DSNTIJRT.

## Procedure

To migrate a Db2 for z/OS subsystem to Db2 12:

1. Estimate storage needs for your Db2 12 environment. For more information, see [“Storage requirements for Db2 for z/OS”](#) on page 6.
2. Determine the new capabilities that you want use in Db2 12, and make plans for other changes in the new release. For more information, see:
  - [What's new in Db2 12 \(Db2 for z/OS What's New?\)](#)
  - [Changes to plan for in Db2 12 \(Db2 for z/OS What's New?\)](#)
3. If you are using distributed data, install TCP/IP, VTAM, or both. For more information, see [“Connecting distributed database systems”](#) on page 867.
4. If you plan to use data sharing, set up a Parallel Sysplex. For more information, see [“Parallel Sysplex requirements for Db2 data sharing”](#) on page 602.
5. Use SMP/E to load the Db2 12 libraries. For more information, see [Chapter 3, “Making the Db2 product code available,”](#) on page 33.

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDNSLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

If you plan to use the callable SQL interface of Db2, see [Configuring Db2 ODBC and running sample applications \(Db2 Programming for ODBC\)](#) for the additional installation jobs that you need to run. If you plan to use Db2 for z/OS Java Edition, you must run more installation jobs. For more information, see [Installing the IBM Data Server Driver for JDBC and SQLJ](#).

6. Install needed service on Db2 11. For information about the required service to apply, see the [Program Directory](#).

**Important:** Apply the for fallback SPE (APAR PI33871) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration”](#) on page 3.

7. Check for release incompatibilities, and make the necessary changes in your applications. For more information, see [“Make adjustments for incompatible changes in Db2 12”](#) on page 489.
8. Generate tailored JCL jobs for migrating to Db2 12. You can use the Db2 installation CLIST. For more information, see [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode”](#) on page 52.
9. Complete the following migration tasks:

[“Migration step 1: Actions to complete before migration”](#) on page 486

[“Migration step 2: Verify the integrity of Db2 table spaces \(optional\)”](#) on page 496

[“Migration step 3: Identify invalid packages \(optional\)”](#) on page 497

[“Migration step 4: Check for consistency between catalog tables \(optional\)”](#) on page 498

[“Migration step 5: Take image copies of the directory and catalog: DSNTIJIC”](#) on page 498

[“Migration step 6: Connect Db2 to TSO”](#) on page 499

[“Migration step 7: Connect Db2 to IMS \(optional\)”](#) on page 502

[“Migration step 8: Connect CICS to Db2 \(optional\)”](#) on page 502

[“Migration step 9: Stop Db2 11 activity”](#) on page 503

[“Migration step 10: Back up your Db2 11 volumes \(optional\)”](#) on page 505

[“Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM”](#) on page 505

[“Migration step 12: Establish subsystem security \(optional\)”](#) on page 507

[“Migration step 13: Define Db2 12 to IRLM and MVS: DSNTIJMV”](#) on page 507

[“Migration step 14: update Db2 address space start and language procedure definitions: DSNTIJMA, DSNTIJMW, DSNTIJMP, DSNTIJMJ” on page 508](#)

[“Migration step 15: Define system data sets: DSNTIJIN” on page 511](#)

[“Migration step 16: Define user authorization exit routines: DSNTIJEX \(optional\)” on page 511](#)

[“Migration step 17: Refresh the z/OS definition of Db2 ” on page 512](#)

[“Migration step 18: Start Db2 12” on page 513](#)

[“Migration step 19: Tailor Db2 12 catalog: DSNTIJTC” on page 515](#)

[“Migration step 20: Ensure that the catalog has no problems \(optional\)” on page 517](#)

[“Migration step 21: Prepare dynamic SQL program: DSNTIJTM” on page 517](#)

[“Migration step 22: Bind SPUFI and DCLGEN and user-maintained database activity: DSNTIJSG” on page 518](#)

[“Migration step 23: Configure Db2 for running stored procedures and user-defined functions \(optional\)” on page 519](#)

[“Migration step 24: Set up Db2-supplied routines” on page 530](#)

[“Migration step 25: Convert EXPLAIN tables to the current format” on page 541](#)

[“Migration step 26: Verify views: DSNTIJVR” on page 544](#)

[“Migration step 27: Take an image copy of the Db2 12 catalog : DSNTIJIC” on page 544](#)

[“Migration step 28: Verify migration of Db2 11 IVP objects to Db2 12 \(optional\)” on page 544](#)

10. When you are ready to use new capabilities in Db2 12, activate new function as described in [“Activating Db2 12 new function at migration” on page 545](#).
11. Install, configure, and verify Db2-supplied routines that depend on Db2 12 function levels, as described in [“Installing and configuring Db2-supplied routines that use new function: DSNTIJRT” on page 549](#).
12. Verify the successful migration to Db2 12, as described in [“Verifying successful migration to Db2 12” on page 560](#).
13. Enable more capabilities in your Db2 environment. For more information, see [Chapter 10, “Configuring additional capabilities for Db2 for z/OS,” on page 819](#).

## What to do next

You might want to activate new capabilities that are introduced by higher Db2 12 function levels. For more information about continuous delivery and function levels in Db2 12, see the following topics:

- [Db2 12 function levels \(Db2 for z/OS What's New?\)](#)
- [Adopting new capabilities in Db2 12 continuous delivery \(Db2 for z/OS What's New?\)](#)

**Important:** Do not issue the ACTIVATE command or run job DSNTIJAF for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the ACTIVATE command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.

### Related concepts

[What's new in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related reference

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

## Migration step 1: Actions to complete before migration

Before you migrate to Db2 12, you must prepare your system for migration. Preparations include making adjustments for release compatibilities, running premigration queries, and completing other premigration tasks.



## Run premigration queries (DSNTIJPM)

Before you migrate to Db2 12, run premigration queries on the Db2 11 catalog.

### Procedure

To run premigration queries:

1. Copy the updated job DSNTIJPM from Db2 12 to Db2 11.
2. Customize job DSNTIJPM as described in the job prolog.
3. Run job DSNTIJPM.

### Results

Job DSNTIJPM generates reports about conditions that require action before or during the migration process. Such conditions include obsolete object formats, missing required objects, packages that must be rebound before migration, and dependencies that are affected by the migration process. For detailed information about the contents of the reports for migration to Db2 12, see the report descriptions in job DSNTIJPM.

### Premigration job DSNTIJPM for migration to Db2 12

You can find an online copy of the content of job DSNTIJPM in IBM Documentation. See [Run premigration queries \(DSNTIJPM\)](#).

The content of the DSNTIJPM premigration job is presented here for informational purposes only. Use the actual job that is supplied with the Db2 12 product code when you complete this task.

## Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12

By taking appropriate actions in Db2 11 well before migration to Db2 12, you can minimize the risk of disruptive automatic binds of application plans and packages during and after migration to Db2 12.

### Before you begin

Identify plans and packages that are subject to autobind at migration to Db2 12 because they were last bound in a release earlier than DB2 10. To do so, run job DSNTIJPM and examine the premigration reports about package copies and plans that are not supported after migration to Db2 12. For more information, see [“Run premigration queries \(DSNTIJPM\)” on page 487](#).

**Important:** Apply APAR PI87675 to eliminate the possibility of repeating automatic remigration binds during release coexistence.

### About this task

**Tip:** Do this task well in advance (months if possible) before migration to Db2 12, so that you have sufficient time to run the applications and address any performance problems that might occur after the rebinds. The goal is to remove the operational and performance risks related to automatic bind from the Db2 12 migration window.

Migration-related *automatic binds* (also called "autobinds") occur in Db2 12 because it cannot use runtime structures from a plan or package that was last bound in a release earlier than DB2 10. Plans and packages that were bound in Db2 11 can run in Db2 12, without the risk of migration-related autobinds. However, plans and packages that are bound in Db2 12 cannot run on Db2 11 members without an autobind in Db2 11.

If the autobinds are allowed to occur, they are inevitably disruptive for rolling online migrations, or any time that different releases coexist in data sharing environments. During and after migration, such autobinds can result in costly problems, including performance regression and even application outages.

Autobinds occur the first time that any plan or package runs in Db2 12, which means that the autobinds, and resulting problems and application outages, can occur well after a migration window. That is, such problems and resulting outages can occur any time in the "first impression" window in Db2 12, which is any time until the plan or package first runs in Db2 12.

The best approach is to bind all packages and plans that might be subject to migration-related autobinds in Db2 11 with good performance before you start the migration to Db2 12. Doing so reduces the risk of the following problems that can result from autobinds:

- Application failures because of contention between releases. For any migration that brings into release coexistence, autobinds might fail for plans or packages that are in use by a Db2 11 member, causing applications to fail on the Db2 12 member.

Successful autobinds on Db2 12 in a coexistence environment also create a package or plan that Db2 11 members cannot run without another autobind. The autobind might also fail if the plan or package is in use by a Db2 12 member.

- Application failures, when autobinds fail for access control authorization exit users because the authorization ID for the autobind has insufficient privileges, compared to the owner of the package or the plan.
- Difficult to resolve performance regressions. For packages, a migration-related autobind also destroys the current package. If the autorebind succeeds but introduces an access path regression, REBIND SWITCH is not possible. Any performance regression that occurs in Db2 12 might also occur in Db2 11.

## Procedure

To avoid autobinds during or after the Db2 12 migration process, take the following actions. For best results, complete these actions well before migration to Db2 12 (months if possible) so that you have sufficient time to run the applications and resolve any performance issues that might occur after the rebinds.

1. In Db2 11 and well before migration to Db2 12, rebind any plans that job DSNTIJPM identifies.  
Autobinds of plans can be particularly disruptive for application workloads that depend on few or even a single large plan.
2. In Db2 11 and well before migration to Db2 12, rebind any packages that job DSNTIJPM identifies, and specify the PLANMGMT(EXTENDED) bind option.
3. Regenerate any native SQL routines that were last regenerated in a release earlier than DB2 10.  
When you issue a REBIND command for an application that uses native SQL routines, it rebinds only the SQL statements and not the control statements, so you must use ALTER PROCEDURE statements with the REGENERATE keyword. For more information, see [Regenerating an existing version of a native SQL procedure \(Db2 Application programming and SQL\)](#).
4. Run the applications on Db2 11 for a period of time so that you have plenty of time to address any performance issues that might occur.
5. Free old package copies regularly, and especially just before the migration, to get recent original package copies.  
The prior package is preserved for use by Db2 11. If a performance regression occurs, you can rebind the package with the SWITCH option to recover the previous access path.
6. Set the ABIND subsystem parameter appropriately for your environment:
  - In data sharing, set ABIND to COEXIST. If a package or plan is bound in Db2 12 and it runs later in Db2 11, it is automatically rebound. However, the Db2 11 plan or package can be used when it runs again in Db2 12, without another rebind. However, the plan or package runs without any Db2 12 enhancements in this case.
  - In non-data sharing Db2 subsystems, set ABIND to YES. Coexistence across releases is not an issue in such cases. If you must fall back to Db2 11, explicitly rebind packages and plans that were bound in Db2 12. By doing so, you can avoid remigration autobinds that occur for packages or plans that were bound in Db2 12 and are then automatically bound after fallback to Db2 11.

7. Bind most packages or plans in Db2 12 only after migration is complete for all members and coexistence with Db2 11 is no longer a concern.

### **Related concepts**

[Automatic binds in coexistence](#)

Changes to package structures that are introduced in Db2 12 are not available to members of the group that have not migrated. You must plan accordingly when developing your migration plan.

[Automatic rebinds \(Db2 Application programming and SQL\)](#)

### **Related reference**

[AUTO BIND field \(ABIND subsystem parameter\)](#)

The ABIND subsystem parameter specifies whether Db2 automatically rebinds packages and plans in certain situations at run time.

## **Free inactive package copies**

When you use plan management polices to save package copies, original copies can become stale. By freeing inactive copies just before migration, you enable Db2 to save usable original package copies at the first rebind in Db2 12.

### **Before you begin**

You can do this task only if you previously specified a plan management policy to specify that Db2 saves access path information for SQL statements, as described in [Saving access path information for static SQL statements \(Db2 Performance\)](#). Use the default option EXTENDED in most cases.

### **About this task**

Original package copies in particular can become stale or invalid because Db2 never replaces the original copies after you first rebind with EXTENDED, unless you free them. An original copy that is many years old probably cannot be used. Because the goal is to keep stable and usable access paths available, it is best to free invalid copies before migration, so that Db2 saves a new original copy in the first rebind after migration.

### **Procedure**

Just before migration, issue FREE PACKAGE commands and specify PLANMGMTSCOPE(INACTIVE).

Db2 removes all original and previous package copies from the Db2 catalog. Then at the first rebind after migration to Db2 12, Db2 saves the last current package copies from Db2 11 as the new original package copies in Db2 12.

### **Related tasks**

[Saving and switching to previous access paths \(Db2 Performance\)](#)

### **Related reference**

[FREE PACKAGE subcommand \(DSN\) \(Db2 Commands\)](#)

## **Make adjustments for incompatible changes in Db2 12**

Some changes in Db2 12 might affect your Db2 operations after migrating.

### **Procedure**

Familiarize yourself with the following information and plan to make appropriate adjustments:

- [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#)
- [Incompatible changes summary for function levels 501 and higher \(Db2 for z/OS What's New?\)](#)
- [Function that Db2 12 no longer supports \(Db2 for z/OS What's New?\)](#)
- [Deprecated function in Db2 12 \(Db2 for z/OS What's New?\)](#)

## Adjust subsystem parameter settings for parameters removed in Db2 12

Before you can migrate to Db2 12, you must set the values of certain subsystem parameters that are removed in Db2 12.

### Procedure

To adjust for subsystem parameters that are removed in Db2 12, complete the following steps:

- Modify your subsystem parameter module to specify the following settings.
  - COMPRESS\_SPT01=YES
  - SPT01\_INLINE\_LENGTH=32138
  - OBJECT\_CREATE\_FORMAT=EXTENDED
  - UTILITY\_OBJECT\_CONVERSION=NOBASIC

In data sharing, you must ensure that all members of the group run with these settings before migrating any member of the group to Db2 12.

### Related concepts

[Subsystem parameter release incompatibilities in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related reference

[Subsystem parameter changes in Db2 12 \(Db2 for z/OS What's New?\)](#)

## Examine all new and changed values for DB2I panels

During a migration, the DB2I default panels DSNEOP01 and DSNEOP02 are not initialized with the values that are specified during the installation CLIST process. The DB2I panel variables in the ISPF profile from the previous release are used on the current release. Any customized DSNEPROF members are migrated from your previous release to Db2 12.

### Procedure

Examine any new or changed DB2I default panel values.

## Ensure that sample objects from your previous release are available

If you no longer have the IVP jobs from your previous release, you need to run the previous release's installation CLIST to regenerate them.

### Procedure

If you dropped your previous release's sample database (by running job DSNTEJ0), run the previous IVP jobs from the previous release through phase 3 before you start the migration.

If you do not have the jobs from the previous release available during migration, you will not have a Db2-supported IVP to verify a successful migration.

## Convert the BSDS, Db2 catalog, and directory to 10-byte RBA and LRSN format

If the bootstrap data set (BSDS) is not already converted to use the 10-byte RBA and LRSN fields, you must convert it before you start Db2 in Db2 12. By default, the BSDS of a Db2 11 subsystem is initialized to use 6-byte RBA and LRSN fields. It is strongly recommended that you convert the catalog and directory to the 10-byte format before or soon after you convert the BSDS to the 10-byte format.

## Before you begin



**Attention:** In Db2 subsystems that are not data sharing members, if Db2 is already at risk of reaching the 6-byte RBA limit, it is strongly recommended that you first convert all catalog and directory objects, then convert all user objects to the 10-byte RBA format, before migrating to Db2 12.

## Procedure

Complete the following steps:

- Run job DSNTIJCV to convert the Db2 catalog and directory table spaces and indexes to the 10-byte RBA or LRSN format.  
If you run job DSNTIJCV in Db2 11, ensure that it allocates the Db2 11 SDSNLOAD module.  
Do not rearrange the processing sequence and the table space groupings. The COPY and REORG steps use LISTDEF filtering to exclude table spaces that are already in extended format.  
Job DSNTIJCV is customized when you run the Db2 installation CLIST for migration, as described in [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,”](#) on page 43.
- Convert the BSDS to use the extended 10-byte RBA and LRSN fields, as described in [“Convert BSDS records to the extended 10-byte format: DSNTIJCB”](#) on page 491.

### Related concepts

[The extended 10-byte RBA and LRSN in Db2 12 \(Db2 for z/OS What's New?\)](#)

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

### Related reference

[DSNJCNVT \(Db2 Utilities\)](#)

## ***Convert BSDS records to the extended 10-byte format: DSNTIJCB***

You must convert the BSDS to a new format that supports 10-byte RBA and LRSN fields before you start Db2 in Db2 12. By default, the BSDS of a Db2 11 subsystem is initialized in the 6-byte, pre-Db2 11 format.

## Before you begin

Before you can convert the BSDS, the Db2 subsystem or data sharing member must be started in Db2 11 new-function mode.



**Attention:** In Db2 subsystems that are not data sharing members, if Db2 is already at risk of reaching the 6-byte RBA limit, it is strongly recommended that you first convert all catalog and directory objects, then convert all user objects to the 10-byte RBA format, before migrating to Db2 12.



**Attention:** After the BSDS is converted to the 10-byte format, Db2 stops issuing messages to warn you about the risk of reaching the 6-byte RBA or LRSN limits. The increased size of all log records also accelerates progress toward the 6-byte RBA logging limit.

In Db2 subsystems that are not data sharing members, always convert all Db2 catalog, directory, and user objects to use the extended 10-byte RBA format before you convert the BSDS, especially if Db2 is close to reaching the logging limit for the 6-byte RBA. Failure to convert page sets to the 10-byte RBA format before Db2 reaches the 6-byte logging limit results in failed updates with reason code 00C2026D. No updates are allowed for any object that is still in the 6-byte format.

In data sharing, if any Db2 member is approaching the logging limit for the 6-byte RBA but the LRSN is not approaching the limit of the 6-byte range, converting the BSDS of just that member sufficient to resolve the immediate problem and prevent outages. However, if the LRSN is also approaching the end of the 6-byte range, you must continue and convert page sets to use the 10-byte format before the limit is reached.

At migration to Db2 12, you cannot start Db2 12 until the BSDS is converted to use the 10-byte RBA and LRSN formats. You can convert the BSDS before or during the Db2 12 migration process.

## Procedure

To convert the BSDS to use the extended 10-byte RBA and LRSN format, complete the following steps:

1. Stop Db2.

**Tip:** If you complete the BSDS conversion as part of the Db2 12 migration process, you can avoid an extra stop and start of Db2. To do so, complete the BSDS conversion sometime between [“Migration step 9: Stop Db2 11 activity”](#) on page 503 and [“Migration step 18: Start Db2 12”](#) on page 513.

2. Run job DSNTIJCB and make sure that it allocates the Db2 11 SDSNLOAD module.

The DSNTIJCB job for each Db2 subsystem or data sharing member is located in the *prefix*.NEW.SDSNSAMP sample library that is generated when you run the installation CLIST in MIGRATE mode.

Db2 runs the DSNJCNVT conversion utility to convert the bootstrap data set records to support 10-byte RBA and LRSN fields. For more information, see [DSNJCNVT \(Db2 Utilities\)](#).

3. Start Db2.

## What to do next

If you have not already done so, complete the following tasks:

1. Convert all page sets for the Db2 catalog and directory as described in [“Convert the BSDS, Db2 catalog, and directory to 10-byte RBA and LRSN format ”](#) on page 490.
2. Convert all user objects to support the 10-byte RBA and LRSN, as described in [Converting page sets to the 10-byte RBA or LRSN format \(Db2 Administration Guide\)](#). After Db2 reaches the hard logging limit, you might not be able to convert the catalog and directory page sets, as described in [Converting page sets to the 10-byte RBA or LRSN format \(Db2 Administration Guide\)](#).
3. Continuously monitor the RBA and LRSN values until all catalog, directory, and user objects are converted to the 10-byte RBA or LRSN format. Failure to convert page sets before the 6-byte soft logging limit is reached results in failed updates with reason code 00C2026D, and any objects still in the 6-byte format become read-only. RBA or LRSN values greater than x'F00000000000' indicate that your system is at risk of reaching the 6-byte logging limit. For more information about the RBA and LRSN logging limits, see [What to do before RBA or LRSN limits are reached \(Db2 Administration Guide\)](#).

### Related concepts

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

[The extended 10-byte RBA and LRSN in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related reference

[Job DSNTIJCB](#)

Job DSNTIJCB supports the DSNJCNVT stand-alone utility for converting the BSDS records to support 10-byte RBA and LRSN fields.

### Job DSNTIJCB

Job DSNTIJCB supports the DSNJCNVT stand-alone utility for converting the BSDS records to support 10-byte RBA and LRSN fields.

DSNTIJCB consists of the following job steps:

#### DSNTDEF

Activates IDCAMS to define new BSDS data sets with CLUSTER, DATA, and INDEX components under the temporary names *prefix*.BSDS01.NEW and *prefix*.BSDS02.NEW.

#### DSNTCNVT

Activates DSNJCNVT to read records from the existing BSDS, converts them to support the extended RBA and LRSN format, and writes them into the *prefix*.BSDS01.NEW and *prefix*.BSDS02.NEW data sets.

## DSNTRENO

Renames the existing BSDS data sets to backup names, *prefix*.BSDS01.OLDFMT and *prefix*.BSDS02.OLDFMT.

## DSNTRENN

Renames *prefix*.BSDS01.NEW and *prefix*.BSDS02.NEW to *prefix*.BSDS01 and *prefix*.BSDS02.

No job step can run unless all preceding job steps complete with return code 0.

When the installation CLIST customizes DSNTIJCB, it substitutes the BSDS names that are specified in fields COPY 1 NAME and COPY 2 NAME on installation panel DSNTIPH for *prefix*.BSDS01 and *prefix*.BSDS02. The fields allow each name to support names up to 30 bytes in length, so no special handling is needed to rename the existing data sets.

### Related concepts

[The extended 10-byte RBA and LRSN in Db2 12 \(Db2 for z/OS What's New?\)](#)

### Related tasks

[Convert BSDS records to the extended 10-byte format: DSNTIJCB](#)

You must convert the BSDS to a new format that supports 10-byte RBA and LRSN fields before you start Db2 in Db2 12. By default, the BSDS of a Db2 11 subsystem is initialized in the 6-byte, pre-Db2 11 format.

## Convert RLF tables to the current format

Before migration to Db2 12, you must convert your resource limit facility (RLF) tables to take advantage of longer field sizes that were introduced in Db2 11 and in DB2 version 8.

### Before you begin

If you completed this task in a previous release, no action is necessary.

Ensure that the routines to be monitored are bound with APPLCOMPAT(V11R1) or higher.

### About this task

Certain obsolete RLF table formats are deprecated, or unsupported starting in Db2 12.

- Starting in Db2 12, DSNRLSTxx table formats and related index formats from before DB2 version 8 format are not supported. When Db2 detects DSNRLSTxx tables with unsupported formats, it issues message DSNT731I.
- DSNRLMTxx table formats and related index formats from before Db2 11 are deprecated. In Db2 12, if Db2 detects DSNRLMTxx tables in a deprecated format, it issues message DSNT732I, processing for the START RLIMIT command continues, and the resource limit facility starts using the deprecated objects.

Installation job DSNTIJSG contains the JCL for creating RLF tables.

### Procedure

To convert RLF tables to the new format:

1. Stop the resource limit facility by issuing the following command.

**GUI**

```
-STOP RLIMIT
```

**GUI**

2. If a DSNRLSTxx table was never updated to the format introduced in DB2 version 8, alter the data types for all of the following columns to VARCHAR(128).
  - AUTHID
  - RLFCOLLN
  - RLFPKG

This step is required before migration to Db2 12.

3. Take one of the following actions to create RLF tables with the longer field lengths.

- Alter the existing DSNRLMTxx table column data types for RLFEUAN, RLFEUID, and RLFEUWN to specify the new longer lengths.
  - Alter RLFEUAN to VARCHAR(255)
  - Alter RLFEUID to VARCHAR(128)
  - Alter RLFEUWN to VARCHAR(255)

You cannot alter a subset of the listed columns. You must alter all the above columns or none.

**Important:** After you change table or index definitions, consider reorganizing data to improve performance. After you change data types or column lengths by using ALTER TABLE statements, Db2 places the table space that contains the modified data in advisory REORG-pending (AREO\*) status. The table space is in AREO\* status because the existing data is not immediately converted to its new definition. Reorganizing the table space prevents possible performance degradation.

**Tip:** When data is in REORG-pending or AREO\* status, use the REORG utility with the SCOPE PENDING option to automatically reorganize partitions. With this option, you avoid identifying which partitions require reorganization and customizing the REORG control statement.

- Create a new DSNRLMTxx table with the new longer lengths client information fields. Installation job DSNTIJSJG contains the JCL for the creation of RLF tables.

You can copy the data from an existing RLF table to a new table. The following example copies data from DSNRLMT01 to DSNRLMT02.

#### GUIP

```
INSERT INTO authid.DSNRLMT02
  ( RLFFUNC, RLFEUAN, RLFEUID, RLFEUWN, RLFIP,
    ASUTIME, RLFASUERR, RLFASUWARN, RLF_CATEGORY_B )
SELECT
  RLFFUNC, RLFEUAN, RLFEUID, RLFEUWN, RLFIP,
  ASUTIME, RLFASUERR, RLFASUWARN, RLF_CATEGORY_B
FROM authid.DSNRLMT01;
```

#### GUIP

4. Start the resource limit facility with the ID of DSNRLMTxx table to be used.

The following example shows that RLF is activated with DSNRLMT02. The ID in the START command is also applied to the DSNRLSTxx table.

#### GUIP

```
-START RLIMIT ID=02
```

#### GUIP

### Related tasks

[Installation step 19: Define and bind Db2 objects: DSNTIJSJG](#)

Use job DSNTIJSJG to bind Db2-supplied packages and plans, initialize the Db2 communications database, and create user-managed databases for the Db2 resource limit facility (RLF), Data Definition Control support, and query optimization.

### Related reference

[DSNRLMTxx resource limit tables \(Db2 Performance\)](#)

[DSNRLSTxx resource limit tables \(Db2 Performance\)](#)

[-STOP RLIMIT command \(Db2\) \(Db2 Commands\)](#)

[-START RLIMIT command \(Db2\) \(Db2 Commands\)](#)



## Ensure that no utility jobs are running

In Db2 12, you can restart or terminate a utility only on the same release on which it was started.

### About this task

Outstanding utility jobs started in Db2 11 cannot be restarted or terminated after migration to Db2 12.

Immediately before you begin the migration process, ensure that you do not have outstanding utility jobs.

### Procedure

Issue the DISPLAY UTILITY(\*) command.

### Related reference

[-DISPLAY UTILITY command \(Db2\) \(Db2 Commands\)](#)

## Identify applications that are incompatible with online migration

Before scheduling an online migration, you can identify applications, activities, and Db2 resources that might be incompatible with catalog migrations and updates and take appropriate actions beforehand to minimize the possibility of a failed migration.

### About this task

**Recommendation:** Complete the following steps on a regular basis during potential migration windows to identify any and all applications that might be incompatible with migration processing.

### Procedure

To identify applications that might interfere with online migration, take one of the following actions:

- Issue the DISPLAY BLOCKERS command, which displays locks and claims that active threads hold against specified databases.  
You can use the optional DETAIL keyword to receive additional report information about each lock or claim.
- Invoke the BLOCKING\_THREADS built-in function, which returns a table that contains one row for each lock or claim that threads hold against specified databases.

### What to do next

If incompatible applications exist, take one of the following actions:

- Terminate any active threads that hold locks or claims against the specified databases. See [Canceling threads \(Db2 Administration Guide\)](#) for more information.
- Schedule the migration during a time window when the incompatible applications are not running.
- Schedule a planned outage for running the CATMAINT utility.

### Related reference

[-DISPLAY BLOCKERS command \(Db2\) \(Db2 Commands\)](#)

[BLOCKING\\_THREADS table function \(Db2 SQL\)](#)

## Migration step 2: Verify the integrity of Db2 table spaces (optional)

Use the DSN1COPY and CHECK INDEX utilities to verify the integrity of the Db2 directory and catalog table spaces on the subsystem that you are migrating.

### About this task

**Important:** This migration step identifies data integrity issues that might interfere with subsequent migration tasks.

**Tip:** For best results, use this process to check the Db2 catalog and directory regularly, even outside of the migration process.

### Procedure

To verify the integrity of your Db2 directory and catalog table spaces:

1. Run the DSN1COPY utility with the CHECK option on all catalog table spaces to ensure that the table space pages are physically correct and that the catalog table spaces are clustered.

When you run this utility on segmented table spaces or LOB table spaces, you might receive message DSN1985I. You can ignore this message.

The segmented table spaces in the directory and catalog are:

- DSNDB01.SPT01
- DSNDB01.SYSUTILX
- DSNDB06.SYSDDF
- DSNDB06.SYSSTATS

The LOB table spaces in the directory and catalog are:

- DSNDB01.SYSDBDXA
- DSNDB01.SYSSPUXA
- DSNDB01.SYSSPUXB
- DSNDB06.SYSJAXA
- DSNDB06.SYSJAXB
- DSNDB06.SYSPLUXA
- DSNDB06.SYSPLUXB
- DSNDB06.SYSTSATX
- DSNDB06.SYSTSCHD
- DSNDB06.SYSTSCHR
- DSNDB06.SYSTSCTD
- DSNDB06.SYSTSCTR
- DSNDB06.SYSTSDQE
- DSNDB06.SYSTSDQH
- DSNDB06.SYSTSDQO
- DSNDB06.SYSTSDQS
- DSNDB06.SYSTSDQT
- DSNDB06.SYSTSIXR
- DSNDB06.SYSTSIXT
- DSNDB06.SYTSOBX
- DSNDB06.SYSTSPDT
- DSNDB06.SYSTSPHX

- DSNDB06.SYSTSPKX
- DSNDB06.SYSTSPTX
- DSNDB06.SYSTSPVR
- DSNDB06.SYSTSQRA
- DSNDB06.SYSTSSNL
- DSNDB06.SYSTSSXL
- DSNDB06.SYSTSTRT
- DSNDB06.SYSTSVAD
- DSNDB06.SYSTSVAT
- DSNDB06.SYSTSVTR
- DSNDB06.SYSTSVWT

2. Run the CHECK DATA and CHECK INDEX utilities.

3. You should run the following query on your Db2 11 catalog tables to ensure that you do not have a STOGROUP that is defined with both specific and non-specific volume IDs. If the query returns any rows, the identified STOGROUPs have both specific and non-specific volume IDs. Table spaces in databases that use these STOGROUPs cannot be image copied or recovered until ALTER STOGROUP is used to remove volumes so that the STOGROUP has either specific or non-specific volume IDs.

This query is commented out in the Db2 12 member DSNTE5Q of *prefix.SDSNSAMP*.

#### GUIP

```
SELECT * FROM SYSIBM.SYSVOLUMES V1
       WHERE VOLID <math>\neq</math> '*' AND
       EXISTS (SELECT * FROM SYSIBM.SYSVOLUMES V2
              WHERE V1.SGNAME = V2.SGNAME AND
                    V2.VOLID = '*')
```

#### GUIP

#### Related reference

[CHECK INDEX \(Db2 Utilities\)](#)

[DSN1COPY \(Db2 Utilities\)](#)

#### Related information

[DSN1985I \(Db2 Messages\)](#)

## Migration step 3: Identify invalid packages (optional)

Migrating to Db2 12 renders some packages invalid.

### Procedure

Run the following query on the Db2 11 subsystem that you are migrating.

#### PSPI

```
SELECT DISTINCT SUBSTR(STRIIP(BNAME) || ' ', 1, 18),
                 STRIIP(DCOLLID) || '.' || STRIIP(DNAME) || '.' || HEX(DCONTOKEN)
FROM SYSIBM.SYSPACKDEP
WHERE (BTYPE = 'I'
      AND BQUALIFIER = 'SYSIBM'
      AND BNAME IN ('DSNOTX01', 'DSNATX02'))
OR (BTYPE = 'T'
    AND BQUALIFIER = 'SYSIBM'
    AND BNAME IN('SYSCONTROLS', 'SYSENVIRONMENT',
                 'SYSINDEXES', 'SYSKEYS',
                 'SYSPACKAGE', 'SYSPACKCOPY',
                 'SYSROUTINES', 'SYSTABLES',
                 'SYSTRIGGERS'))
```

)  
ORDER BY 1, 2

PSPI

If you are not in a data sharing coexistence environment, after migration, you can explicitly rebind these packages or let Db2 rebind them automatically. If you are in a data sharing coexistence environment, rebind these packages before you migrate any members to Db2 12.

### Related concepts

[Changes that invalidate packages \(Db2 Application programming and SQL\)](#)

## Migration step 4: Check for consistency between catalog tables (optional)

The DSNTESQ queries check the logical correctness of the Db2 catalog.

### Before you begin

Before you run these queries, complete “Migration step 2: Verify the integrity of Db2 table spaces (optional)” on [page 496](#) to run the DSN1COPY utility with the CHECK option and the CHECK DATA and CHECK INDEX utilities.

### About this task

**Tip:** For best results, use this process to check the Db2 catalog regularly, even outside of the migration process.

### Procedure

Run the queries that are not commented out in member DSNTESQ of the *prefix.SDSNSAMP* library. You can execute the SQL statements in DSNTESQ from SPUFI or from a dynamic SQL program like DSNTPE2.

You can run the queries on the actual catalog tables or on "mirror" copies of the catalog tables. If you run the queries on the copies, use the comment lines in member DSNTESQ for guidance. By running queries on copies of the catalog table, you reduce contention on the catalog.

### Related tasks

[Migration step 2: Verify the integrity of Db2 table spaces \(optional\)](#)

Use the DSN1COPY and CHECK INDEX utilities to verify the integrity of the Db2 directory and catalog table spaces on the subsystem that you are migrating.

## Migration step 5: Take image copies of the directory and catalog: DSNTIJIC

For backup purposes, create a copy of the catalog and directory of the system that you are migrating.

### About this task



**Attention:** If you do not create this copy, Db2 can start. However, if errors in the catalog or directory require you to fall back to your previous version, you risk losing some of your tables and data.

### Procedure

To create an image copy of the directory and catalog, perform the following steps with the Db2 11 copy of DSNTIJIC:

1. Examine job DSNTIJIC for the following items, and modify as needed:
  - The tape unit name. The job lists the tape unit name as TAPE. If this is incorrect for your site, correct it. The name TAPE is also used as the unit name for the default archive log data sets.
  - Expiration date or retention period. You can add a retention period or an expiration date to the job.

- The user on the JOB statement. Ensure that the user is authorized. If Db2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.
2. Run the Db2 11 DSNTIJIC job.

Job DSNTIJIC contains a list of all the Db2 directory and catalog table spaces. When you run DSNTIJIC, it invokes the Db2 image copy utility to copy these table spaces to tape. The copied table spaces allow you to recover the Db2 catalog and directory in case of a failure.
  3. If job DSNTIJIC fails or abends, look for problems with the tape that is set up for image copy. If you do not find a problem, examine the log for problems. For example, look for incorrect size or I/O errors.

## What to do next

After migration, periodically run the Db2 12 job DSNTIJIC against the Db2 12 directory and catalog, perhaps daily or weekly. This action reduces the amount of time that is required for recovering the Db2 directory or catalog. The copied data and log data sets are needed for recovery.

If you are remigrating, you need to complete one of the following actions:

- Change the names of the data sets in which the new image copies are to reside. (Migration image copies use the current data set names.)
- Run the MODIFY utility to remove the migration image copies. If you select this option, ensure that you are familiar with the MODIFY utility.

### Related reference

[MODIFY RECOVERY \(Db2 Utilities\)](#)

## Migration step 6: Connect Db2 to TSO

Access to TSO is required to support the interactive component of Db2 (DB2I). Access to TSO also allows batch applications to access Db2 when those batch programs are executed under the TSO terminal monitor program (TMP).

### Procedure

To attach Db2 to TSO:

1. Make Db2 load modules available to TSO and batch users.
2. Make Db2 CLISTs available to TSO and batch users.
3. Make panels, messages, and load modules available to ISPF and TSO.

## What to do next

Save your TSO logon procedures and JCL from Db2 11 in case you need to fall back from Db2 12.

## Make Db2 load modules available to TSO and batch users

To connect Db2 to TSO, you must first make Db2 load modules available to TSO and batch users. If *prefix.SDSNEXIT* and *prefix.SDSNLOAD* are included in your LNKLSTxx, you can skip this step.

### Procedure

If you have not included *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in your LNKLSTxx, add JOBLIB or STEPLIB statements to your logon procedures and JCL to ensure that you access the Db2 12 load modules. Include *prefix.SDSNEXIT* before *prefix.SDSNLOAD* in your JOBLIB or STEPLIB concatenations.

## What to do next

You can attach to multiple releases of Db2 with your existing TSO or CAF logon procedures without changing the load libraries for your applications. After you migrate completely to the latest level of Db2, you must update those procedures and jobs to point to the latest level of Db2 load libraries.

## Make Db2 CLISTs available to TSO and batch users: DSNTIJVC

Job DSNTIJVC merges the tailored CLISTs from *prefix*.NEW.SDSNTEMP with unchanged CLISTs from *prefix*.SDSNCLST, and it places all CLISTs in *prefix*.NEW.SDSNCLST.

## About this task

Tailoring changes can modify these CLISTs: DSNEMC01, DSNH, DSNU, and DSNHC. The DSNTINST CLIST reads these CLISTs from *prefix*.SDSNCLST, edits them, and places them in *prefix*.NEW.SDSNTEMP. You can modify the default values.

The DSNEMC01 CLIST uses the values that are specified on installation panel DSNTIPF and stores the results in the ISPF profile member DSNEPROF. You can migrate any customized DSNEPROF members from Db2 11 to Db2 12. However, you need to examine any new or changed default panel values to ensure that your customized values are still valid.

DSNTIJVC also converts the Db2 CLISTs from a fixed-block record format to a variable-block format, with a record length of 84 and a block size of 3120. A CLIST that has been converted from fixed-block format to variable-block format cannot be used as input to the DSNTINST CLIST; use the unedited version of the SDSNCLST data set, as created by SMP/E.

## Procedure

To make the CLISTs available to TSO and batch users:

1. If you use fixed-block CLIST libraries, modify the DSNTIJVC job as follows:
  - Change the SYSIN DD to DUMMY.
  - Change the allocation of *prefix*.SDSNCLST to match the data control block (DCB) attributes of your other CLIST libraries.
2. Run job DSNTIJVC.
3. Either concatenate *prefix*.NEW.SDSNCLST with your existing CLIST libraries or copy *prefix*.NEW.SDSNCLST into an existing CLIST library.

## What to do next

If you need to rerun job DSNTIJVC, first delete data set *prefix*.NEW.SDSNCLST, which is created by this job.

When corrective service is applied to a CLIST, SMP/E changes only the *prefix*.SDSNCLST data set. You need to redo any record format changes and reapply any special tailoring that is required. You also need to move the CLIST to *prefix*.NEW.SDSNCLST. Corrective service (program temporary fixes) for these CLISTs is sent with ++HOLD statements, calling your attention to the possibility of additional work.

## Related concepts

[Installation and migration jobs that the CLIST tailors](#)

The installation CLIST uses the values that you specify on the installation panels to tailor and load the installation or migration jobs. Each job is composed of one or more JCL procedures or job steps.

## Make DB2I panels, messages, and load modules available to ISPF and TSO

During migration, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

### About this task

DB2I uses the ISPF PROFILE and SHARED variable pools for most panel variable fields. As a result, you can easily re-enter a panel when panel variables have previously been specified. For the Db2 subcommands that permit lists of plan names, package names, DBRMs, and ENABLE and DISABLE statements, DB2I provides ISPF to contain all the user-specified variables for these subcommand keywords.

DB2I creates and maintains a set of ISPF tables in a user-defined TSO data set that is allocated to a data set with a ddname of DSNETBLS. The DB2I-generated tables in this library are DSNCONNS, DSNDBRMS, and DSNPLPKN. The following table shows the Db2 ISPF table library member names and their contents.

<b>DSNCONNS</b>	ENABLE or DISABLE connection type and connection name variables that are referenced by plan or package name
<b>DSNDBRMS</b>	Subcommand DBRM member and LIBRARY name variables that are referenced by plan name
<b>DSNPLPKN</b>	Package list variables that are referenced by package name
<b>DSNPATHS</b>	Schema name variables that are referenced by plan or package name and that are to be included in the PATH keyword

DB2I uses ISPF table services to maintain individual ISPF tables within the DSNETBLS data set. For performance reasons, ISPF keeps this table library in an open state once an individual table has been updated. Attempts to close this data set by using the TSO FREE command results in error message IKJ56861I.

### Procedure

To make panels, messages, and load modules available to ISPF and TSO:

1. If you added the DB2I libraries as part of Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43, you can skip this step. Otherwise, concatenate the Db2 ISPF libraries with the ISPPLIB, ISPTLIB, ISPSLIB, and ISPMLIB DD statements in your logon procedures. You must also concatenate the Db2 ISPF libraries with these DD statements in any of your CLISTs where the libraries might be allocated. These libraries are *prefix.SDSNSPFP*, *prefix.SDSNSPFM*, *prefix.SDSNSPFS*, and *prefix.SDSNPFPE* or *prefix.SDSNPFPE*. If you use English DB2I panels, concatenate SDSNPFPE to ISPPLIB. If you use Kanji DB2I panels, concatenate SDSNPFPE instead of SDSNPFPE.

```

PROFILE WTP MSGID
ALLOCATE DDNAME(SYSPROC) DSN('prefix.SDSNCLST') SHR REUSE
ALLOCATE DDNAME(ISPMLIB) DSN('prefix.SDSNSPFM' +
'ISP.SISPMENU') SHR REUSE
ALLOCATE DDNAME(ISPPLIB) DSN('prefix.SDSNSPFP' 'prefix.SDSNPFPE' +
'ISP.SISPPENU') SHR REUSE
ALLOCATE DDNAME(ISPSLIB) DSN('prefix.SDSNSPFS' +
'ISP.SISPSLIB' 'ISP.SISPSENU') SHR REUSE

```

2. Create the DSNETBLS data set.

When allocating this data set, you should assign the following DCB attributes, where *n* is any integer:

```
DSORG(PO) RECFM(F B) LRECL(80) BLKSIZE(n*LRECL)
```

The following example shows how to set up an ALLOCATE statement to create the data set:

```
ALLOC DA(DSNSPFT) NEW SP(1 1) TR DIR(10) +
DSORG(PO) RECFM(F B) LRECL(80) BLKSIZE(800)
F(DSNETBLS) REUSE
```

The following example shows how to allocate an existing data set to the data set with the DSNETBLS ddname:

```
ALLOC DA(DSNSPFT) F(DSNETBLS) REUSE
```

3. If you want to run the ISPF/CAF sample application that is provided with Db2, ensure that the data set *prefix.RUNLIB.LOAD* is included in the logon procedures or in the ISPLLIB concatenation. If you chose IBMCOB for your LANGUAGE DEFAULT on panel DSNTIPF, you should also include the data set *prefix.CEE.SCEERUN*.

### Related concepts

[Dynamic SQL and the ISPF/CAF application](#)

The Phase 3 jobs of the installation or migration verification process install the ISPF/CAF sample application. This sample consists of an assembler or COBOL call attachment facility (CAF) interface, a connection manager program, and the phone application. The sample also includes the distributed application that uses DRDA access.

### Related tasks

[Make Db2 load modules available to TSO and batch users](#)

To connect Db2 to TSO, you must first make Db2 load modules available to TSO and batch users. If *prefix.SDSNEXIT* and *prefix.SDSNLOAD* are included in your LNKSTxx, you can skip this step.

### Related reference

[z/OS ISPF Messages and Codes](#)

## Migration step 7: Connect Db2 to IMS (optional)

Connecting Db2 to IMS is an optional part of migration. Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. [Make Db2 load modules available to IMS.](#)
2. [Define Db2 to IMS.](#)
3. [Define new programs and transactions to IMS.](#)
4. [Prepare IMS applications for Db2.](#)
5. Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications.](#)
  - [Generate a user language interface.](#)

### Related tasks

[Connecting the IMS attachment facility](#)

Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

## Migration step 8: Connect CICS to Db2 (optional)

To connect Db2 to CICS, you need to disconnect and connect the CICS region.

### About this task

A macro is supplied with CICS to define the connection between CICS and Db2 by using a resource control table (RCT).



Ensure that you coordinate the attachment facility connection with your CICS support group.

## Procedure

To connect the CICS attachment facility:

1. Recalculate space requirements for the CICS attachment facility.
2. Define your CICS attachment facility parameters using the RCT.
3. Update the CICS system tables.
4. Update the CICS initialization JCL.
5. Coordinate Db2 and CICS security if necessary.
6. Prepare new CICS applications for Db2 if necessary.

### Related tasks

[Defining the CICS Db2 connection](#)

## Migration step 9: Stop Db2 11 activity

Before making Db2 12 operational, ensure that all work is stopped on the Db2 11 subsystem.

### Before you begin

If you do not stop work on the Db2 11 subsystem or data sharing member that you are migrating, fallback procedures might fail.

### Procedure

To stop work on the system that you are migrating:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for Db2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

**GUIP1**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP1**

The QUIESCE keyword allows Db2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access Db2:

**GUIP1**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP1**

If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct jobs were run for DSNTIJUZ. Ensure that you started Db2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all Db2 11 work is stopped:
  - Make sure no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use -DSN1 RECOVER INDOUBT for any indoubt threads.

- All utilities must be restarted or terminated on the version on which they were started. If you do not use data sharing, ensure that all utilities are completed or terminated on Db2 11. To ensure that no utility work remains, issue the following command:

**GUIP**

```
-DSN1 DISPLAY UTILITY(*)
```

**GUIP**

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the Db2 directory (DSNDB01) or the Db2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

**GUIP**

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

**GUIP**

You must have system administrator or system operator authority (specified on installation panel DSNTIPP1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop Db2 by issuing the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

## What to do next

If you have not already converted the BSDS to extended format, you must complete the conversion, as described in [“Convert the BSDS, Db2 catalog, and directory to 10-byte RBA and LRSN format”](#) on page 490, before you begin [“Migration step 18: Start Db2 12”](#) on page 513.

### Related reference

- DISPLAY DATABASE command (Db2) ([Db2 Commands](#))
- DISPLAY THREAD command (Db2) ([Db2 Commands](#))
- DISPLAY UTILITY command (Db2) ([Db2 Commands](#))
- STOP DB2 command (Db2) ([Db2 Commands](#))
- TERM UTILITY command (Db2) ([Db2 Commands](#))

## Migration step 10: Back up your Db2 11 volumes (optional)

After you have stopped Db2 11 activity, you can back up your Db2 11 subsystem. This backup provides a recovery base in case one becomes necessary.

### Procedure

Take dumps of the Db2 subsystem data sets. You also can take dumps of the SMP/E data sets and the Db2 distribution and target libraries.

## Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM

For migration to Db2 12, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdecpl*), and define the offline message generator CCSID (DSNHMCID).

### Before you begin

If the Db2 subsystem that you are migrating has only one bootstrap data set (BSDS), add second BSDS before you migrate. For more information, see [“Adding a second BSDS” on page 506](#).

### About this task

The subsystem parameter module (DSNZPxxx) and application defaults module (*dsnhdecpl*) names are specified in the following DSNITPO3 installation panel fields:

- “PARAMETER MODULE field” on [page 187](#)
- “APPL DEFAULTS field” on [page 187](#)

### Procedure

To define the Db2 12 initialization parameters, complete the following steps:

1. Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module” on page 403](#).

2. Run job DSNTIJUA.

Job DSNTIJUA defines the Db2 data-only application defaults module.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

For more information, see [“Job DSNTIJUA: define data-only application defaults module” on page 404.](#)

### 3. Run job DSNTIJUM.

Job DSNTIJUM defines the Db2 data-only offline message generator CCSID (DSNHMCID) module which is needed for message conversion by Db2 applications and utilities. For more information, see [“Job DSNTIJUM: define Db2 data-only offline message generator CCSID \(DSNHMCID\) module” on page 405.](#)

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## Adding a second BSDS

If you are migrating a Db2 subsystem that has only one bootstrap data set (BSDS), add second BSDS to before you migrate.

### About this task

A second BSDS simplifies recovery in most situations. With a second BSDS, you can continue working in many cases that otherwise require recovery and restart. The required storage is small, and the data set is relatively inactive.

**Important:** If you do not add a second BSDS, add TW0BSDS=NO in the DSN6LOGP macro.

### Procedure

To add a second BSDS, complete the following steps:

1. Run job DSNTIJUZ to set the TW0BSDS=YES parameter in the DSN6LOGP macro.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module” on page 403.](#)

You might receive message GIM65001W when you run steps DSNTLOG and DSNTIMQ, or you might receive a return code of 4 when you run step DSNTIMQ. You can ignore these messages.

If DSNTIJUZ fails or abends, correct the problem and rerun the job, using the same subsystem parameter name.

2. Define a second BSDS. Use the VDSNTISAM BSDS definition in job DSNTIJIN as an example.

For more information, see [“Job DSNTIJIN” on page 436.](#)

3. Add a //BSDS2 DD statement to the DSN1MSTR Db2 startup procedure.

4. Issue a RECOVER BSDS command to establish the dual BSDS.

For more information, see [-RECOVER BSDS command \(Db2\) \(Db2 Commands\).](#)

### Related concepts

[Backup and recovery resources and tools \(Introduction to Db2 for z/OS\)](#)

### Related tasks

Migration step 11: Define Db2 12 initialization parameters: DSNTIJUZ, DSNTIJUA, and DSNTIJUM

For migration to Db2 12, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdcep*), and define the offline message generator CCSID (DSNHMCID).

### Related information

[Using Access Method Services \(DFSMS Access Method Services for Catalogs\)](#)

## Migration step 12: Establish subsystem security (optional)

Db2 lets you control access to data within Db2. Db2 also works together with outside security systems, such as RACF, that control access to the Db2 subsystem.

### About this task

Because your Db2 12 subsystem reuses the data objects from your Db2 11 subsystem, you have probably already supplied the protection that those objects need. However, you probably want to protect the new (Db2 12) Db2 data objects.

### Procedure

To establish subsystem security:

1. Customize job DSNTIJRA, as described in the job prolog.
2. Run job DSNTIJRA.

Job DSNTIJRA defines the administrative task scheduler started task module to RACF program control and defines the administrative task scheduler as a trusted context in RACF. DSNTIJRA is intended for the site security administrator, and can be run any time prior to installing or migrating to Db2 12.

3. If you have a Db2 data sharing environment, customize and run DSNTIJRA for each member of the group.

### Related concepts

[Getting started with Db2 security \(Managing Security\)](#)

## Migration step 13: Define Db2 12 to IRLM and MVS: DSNTIJMV

For migration to Db2 12, job DSNTIJMV updates SYS1.PARMLIB members to update the definition of Db2 12 to IRLM and MVS.

### Before you begin

Ensure that you completed the task in [“Make Db2 load modules available to TSO and batch users” on page 499](#).

### About this task

Job DSNTIJMV demonstrates how to update SYS1.PARMLIB members to update the definitions for Db2 12 to IRLM and MVS. Although you might edit and run this job, the more common approach is to examine the changes that DSNTIJMV makes and use an editor, such as ISPF/PDF, to make the required updates directly to the SYS1.PARMLIB members.

Because DSNTIJMV cannot anticipate all the necessary updates to identify Db2 to MVS and IRLM in your z/OS environment, additional updates might be required for your site. You can complete these updates either by making the updates directly in SYS1.PARMLIB members, or by editing the DSNTIJMV job.

Do not overwrite the entries for Db2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see [Program properties table \(PPT\) \(MVS Initialization and Tuning Reference\)](#).

### Procedure

To update the Db2 definitions to IRLM and MVS for Db2 12, complete the following steps:

1. Examine the DSNTIJMV job and study the updates that it makes.
2. Update the following SYS1.PARMLIB members by editing them directly, or by tailoring and running job DSNTIJMV:

### **IEAAPFxx or PROGxx**

This member is updated to include the Db2 program libraries (*prefix.SDSNEXIT*, *prefix.SDSNLOAD*, *prefix.SDXRRESL*, and *prefix.SDSNLINK*) as libraries that are authorized by using the authorized program facility (APF).

*prefix.SDSNLINK* does not need to be included in the list of APF-authorized libraries unless LNKAUTH=APFTAB is set.

All libraries that are concatenated with *prefix.SDSNEXIT* and *prefix.SDSNLOAD* in STEPLIB and JOBLIB statements must be APF-authorized.

### **LNKLSTxx**

This member is updated to include the Db2 load module library, *prefix.SDSNLINK*, in the LNKLSTxx. If you moved the modules from *prefix.SDSNLINK* into another library, edit DSNTIJMV to include that library in the LNKLSTxx. If you have combined *prefix.SDSNLINK* and *prefix.SDSNLOAD* into one library, edit DSNTIJMV to include the combined library in the LNKLSTxx.

#### **Tip:**

You can do additional editing for the SYS1.PARMLIB updates. If you are editing DSNTIJMV rather than making the changes directly, you have a choice: You can either include your additional entries for the SYS1.PARMLIB members (IEAAPFxx and LNKLSTxx) at the end of the existing list of entries, or you can place them earlier in the list.

If you include these entries at the end of the existing SYS1.PARMLIB list, ensure that commas (the continuation character) delimit each entry except the last entry.

ECSA size is another SYS1.PARMLIB change to consider at this time. You specify ECSA size in the CSA parameter of the IEASYS00 parameter. Ensure that you have specified an adequate size for this subsystem.

3. If necessary, update the NSYSLX option of the z/OS IEASYSxx PARMLIB member to define more z/OS system linkage indexes (LXs).

Each Db2 and each IRLM that you define to z/OS in the IEFSSNxx PARMLIB member requires a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your Db2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs; otherwise, your subsystems might not start.

4. Complete the following steps to enable diagnosis of IRLM problems:
  - a) Specify the IRLM dump formatting modules DXRRLM50, DXRRLM55, and DXRRLS55 in a BLSCUSER member in a data set that is in the system's PARMLIB concatenation.
  - b) Copy the DXRRL186, DXRRLFTB, DXRRLM50, DXRRLM55, and DXRRLS55 modules from the IRLM SDXRRESL data set to a data set in the system's link list. Or, add the SDXRRESL data set to the system's link list in a PROGxx member of a data set in the system's PARMLIB concatenation. If you use more than one level of IRLM, you must use a STEPLIB concatenation when using IPCS to process dumps that are taken for the levels whose modules are not in the link list.

#### **Related tasks**

[Migration step 17: Refresh the z/OS definition of Db2](#)

As part of the migration to Db2 12, you must refresh how Db2 is defined to z/OS.

## **Migration step 14: update Db2 address space start and language procedure definitions: DSNTIJMA, DSNTIJMW, DSNTIJMP, DSNTIJMJ**

During migration to Db2 12, you must update the definitions of Db2 in SYS1.PROBLIB or the user-defined procedure library of the target z/OS system.

#### **Before you begin**

Ensure that the following task is complete: [“Make Db2 load modules available to TSO and batch users” on page 499.](#)

## About this task

The jobs in this task rename your existing Db2 11 procedures so that they do not conflict with the Db2 12 procedures, which replace your old procedures.

## Procedure

To update the system procedure library for the target z/OS system for migration to Db2 12 , complete the following steps:

1. Update the Db2 and IRLM address space startup procedures by tailoring and running job DSNTIJMA.  
Job DSNTIJMA renames and replaces the startup procedures in the target system procedure library for the following Db2 address spaces, where *ssnm* is the subsystem name:

- system services address space (*ssnmMSTR*)
- database services address space (*ssnmDBM1*)
- DDF address space (*ssnmDIST*)
- administrative task scheduler stored procedure address space (*ssnmADMT*)
- IRLM address space (*irlmproc*)

Examine the size of the private area on the Db2 startup procedures. If necessary, modify the procedures to satisfy the requirements for environmental descriptor manager (EDM) pool size, buffers, number of data sets open, and amount of available private address space. For more information, see [“Calculating working storage requirements” on page 26](#).

The STEPLIB concatenation of the database services address space (*ssnmDBM1*) procedure includes a commented-out DD for the IBM Language Environment data sets SCEERUN and SCEERUN2. If your system does not include SCEERUN and SCEERUN2 in the system link list, you must uncomment this DD.

2. Update the address space startup procedures for the Db2-supplied WLM environments to by tailoring and running job DSNTIJMW.

Job DSNTIJMW renames and replaces the following procedures in the system procedure library for WLM environments:

- *ssnmWLM* for the sample WLM environment
- *ssnmWLMC* for DSNWLM\_DSNACICS
- *ssnmWLMD* for DSNWLM\_DEBUGGER
- *ssnmWLMG* for DSNWLM\_GENERAL
- *ssnmWLMJ* for DSNWLM\_JAVA
- *ssnmWLMM* for DSNWLM\_MQSERIES
- *ssnmWLMP* for DSNWLM\_PGM\_CONTROL
- *ssnmWLMR* for DSNWLM\_REXX
- *ssnmWLM1* for DSNWLM\_NUMTCB1
- *ssnmWLMU* for DSNWLM\_UTILS
- *ssnmWLMW* for DSNWLM\_WEBSERVICES
- *ssnmWLMX* for DSNWLM\_XML

3. Copy the Db2 language procedures by running job DSNTIJMP.

Job DSNTIJMP renames and replaces the following Db2- supplied language procedures to the target system procedure library:

- DSNHASM for preparing Db2 assembler language programs
- DSNHC for preparing Db2 C programs
- DSNHCPP for preparing Db2 C++ programs
- DSNHCPP2 for preparing Db2 object-oriented C++ programs

- DSNHICOB for preparing Db2 COBOL programs
- DSNHPLI for preparing Db2 PL/I programs
- DSNHFOR for preparing Db2 FORTRAN programs
- DSNHSQL for preparing Db2 external SQL procedures
- DSNUPROC for running Db2 Utilities

Change any data set names that differ at your site. If you specified a data set name suffix in the DATA SET NAME SUFFIX field of DSNTIPA1, that suffix is appended to data sets &USER..DBRMLIB.DATA, &USER..RUNLIB.LOAD, and &USER..SRCLIB.DATA. To override these data set names, you must edit the updates to the target system procedure library.

The language preparation procedures in job DSNTIJMP use the DISP=OLD parameter to enforce data integrity. However, when the installation CLIST runs, the DISP=OLD parameter for the DBRM library data set is modified to DISP=SHR. This might cause data integrity problems when you run multiple precompiler jobs. To avoid these data integrity problems, if you are not using DFSMSdfp partitioned data set extended (PDSE), you must change the language preparation procedures (DSNHICOB, DSNHICB2, DSNHFOR, DSNHC, DSNHCPP, DSNHCPP2, DSNHPLI, DSNHASHM, and DSNHSQL) to specify the DISP=OLD parameter instead of the DISP=SHR parameter.

If compiler STEPLIB statements are needed, add them.

4. Update the environment files for the Db2-supplied Java WLM environment by tailoring and running job DSNTIJMJ.

Job DSNTIJMJ has the following three steps that update environment files for the Db2-supplied WLM environment, DSNWLM\_JAVA:

- a. Job step DSNTIJJ creates a Language Environment run-time options (JAVAENV) data set for the *ssnm*WLMJ address space procedure. This data set is allocated by the JAVAENV DD of the *ssnm*WLMJ address space procedure that is created in job DSNTIJMW.

In this job step, review the *JAVA\_HOME* path, which is the path where the JDK is located, and update if necessary. If you are using a 64-bit JVM, use the following path:

```
JAVA_HOME=/usr/lpp/java160/J6.0_64
```

If you are using a 31-bit JVM, use the following path for Java 5:

```
JAVA_HOME=/usr/lpp/java150/J5.0
```

Or use the following path for Java 6:

```
JAVA_HOME=/usr/lpp/java160/J6.0
```

You cannot specify two JDKs in a single *JAVA\_HOME* path.

- *\_CEE\_ENVFILE* if present, must be set to the name and path of the environment variable file that was created by job step DSNTIJR.
- *JVMPROPS* needs to be set to the name and path of the JVM startup options file that was created by job step DSNTIJS.
- *DB2\_BASE* and *JCC\_HOME* need to be set to the names of the HFS directories that you selected for the Db2 for z/OS and JCC product classes.

You cannot specify two JDKs in a single *JAVA\_HOME* path.

- b. Job step DSNTIJR creates an environment variable file in HFS.
- c. Job step DSNTIJS creates a JVM startup options file in HFS.
- d. The absolute path and name of a HFS or zFS file is passed to DSNTJMJX.
- e. DSNTJMJX checks whether the directory where this file is located exists or not. If the directory does not exist, it is created.



5. After running job DSNTIJMJ, review the content of the Language Environment options data set and adjust the following environment variables as needed.

The data set is created by DSNTIJMV and must be allocated by the JAVAENV DD of the address space procedure for the Db2 core WLM environment for Java routines.

- If `_CEE_ENVFILE` is present, set it to the name and path of the environment variable file that was created by job step DSNTIJR.
- Set `JVMPROPS` the name and path of the JVM startup options file that was created by job step DSNTIJS.
- Set `DB2_BASE` and `JCC_HOME` to the names of the HFS directories that you selected for the Db2 for z/OS and JCC product classes.

## Migration step 15: Define system data sets: DSNTIJIN

When job DSNTIJIN is tailored for migration, it defines the following non-VSAM data sets: *prefix.SRCLIB.DATA*, *prefix.RUNLIB.LOAD*, and *prefix.DBRMLIB.DATA*.

### About this task

When job DSNTIJIN is tailored for migration, it does not define data sets for new Db2 catalog and directory table spaces and indexes. Catalog and directory data sets are automatically defined by Db2 when you run job DSNTIJTC to tailor the catalog.

When migrating to Db2 12, do not use DSNTIJIN or any other job to define data sets for the Db2 catalog and directory.

### Procedure

Run job DSNTIJIN.

## Migration step 16: Define user authorization exit routines: DSNTIJEX (optional)

You can use job DSNTIJEX to define user authorization exit routines. If you did not run job DSNTIJEX in the release from which you are migrating, you can skip this step.

### About this task

Job DSNTIJEX builds sample authorization exit routines from the source code in *prefix.SDSNSAMP*. These sample authorization exit routines are `DSN3@SGN` and `DSN3@ATH`, and the user version of the access control authorization exit routine `DSNX@XAC`. DSNTIJEX then places the exit routines in the *prefix.SDSNEXIT* library.

Job DSNTIJEX includes a step to assemble and link-edit the sample version of `DSNACICX`, which you can use to modify CICS parameters that the `DSNACICS` caller specifies. You can modify the access control authorization exit routine `DSNX@XAC` and use DSNTIJEX to assemble and link-edit it. This exit routine allows you to bypass some or most of Db2 authorization checking and to specify your own authorization checking. The Db2 CLIST tailors the JCL in DSNTIJEX to meet the requirements of your site.

The sample authorization exit routines are not the same as the default authorization exit routines that are supplied by Db2. By implementing the sample authorization exit routines, you can provide group names as secondary authorization IDs.

You have the following options regarding exit routines:

- To use the default authorizations, skip job DSNTIJEX.
- To use the sample authorization exit routines, run job DSNTIJEX.
- To use your own authorization exit routines, modify job DSNTIJEX to reference the correct library, and then run it.

## Procedure

If you choose to run job DSNTIJEX:

1. Make the following optional adjustments to DSNTIJEX if they apply to your site:
  - DSNXSXAC is a copy of the default access control authorization exit routine that you can modify. This exit routine allows you to bypass some or most of Db2 authorization checking and to specify your own authorization checking. If you do not change the exit routine, you should delete this step.
  - DSNACICS is a stored procedure that invokes user exit routine DSNACICX, which you can use to modify CICS parameters that the DSNACICS caller specifies. If you do not need to modify the caller's parameter values, you can use the default DSNACICX exit routine. However, if you need to modify the caller's parameter values, you need to perform the following tasks:
    - a. Write a user exit routine in assembler, COBOL, C, or PL/I
    - b. Assemble or compile the source code
    - c. Link-edit the object code into the Db2 exit routine library

Installation job DSNTIJEX includes a step to assemble and link-edit the sample version of DSNACICX. You can use this step as a model for your program preparation job.

- If you will use the RACF/Db2 external security module (DSNXRXAC) as your Db2 access control authorization exit, modify job DSNTIJEX to refer to DSNRXAC instead of DSNXSXAC.

2. Run job DSNTIJEX.

If job DSNTIJEX runs successfully, it produces a return code of 0 or 4.

If job DSNTIJEX fails or abends, correct the problem, and rerun the job.

### Related concepts

[Access control authorization exit routine \(Managing Security\)](#)

[Db2 data access control \(Managing Security\)](#)

### Related information

[Exit routines \(Db2 Administration Guide\)](#)

## Migration step 17: Refresh the z/OS definition of Db2

As part of the migration to Db2 12, you must refresh how Db2 is defined to z/OS.

### Before you begin

Complete the following tasks:

- Ensure that the early code pre-conditioning PTFs are installed on your system before you migrate. For details, see [“Required maintenance for Db2 12 installation or migration”](#) on page 3.
- Determine the version of the ERLY code to include in the system link list, as described in [“Choosing link list options”](#) on page 34. In most cases, use the ERLY code that is distributed with the Db2 release you are migrating to. The link list can contain only one level of the early code, and it must support all Db2 subsystems and different Db2 releases that share it.
- Update the definition for Db2 12 to IRLM and MVS, as described in [“Migration step 13: Define Db2 12 to IRLM and MVS: DSNTIJMV”](#) on page 507.

### About this task

This migration task is necessary to apply changes for Db2 12 migration in the following z/OS structures:

- The link list look-aside address space (LLA), which contains the Db2 12 early (ERLY) code from the SDSNLINK load module library.
- Member IEAAPFxx, for new APF libraries.
- Member LNKLSTxx, for new load module libraries.

- JCL startup procedures for the Db2 12 address spaces, including WLM environments used by stored procedures and user-defined functions.
- JCL procedures for preparing Db2 12 application programs.

## Procedure

- Refresh how Db2 is defined to z/OS by using one of the following approaches:
  - Do an initial program load (IPL) of z/OS. You must choose this approach if you issued z/OS SETPROG LINKLST commands to refresh the system link list in member LNKLSTxx.  
After the IPL of z/OS completes, message DSN3100I is displayed on the z/OS console, stating that Db2 is ready for the START command.
  - If you changed to a new version of the ERLY code, and you did not refresh the system link list in member LNKLSTxx, run the -REFRESH DB2,EARLY command from a z/OS console that has START command capability. When -REFRESH DB2,EARLY is run, previous copies of the ERLY modules are deleted from the system the next time that Db2 is started. -REFRESH DB2,EARLY is valid only when Db2 is not started.

## What to do next

[“Migration step 18: Start Db2 12” on page 513](#)

### Related tasks

Migration step 13: Define Db2 12 to IRLM and MVS: DSNTIJMV

For migration to Db2 12, job DSNTIJMV updates SYS1.PARMLIB members to update the definition of Db2 12 to IRLM and MVS.

### Related reference

[-REFRESH DB2,EARLY command \(Db2\) \(Db2 Commands\)](#)

[z/OS SETPROG Command \(MVS System Commands\)](#)

### Related information

[DSN3100I \(Db2 Messages\)](#)

## Migration step 18: Start Db2 12

During migration to Db2 12, start the Db2 subsystem after you run job DSNTIJMV and IPL z/OS.

### Before you begin

If you have not already done so, convert the BSDS to extended format, as described in [“Convert the BSDS, Db2 catalog, and directory to 10-byte RBA and LRSN format ” on page 490](#).

## Procedure

To start Db2, complete the following steps:

1. Start Db2 from the z/OS console with the following command, where -DSN1 is the subsystem command prefix that you defined for Db2, and *DSNZPxxx* is the name of the Db2 initialization parameter module:

```
-DSN1 START DB2 PARM(DSNZPxxx)
```

If you omit the PARM parameter, and you specified a value in the PARAMETER MODULE field on installation panel DSNTIPO3, that value is used as the parameter module name. If you did not specify a parameter module on panel DSNTIPO3, Db2 uses the default, which is DSNZPARM. See [“PARAMETER MODULE field” on page 187](#).

If Db2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

Some Db2 catalog or directory table spaces remain restricted until you migrate the catalog to Db2 12. For more information, see [What to do next](#).

If Db2 starts successfully, some or all of the following address spaces start, where *ssnm* is the Db2 subsystem name.

- The system services address space (*ssnmMSTR*)
- The database services address space (*ssnmDBM1*)
- The IRLM address space (*irlmproc*), where *irlmproc* is the IRLM procedure name
- Possibly, the DDF address space (*ssnmDIST*)
- Possibly, the administrative task scheduler stored procedure address space (*ssnmADMT*)

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If Db2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the correct job was run for DSNTIJUZ. Also, check that the subsystem parameter member that you specified (or used by default) when you started Db2 is the one that the DSNTIJUZ job built. Check the JCL for the Db2 startup procedure.

2. If you want to use the TSO SUBMIT command to do housekeeping and migration verification, start TSO (if it is not already started).
3. If you did not enable primary user IDs to issue Db2 commands from the z/OS console or TSO SDSF when you first installed the subsystem, take one of the following actions:
  - Grant SYSOPR authority to all primary user IDs that issue Db2 commands from the z/OS console or TSO SDSF. Issue the following command:

```
GRANT SYSOPR TO userid
```

- Define RACF classes to authorize Db2 commands. Use the following statements:

```
SETR CLASSACT(DSNADM)
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)
SETR RACLIST(DSNADM) REFRESH
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)
SETR RACLIST(DSNADM) REFRESH
```

## What to do next

In the next migration step, you migrate the catalog to Db2 12. See [“Migration step 19: Tailor Db2 12 catalog: DSNTIJTC” on page 515](#). Until then, access to some catalog and directory table spaces are restricted. The following messages might occur during or after startup of Db2 because the catalog and directory table spaces are restricted:

- DSNT500I with reason code 00C900A6
- DSNT501I with reason code 00C900A6
- DSNL700I with reason code 00C900A6 (if DDF is auto-started). This message might be followed by messages DSNL007I and DSNL008I, indicating that DDF is terminating.
- Abend 04E with reason code 00E70014 (during DDL registration)

These restrictions can cause failure of processes that are started as part of normal Db2 startup, such as collection of real-time statistics, until catalog tailoring is completed. Possible actions to restart such processes are explained in the discussion of job DSNTIJTC.

You can determine the existing restrictions by issuing the command after you start Db2. (However, this command might also generate message DSNT501I with reason code 00C900A6.)

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

#### **Related reference**

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

[-DISPLAY DATABASE command \(Db2\) \(Db2 Commands\)](#)

#### **Related information**

[DSNJ157I \(Db2 Messages\)](#)

## **Migration step 19: Tailor Db2 12 catalog: DSNTIJTC**

Job DSNTIJTC invokes the CATMAINT utility to migrate the Db2 11 catalog to the Db2 12 catalog, and its successful completion makes Db2 12 available for use.

### **Before you begin**

Ensure that no incompatible applications will interfere with the catalog migration. For details, see [“Identify applications that are incompatible with online migration” on page 495](#).

### **About this task**

By completing this step, you migrate the Db2 catalog and make it available for use in Db2 12.

When you start Db2 12 before you complete this step, Db2 returns various messages because the Db2 12 catalog is not yet available for use. Examples include the following messages and reason codes:

- DSNT500I with reason code 00C900A6
- DSNT501I with reason code 00C900A6
- DSNL700I with reason code 00C900A6 (if DDF is auto-started). This message might be followed by messages DSNL007I and DSNL008I, indicating that DDF is terminating.
- Abend 04E with reason code 00E70014 (during DDL registration)

You can determine the existing restrictions by issuing the command after you start Db2. (However, this command might also generate message DSNT501I with reason code 00C900A6.)

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

DSNTIJTC contains the following job steps:

#### **DSNTITC**

Job step DSNTITC, which creates new catalog and directory objects, adds columns to existing catalog tables, and creates and updates indexes on the catalog tables to accommodate new Db2 12 objects. All IBM-supplied indexes are created or updated sequentially during the execution of this step. At migration to Db2 12 this job step updates that catalog level to V12R1M500.

#### **CHKTITC**

Job step CHKTITC checks the return code of the CATMAINT utility. If the return code is 8 or greater, the job executes the job steps that follow CHKTITC.

#### **DSNTIRI**

Job step DSNTIRI executes only when job step DSNTITC terminates abnormally or with a return code of 8 or greater. DSNTIRI rebuilds catalog indexes that were placed in REBUILD-pending status during execution of DSNTITC.

## DSNTITD

Job step DSNTITD executes only when job step DSNTITC terminates abnormally or with a return code of 8 or greater. DSNTITD issues the DISPLAY BLOCKERS command with the DETAIL option and displays information about locks or claims that might have interfered with the catalog migration.

## Procedure

To complete the tailoring of the Db2 catalog:

1. Run job DSNTIJTC on your Db2 12 subsystem.

A status message, DSNU777I, is issued at several points to indicate migration progress. Diagnostic error messages are issued when CATMAINT processing fails. If a problem is found during the SQL processing phase of migration, message DSNU778I is issued. If non-supported functions are encountered, message DSNU776I is issued. All of these messages are written to the SYSPRINT data set.

If you receive abend reason code 00C200EF, the catalog and directory data sets are not in a compliant SMS environment.

When the catalog update is complete, Db2 records the catalog level change in the SYSIBM.SYSLEVELUPDATES catalog table and issues message DSNG014I to the console.

2. If job DSNTIJTC fails, save the output and correct the problem.

- a) Terminate the CATMAINT utility if it is pending.
- b) Run job DSNTIJTC again without modification.

3. If job DSNTIJTC fails again, return to Db2 11.

Because CATMAINT failures roll back all Db2 12 changes, the catalog and directory are in the format of Db2 11. Altered indexes are not rolled back. Determine if any index is in a pending status by using the CHECK INDEX utility. To return to Db2 11, complete these steps:

- a) Rename procedures to use the libraries of your previous release.
- b) Reconnect TSO, IMS, and CICS to the libraries of your previous release.

4. If your previous release is damaged, you need to complete a point-in-time recovery to recover the system. To complete a point-in-time recovery:

- a) Restore your previous version's catalog and directory from image copies.
- b) Restore the BSDSs from archive logs that were made prior to migration.
- c) Flush the SCA (for data sharing environments only).
- d) Recover the catalog and directory indexes.

When you remigrate to Db2 12, run the DSNTIJTC job again.

## Results

The catalog is now tailored at catalog level V12R1M500, which supports Db2 12 function level 100, function level 500, and function level 501. For more information about function levels and catalog levels in Db2 12 continuous delivery, see [Function levels and related levels in Db2 12 \(Db2 for z/OS What's New?\)](#).

## What to do next

- If you received message DSNL700I with reason code 00C900A6 and DDF terminated after you started Db2 12 for the first time, start DDF manually after you run DSNTIJTC.
- If the CATMAINT utility jobs from the previous step placed any altered Db2 catalog objects in REORG-pending (AREO\*) advisory status, run the REORG utility for those objects.

## Related concepts

[Work file database storage requirements](#)

The work file database is used as storage for processing SQL statements that require working storage.

[Recovery of data to a prior point in time \(Db2 Administration Guide\)](#)

#### **Related tasks**

[Falling back to Db2 11](#)

If you encounter serious errors after tailoring the catalog and directory for Db2 12, you can return to Db2 11. Fallback to Db2 11 is only supported if Db2 12 is at function level 100.

#### **Related reference**

[CATMAINT \(Db2 Utilities\)](#)

#### **Related information**

[DSNU776I \(Db2 Messages\)](#)

[DSNU777I \(Db2 Messages\)](#)

[DSNU778I \(Db2 Messages\)](#)

[00C900A6 \(Db2 Codes\)](#)

## **Migration step 20: Ensure that the catalog has no problems (optional)**

After you tailor your Db2 12 for z/OS catalog, you should check the integrity of your catalog and directory.

### **Procedure**

To check the integrity of your catalog and directory, complete these steps in any order:

- Run the CHECK INDEX utilities on all the indexes in the catalog and directory by using job DSNTIJCX.
- Run the queries in member DSNTESQ of *prefix*.SDSNSAMP. Because SPUFI is not yet bound, you cannot use SPUFI to run these queries.  
One alternative is to use the Db2 11 DSNTPE2 program to run the queries.
- Run the DSN1COPY utility with the CHECK option on the catalog table spaces.

#### **Related tasks**

[Migration step 2: Verify the integrity of Db2 table spaces \(optional\)](#)

Use the DSN1COPY and CHECK INDEX utilities to verify the integrity of the Db2 directory and catalog table spaces on the subsystem that you are migrating.

#### **Related reference**

[DSN1COPY \(Db2 Utilities\)](#)

## **Migration step 21: Prepare dynamic SQL program: DSNTIJTM**

Job DSNTIJTM assembles, link-edits, binds, and runs DSNTIAD, a program that processes certain SQL statements dynamically.

### **Procedure**

To prepare the dynamic SQL program:

1. Review and possibly modify or delete the GRANT statements in job DSNTIJTM. This job grants PUBLIC access to a number of Db2-supplied objects. Consider granting execute access on the plan to PUBLIC.
2. Run job DSNTIJTM.

## Migration step 22: Bind SPUFI and DCLGEN and user-maintained database activity: DSNTIJSJG

Use job DSNTIJSJG to bind packages for SPUFI, DCLGEN, and the EXEC SQL utility.

### About this task

In migration mode, DSNTIJSJG completes the following actions:

- Binds packages at the new release level for SPUFI, DCLGEN, and the EXEC SQL utility.
- Creates a new resource limit facility table, DSNRLMT $nn$ , and a new resource limit facility index, DSNMRL $nn$ . By default, the step that creates this new table and index is commented out in the JCL. To have Db2 create DSNRLMT $nn$  and DSNMRL $nn$ , uncomment the step.
- Adds new EXPLAIN tables under the SYSIBM schema.

### Procedure

To bind the SPUFI, DCLGEN, and the EXEC SQL packages for Db2 12, complete the following steps:

1. If you bound special SPUFI packages and plans in Db2 11, you need to bind those packages again in Db2 12. You do not need to bind those plans again. For example, to update special SPUFI packages that were created for use by SPUFI users who require a TSO terminal CCSID of 1047, issue the following commands.

#### GUIP1

```
BIND PACKAGE(SPUR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(UR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(TIAP1047) MEMBER(DSNTIAP) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(SPCS1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(SPRR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(RR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')
```

#### GUIP1

2. If you are using a data sharing environment, you must ensure that the resource limit facility (RLF) is inactive on all members in the data sharing group before running DSNTIJSJG. To do this, issue the STOP RLIMIT command for each member.
3. Ensure that all your subsystems have the same maintenance level for your DSNUGSQJL DBRM.
4. Run job DSNTIJSJG,  
If DSNTIJSJG runs successfully, it produces a return code of 0. However, job step DSNTIJSJG can produce a return code of 4 if the specified access has already been granted on one or more objects.
5. If job DSNTIJSJG fails or abends, ensure that the user that is specified on the JOB statement is authorized. Use the name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1. (The RESTART parameter on the JOB statement can be useful.) Correct any other problems, and run job DSNTIJSJG again.
6. If you encounter resource shortages, review the parameters in job DSNTIJSJG and make any necessary modifications. Then, stop Db2, rerun DSNTIJSJG, start Db2, and rerun DSNTIJSJG from the last successful step.

### What to do next

Complete the following actions:

- Alter your Db2 12 buffer pools that have frequent page reads or frequent page writes to use PGFIX YES if you have sufficient real storage available for these buffer pools. Fixing the buffer pages in real storage



once and keeping them fixed avoids the processing time that Db2 needs to fix and free pages each time there is an I/O. In some cases, this processing time can be as much as 10% for I/O-intensive workloads. To use this option, issue the following command:

#### GUIP

```
ALTER BPOOL(bpname) VPSIZE(vpsize) PGFIX(YES)
```

#### GUIP

Where *bpname* is the name of the buffer pool and *vpsize* is the size of the virtual pool.

- If you use capabilities such as ODBC, JDBC, and others with Db2, you might need to run other jobs to migrate them for use with Db2 12, for example:
  - For ODBC, see [Migrating to the Db2 12 ODBC driver \(Db2 Programming for ODBC\)](#).
  - For JDBC see [Upgrading the IBM Data Server Driver for JDBC and SQLJ to a new version \(Db2 Application Programming for Java\)](#).

#### Related tasks

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

## Migration step 23: Configure Db2 for running stored procedures and user-defined functions (optional)

This step needs to be performed during installation, and is therefore optional for migration. Before you can use user-defined functions or the following types of stored procedures, you need to perform some set-up tasks:

- External stored procedures
- Native SQL procedures that satisfy any of the following conditions:
  - Calls at least one external stored procedure, external SQL procedure, or user-defined function.
  - Defined with ALLOW DEBUG MODE or DISALLOW DEBUG MODE.
- External SQL procedures (deprecated)
- Db2-supplied stored procedures

All routines, except native SQL procedures, must run in an environment that is established by the z/OS Workload Manager (WLM). A set of Db2-supplied routines are installed by job DSNTIJRT and validated by job DSNTIJRV as part of the migration process. You can also define your own routines or use routines that are provided by a non-IBM vendor. Before you can use any stored procedures and user-defined functions, however, you need to set up WLM environments for these routines. If you plan to use certain Db2-supplied stored procedures or user-defined functions, you need to perform some additional steps.

#### Related concepts

[Stored procedures \(Db2 Application programming and SQL\)](#)

[Functions \(Db2 SQL\)](#)

## Tailoring Db2 subsystem parameters for stored procedures during migration (optional)

Several subsystem parameters should be tailored to your Db2 environment before you use stored procedures. These parameters were set when you installed or migrated Db2. If you are satisfied with those values, you do not need to complete this step.

### About this task

The subsystem parameters for stored procedures are:

- MAX\_NUM\_CUR
- MAX\_ST\_PROC
- STORMXAB
- STORTIME

### Procedure

To modify the values of these subsystem parameters, complete one of the following tasks:

- Run the installation CLIST again in INSTALL or MIGRATE mode. On the installation panels, leave most of the existing values and change the following fields on their respective panels:
  1. On panel DSNTIPA1, specify the input member that contains field values for your current installation.
  2. On panel DSNTIPT, specify different names for the TEMP CLIST LIBRARY and SAMPLE LIBRARY fields to avoid overwriting your original libraries.
  3. On panel DSNTIPX, add or change the values of the MAX ABEND COUNT, TIMEOUT VALUE, MAX OPEN CURSORS, and MAX STORED PROCS fields as appropriate.
  4. On panel DSNTIPY, specify a name for the REMOTE LOCATION field. Db2 uses this name for the stored procedure sample applications.
- Edit job DSNTIJUZ to add or change values for the subsystem parameters for routines.

This method has the following disadvantages:

- Db2 does not use these new values for any future migrations because your DSNTIDxx member and DSNTIJUZ parameters are not saved for future input.
- Db2 does not generate the sample jobs for stored procedure and user-defined functions because you are not running the DSNTINST CLIST.

### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

[DSNTIPT: Db2 data set names panel](#)

The entries on the DSNTIPT panel establish data set names for the libraries that are used in the Db2 CLIST and JCL that Db2 provides. The values that you enter on this panel are edited into all pertinent sample and installation jobs.

[DSNTIPX: Routine parameters panel](#)

The entries on this panel are used to start the stored procedures address space so that it can run stored procedures or user-defined functions.

[DSNTIPY: Job editing panel](#)

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

## Setting up Language Environment for stored procedures during migration

*Language Environment* (LE) is a component of the z/OS operating system that establishes a common run time environment for all applications, regardless of programming language. Db2 uses Language Environment to provide a run time environment for external stored procedures and external SQL procedures.

### About this task

Language Environment provides a set of essential run time services that are available through a set of interfaces that are consistent across programming languages. These services include routines for run time message handling, condition handling, and storage management.

Language Environment provides the following advantages for Db2 stored procedures:

- Language Environment hides the differences between programming languages.
- Language Environment provides the ability to make a stored procedure resident in the stored procedure address spaces.
- Language Environment supports a large number of run time options, including those options that are needed to use tools to debug your stored procedures.

### Procedure

To set up Language Environment for stored procedures:

1. Customize Language Environment by completing the instructions in [z/OS Language Environment Customization](#).
2. Specify the Language Environment run time library in the JCL startup procedure for each WLM-managed address space for stored procedures.

This library must be the only available run time library. Do not reference any other language run time libraries within the system link list or within the STEPLIB statements. If other language run time libraries are defined in the system link list, use STEPLIB statement overrides to exclude them.

Multiple languages can share the same Language Environment run time library. Therefore, you do not need to specify the language-specific libraries in the JCL startup procedure of each stored procedure address space.

**Restriction:** Do not use compilers (or associated run time libraries) that are no longer supported by IBM.

### What to do next

After you set up Language Environment for stored procedures, you can override the Language Environment run time options for individual stored procedures. You can do this by using the RUN OPTIONS clause in the CREATE PROCEDURE statement or ALTER PROCEDURE statement. The default values for Language Environment run time options are defined by z/OS. You might have overridden some of these default values when you customized Language Environment.

#### Related concepts

[External stored procedures \(Db2 Application programming and SQL\)](#)

[SQL procedures \(Db2 Application programming and SQL\)](#)

#### Related reference

[CREATE PROCEDURE statement \(external procedure\) \(Db2 SQL\)](#)

[CREATE PROCEDURE statement \(SQL - external procedure\) \(deprecated\) \(Db2 SQL\)](#)

[Customizing Language Environment run-time options \(z/OS Language Environment Customization\)](#)

## Related information

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

## Implementing RRS for stored procedures during migration

To use some Db2 stored procedures, you must implement Resource Recovery Services (RRS). RRS is a sync point manager program that coordinates two-phase commit processing. Db2 requires that RRS be active because WLM-managed stored procedure address spaces use the RRS attachment facility (RRSAF).

### About this task

RRS records events for protected resources in log streams that are managed by a z/OS component called the system logger. The following table identifies the log streams that RRS uses, where *gname* can be your Sysplex name or any name in a non-Sysplex environment:

Table 40. Log streams that RRS uses

Log stream type	Log stream name	Content
Main unit-of-recovery log state stream	<i>ATR.gname.MAIN.UR</i>	The state of active units of recover (URs). RRS periodically moves this information into the RRS delayed UR state log when UR completion is delayed.
Delayed unit-of-recovery log state stream	<i>ATR.gname.DELAYED.UR</i>	The state of active URs, when UR completion is delayed.
Resource manager data log stream	<i>ATR.gname.RM.DATA</i>	Information about the resource managers that use RRS services.
Restart log stream	<i>ATR.gname.RESTART</i>	Information, which is needed during restart, about incomplete URs. This information enables a functioning RRS instance to assume remaining incomplete work from an RRS instance that failed.
Archive log stream	<i>ATR.gname.ARCHIVE</i>	Information about completed URs. This log stream is optional, but recommended.

All of these log streams are required except for the archive log stream. RRS does not start if it is not able to connect to the required log streams.

In a sysplex environment, these log streams are shared by the systems of the Sysplex.

### Procedure

To implement RRS for stored procedures:

1. Define the RRS log streams that are to be written, either on disk or in the coupling facility by completing the following actions:

- a) If you are using the coupling facility, add definitions for the RRS structures in the CFRM policy.

When you are using coupling facility log streams, each log stream needs to be mapped to a coupling facility structure.

The following example shows JCL that updates the CFRM policy to add the RRS structures:

```
//DEF CFRM1 JOB MSGCLASS=X,TIME=10,MSGLEVEL=(1,1),NOTIFY=&SYSUID  
//STEP1 EXEC PGM=IXCMIAPU
```

```

//SYSPRINT DD SYSOUT=*
//SYSABEND DD SYSOUT=*
//SYSIN DD *
DATA TYPE(CFRM) REPORT(YES)
DEFINE POLICY NAME(CFRM18) REPLACE(YES)
CF NAME(CF01)
  TYPE(009672)
  MFG(IBM)
  PLANT(02)
  SEQUENCE(000000040104)
  PARTITION(1)
  CPCID(00)
  DUMPSPACE(2048)
  CF NAME(CF02)
  TYPE(009672)
  MFG(IBM)
  PLANT(02)
.....
.....
.....
STRUCTURE NAME(RRS_ARCHIVE_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RMDATA_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_MAINUR_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_DELAYEDUR_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)
STRUCTURE NAME(RRS_RESTART_1)
  INITSIZE(8000)
  SIZE(16000)
  PREFLIST(CF1,CF2)
  REBUILDPERCENT(5)

```

- b) Define the log streams in the system logger policy by using the IXCMIAPU utility. This utility program is provided in the SYS1.MIGLIB system library.

If you are using the coupling facility, also define the structures in the system logger policy. You can map each log stream to a single structure or you can map log streams of like data types to the same structure.

#### Example: Defining coupling facility log streams

The following example JCL shows definitions for coupling facility structures and RRS log streams. In this case, each RRS log stream is mapped to a structure.

```

//STEP1 EXEC PGM=IXCMIAPU
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(LOGR) REPORT(YES)

  DEFINE STRUCTURE NAME(RRS_ARCHIVE_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(262)

  DEFINE STRUCTURE NAME(RRS_RMDATA_1) LOGSNUM(1)
    MAXBUFSIZE(1024) AVGBUFSIZE(252)

  DEFINE STRUCTURE NAME(RRS_MAINUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

  DEFINE STRUCTURE NAME(RRS_DELAYEDUR_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

  DEFINE STRUCTURE NAME(RRS_RESTART_1) LOGSNUM(1)
    MAXBUFSIZE(64000) AVGBUFSIZE(158)

DEFINE LOGSTREAM

```

```

NAME(ATR.SANDBOX.ARCHIVE) STRUCTNAME(RRS_ARCHIVE_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RM.DATA) STRUCTNAME(RRS_RMDATA_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.MAIN.UR) STRUCTNAME(RRS_MAINUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.DELAYED.UR) STRUCTNAME(RRS_DELAYEDUR_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)

DEFINE LOGSTREAM
NAME(ATR.SANDBOX.RESTART) STRUCTNAME(RRS_RESTART_1)
LS_DATACLAS(SHARE33)
HLQ(LOGR) MODEL(NO) LS_SIZE(1024)
LOWOFFLOAD(0) HIGHOFFLOAD(80) STG_DUPLEX(NO)
RETPD(15) AUTODELETE(YES)
/*

```

### Example: Defining disk log streams

The following example JCL shows definitions for RRS log streams on disk.

```

/DEFSTREXECPGM=IXCMIAPU
//SYSPRINT DDSYSOUT=A
//SYSINDD *
  DATA TYPE(LOGR)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.MAIN.UR)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(1024)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(1024)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.DELAYED.UR)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(960)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(960)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.ARCHIVE)
    LOWOFFLOAD(0)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(960)
    LS_DATACLAS(VSAMLS)
    AUTODELETE(YES)
    RETPD(2)
    STG_SIZE(2000)

  DEFINE LOGSTREAM NAME(ATR.PLEX1.RM.DATA)
    LOWOFFLOAD(60)
    HIGHOFFLOAD(80)
    DASDONLY(YES)
    HLQ(TEST)
    LS_SIZE(192)
    LS_DATACLAS(VSAMLS)
    STG_SIZE(192)

```

```

DEFINE LOGSTREAM NAME(ATR.PLEX1.RESTART)
  LOWOFFLOAD(60)
  HIGHOFFLOAD(80)
  DASDONLY(YES)
  HLQ(TEST)
  LS_SIZE(960)
  LS_DATACLAS(VSAMLS)
  STG_SIZE(960)

```

- c) If you are using coupling facility log streams, compile and link-edit the changed CFRM policy.
- d) If you are using coupling facility log streams, activate the updated CFRM policy in your Sysplex by using the following operator command:

```
SETXCF START,POLICY,TYPE=CFRM,POLNAME=polname
```

2. Establish the priority for RSS within the WLM policy.

The RRS priority needs to be equal to or higher than the dispatching priority of Db2. You can use the SYSSTC service class for the RRS address space to achieve a higher dispatching priority.

3. Move the ATRRRS procedure that is supplied by IBM from SYS1.SAMPLIB to your SYS1.PROCLIB as member RRS, and make any necessary changes.

This JCL procedure is used to start RRS.

You can use a member name other than RRS, but the first four characters of this name must match the subsystem name that you specify in the IEFSSNxx member of SYS1.PARMLIB in the next step.

The GNAME value in the procedure must match the *gname* that you specified when defining the log streams. The default value for *gname* at RRS startup is the Sysplex name.

The following example shows a sample procedure to start RRS.

```

//RRS PROC GNAME=' ',CTMEM=' '
//RRS EXEC PGM=ATRIMIKE,REGION=0M,TIME=NOLIMIT,
// PARM='GNAME=&GNAME CTMEM=&CTMEM'
//

```

4. Define RRS as a subsystem to z/OS by editing the active IEFSSNxx member of SYS1.PARMLIB to include the following entry:

```
SUBSYS SUBNAME(RRS) /* RESOURCE RECOVERY SERVICES */
```

The subsystem name can be RRS or any other name that you choose. However, the first four characters (or fewer characters if the name is shorter) must match the name of the JCL procedure to start RRS.

5. Start RRS by using the following operator command:

```
START RRS
```

If you subsequently need to stop RRS, use one of the following operator commands:

- SETRRS CANCEL
- SETRRS SHUTDOWN

If neither of these commands stops RRS, use the FORCE RRS,ARM command. In this command, RRS is the subsystem name that your installation assigned to RRS in PARMLIB member IEFSSNxx.

### Related reference

[z/OS MVS Programming: Resource Recovery](#)

[Configuring and defining RRS logging requirements \(z/OS MVS Programming: Resource Recovery\)](#)

[Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

### Related information

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

## Setting up a WLM application environment for stored procedures during migration

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

### About this task

If you use data sharing, see [“Special considerations for WLM-managed stored procedures in coexistence” on page 694](#) for additional guidance about setting up WLM environments.

**Recommendation:** Use partitioned data set extended (PDSE) for load libraries that contain external modules for stored procedures. Using PDSEs might eliminate your need to stop and start the stored procedures address space due to growth of the load libraries. If a load library grows from additions or replacements, the library might need to be extended.

### Procedure

To set up a WLM application environment for one or more stored procedures:

1. Gather requirements for the WLM environment. These requirements include:
  - The name of the Db2 subsystem or data sharing group where the stored procedure or user-defined function is to run.
  - The maximum number of task control blocks (TCBs) that can run concurrently in an address space that is initiated by the WLM environment. This setting, referred to as the NUMTCB, is the maximum number of procedures or functions that should run concurrently in that WLM-managed address space. The appropriate setting depends on the requirements or limitations of the individual stored procedure or user-defined function.
    - For recommended NUMTCB values for Db2-supplied stored procedures, see [“Installation information for procedures and functions that are supplied with Db2” on page 819](#).
    - For recommended NUMTCB values for your own stored procedures, see [Assigning stored procedures and functions to WLM application environments \(Db2 Performance\)](#). If a routine allocates a large amount of memory or if the external module for the routine is not re-entrant, the NUMTCB value should be 1. If there is a need for serialization, the NUMTCB value should also be 1.
    - The WLM environment for a REXX stored procedure must have a NUMTCB setting of 1.
  - Requirements for Authorized Program Facility (APF).
    - Stored procedures and user-defined functions that execute privileged instructions (for example, WLM\_REFRESH) must run in a WLM environment that has an APF-authorized address space.
    - Db2 REXX stored procedures, such as DSNTPSMP, and other routines that use TSO/E and REXX facilities must run in a WLM environment that does not have an APF-authorized address space.
    - Most stored procedures can run in a WLM environment that either has or does not have an APF-authorized address space. However, running a routine in an APF-authorized environment is recommended only when doing so is necessary.
  - Special data sets and DD names that are needed by the stored procedure or user-defined function. For example, all Java stored procedures implicitly require a Language Environment run time options data set to be allocated to DD name JAVAENV. Other routines might also have an explicit requirement for a work file to be allocated to a particular DD name.
2. Create a JCL startup procedure for the WLM application environment.

Use *ssnm*WLM (where *ssnm* is the Db2 subsystem ID) as the basis for creating the new startup procedure. *ssnm*WLM is the default name of the sample JCL procedure for starting WLM-established address spaces. If you specified a name in the WLM PROC NAME field on the DSNTIPX installation panel, the sample procedure has that specified name. The sample procedure is placed in your system



PROCLIB by installation job DSNTIJMV. For the DSNACICS stored procedure, DSNTIJMV also provides sample procedure *ssnmCICS*, where *ssnm* is the subsystem ID. Tailor your new startup procedure as follows:

- Change the APPLENV value to the name of the WLM application environment that you plan to define.
- Change the startup procedure name to an appropriate procedure name.

**Recommendation:** Specify the same name for the application environment name and the procedure name. Using the same name simplifies monitoring the WLM environment definitions.

- Change the value of DB2SSN to your Db2 subsystem name.
- Ensure that the NUMTCB value is appropriate. If the minimum number of address spaces is specified, the NUMTCB value will be the number of task control blocks that are started in an address space.

**Recommendation:** If you want to be able to easily change the NUMTCB value, specify the NUMTCB value here, and do not specify this parameter on the application environment definition panel when you define the WLM application environment. Specifying NUMTCB on the environment definition panel associates this parameter with the WLM application environment definition. Any changes to the JCL startup procedure can be made by refreshing the WLM application environment. However, changes to the WLM application environment require that you reinstall the z/OS service policy at an LPAR or sysplex level. If you specify the NUMTCB parameter for both the WLM application environment and the startup procedure, the value in the WLM application environment overrides the value in the startup procedure.

- If the environment is one in which the cost of starting new address spaces is very high, you can use the MNSPAS parameter. The MNSPAS parameter specifies the minimum number of address spaces that are to be started and maintained. The value can be 0 through 50. The default value is 0, which means that no minimum number of address spaces is specified. If the number of address spaces is at the specified minimum, canceling an address space causes WLM to start another one to maintain the minimum. If you refresh a WLM environment, WLM starts a number of new address spaces as needed (or the specified minimum number) and stops the old address spaces.

If the MNSPAS parameter is specified, the NUMTCB value is the number of task control blocks that are started in an address space. If the MNSPAS parameter is not specified, the NUMTCB value is the maximum number of task control blocks that can be started in an address space.

- Edit the data set names to match your data set names.
- Ensure that the library in which the stored procedure resides is in the STEPLIB concatenation.
- Ensure that the IBM Language Environment run time library is specified in the STEPLIB concatenation, unless your system includes the Language Environment run time library in the system link list.
- If you want to run the stored procedure in a WLM environment that has an APF-authorized address space, ensure that all the libraries in the STEPLIB concatenation are defined to the Authorized Program Facility.
- Add any special DD statements that are required for the stored procedures or user-defined functions that are to run in the WLM environment.
  - If you plan to use stored procedures that use the ODBA interface to access IMS databases, make the following additional changes:
    - Add the data set name of the IMS data set that contains the ODBA callable interface code to the end of the STEPLIB concatenation. The name of this data set is usually IMS.RESLIB.
    - After the STEPLIB DD statement, add a DFSRESLB DD statement that names the IMS data set that contains the ODBA callable interface code.
  - If your routines are defined as PROGRAM TYPE SUB and use z/OS UNIX System Services syscall statements, you might need to add a NOUNDUB DD statement. By default, the z/OS UNIX System Services process and its resources are cleaned up after every stored procedure and user-defined function invocation. If you need the task in this WLM environment to retain the process across subsequent invocations, add a dummy NOUNDUB DD statement. This option specifies that no

cleanup will occur unless the WLM environment is refreshed. To enable this option, add the following statement to the WLM stored procedure address space startup JCL:

```
//NOUNDUB DD DUMMY
```

Use this option with caution because routines use the z/OS UNIX System Services process that was used by the previous routine that was run under the same task. Also note that any open resources such as file descriptors remain open for the next routine that is run under the same task. Consider using this option on new workloads only if reusing the z/OS UNIX System Services process is the desired behavior.

The following example shows a startup procedure for a WLM application environment for external SQL, COBOL, C, C++, PL/I, and assembler stored procedures. This startup procedure for external SQL stored procedures needs one unauthorized data set included in STEPLIB.

```
/******  
/* JCL FOR RUNNING THE WLM-ESTABLISHED STORED PROCEDURES  
/* ADDRESS SPACE  
/* RGN -- THE MVS REGION SIZE FOR THE ADDRESS SPACE.  
/* DB2SSN -- THE DB2 SUBSYSTEM NAME.  
/* NUMTCB -- THE NUMBER OF TCBS USED TO PROCESS  
/* END USER REQUESTS.  
/* APPLENV -- THE MVS WLM APPLICATION ENVIRONMENT  
/* SUPPORTED BY THIS JCL PROCEDURE.  
/*  
/******  
//DB9AWLM PROC RGN=0K,APPLENV=WLMENV,DB2SSN=DB9A,NUMTCB=40,MNSPAS=3  
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,  
// PARM='&DB2SSN,&NUMTCB,&APPLENV,&MNSPAS'  
//STEPLIB DD DISP=SHR,DSN=DB9AU.RUNLIB.LOAD  
// DD DISP=SHR,DSN=CEE.SCEERUN  
// DD DISP=SHR,DSN=DB9A9.SDSNEXIT  
// DD DISP=SHR,DSN=DB9A9.SDSNLOAD
```

3. Define the application environment to WLM by using one of the following methods.

- Use the WLM administrative application (IWMARINO) to define a new environment or copy or modify an existing one.

a. In the first WLM panel, **Definition Menu**, enter 9 for Application Environments.

The application environment definition panel is displayed.

b. On the application environment definition panel, specify the appropriate action code:

- Create a new WLM application environment.
- Copy an existing WLM application environment.
- Modify an existing WLM application environment.

The appropriate panel for creating, copying or modifying the application environment is displayed.

c. If you are creating or modifying a WLM environment, specify the appropriate options for the WLM application environment definition, using the same application environment name and procedure name that you specified for the startup procedure.

d. After you specify the appropriate options, press Enter to create the application environment definition.

- Modify and run sample job DSNTIJRW. As provided, DSNTIJRW creates the core Db2 WLM environments, but you can modify the job to define your own WLM environments. Job DSNTIJMV copies an address space procedure for each of the Db2 core WLM environments into SYS1.PROCLIB.

4. Install the WLM service definition that contains information about the application environment by opening the WLM **Definition Menu** panel and selecting the **Install** function in the **Utilities** menu bar.

5. Activate the WLM service policy from the installed service definition by completing one of the following actions:

- Issue the VARY WLM command as follows:

```
VARY WLM,POLICY=policy-name
```

- On the WLM **Definition Menu** panel, choose the **Activate service policy** option from **Utilities** menu bar.
6. Set up security for the WLM application environments and for creating stored procedures by completing the following actions:
    - a) Specify which WLM-established address spaces can run stored procedures.  
If you do not complete this step, any WLM-established address space can run stored procedures.
    - b) Grant access to users to create procedures in specific WLM address spaces.
    - c) Grant access to users to create procedures in specific schemas. Use the GRANT statement with the CREATIN option for the appropriate schema.
    - d) Grant access to users to create packages for procedures in specific collections. Use the GRANT statement with the CREATE option for the appropriate collection.  
**Requirement:** For native SQL procedures, the collection name for the package must be the same as the schema name.
    - e) Grant access to refresh the WLM environments to the appropriate people.  
For more detail, see [Managing authorization for stored procedures \(Managing Security\)](#).
  7. Ensure that the ID that is used to run the JCL startup procedure for the WLM application environment has permission to use RRSF.  
Each time one of the Db2 WLM address spaces is started, it uses RRSF to attach to Db2.

## What to do next

When you create or alter a stored procedure, specify the WLM application environment that Db2 is to use in the WLM\_ENVIRONMENT option of the CREATE or ALTER PROCEDURE statement. When you specify environments, be aware that:

- Routines that have low memory requirements and that are frequently called should not share an environment with routines that have high memory requirements and are rarely called. Otherwise, storage is wasted.
- Stored procedures can be grouped according to the authorization settings for a WLM environment.
- WLM environments should not be shared among routines that use the same DD name for different purposes.
- WLM environments should not be shared among routines if one routine allocates data sets in the environment and that routine is run only occasionally. If other routines that do not use the data sets use the environment, the data sets are kept artificially allocated, which might interfere with other tasks.

### Related concepts

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

### Related tasks

[Managing authorization for stored procedures \(Managing Security\)](#)

[Refreshing WLM application environments for stored procedures \(Db2 Administration Guide\)](#)

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[DSNTWLMB tool](#)

The DSNTWLMB tool provides a batch interface for defining, installing, and activating WLM environments. You can also use DSNTWLMB to remove WLM application environments. This tool is invoked by job DSNTIJRW to create the core Db2 WLM environments.

[GRANT statement \(collection privileges\) \(Db2 SQL\)](#)

[GRANT statement \(schema privileges\) \(Db2 SQL\)](#)

[set\\_dub\\_default \(BPX1SDD, BPX4SDD\) \(z/OS UNIX System Services Programming\): Assembler Callable Services Reference](#)

### **Related information**

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

[Using Operator Commands for Application Environments \(z/OS MVS Planning: Workload Management\)](#)

## **Migration step 24: Set up Db2-supplied routines**

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

### **Related tasks**

[Disabling Db2-supplied routines for validation](#)

Job DSNTIJRT installs all Db2-supplied routines on your subsystem. After installation or migration, you can disable any routines that are unnecessary or unusable so the validation program can exclude it from processing.

### **Related reference**

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

[Procedures that are supplied with Db2 \(Db2 SQL\)](#)

## **Installing Db2-supplied routines during migration**

The DSNTIJRT and DSNTIJRV jobs install and validate the installation of routines that are supplied with Db2. These jobs are configured with the options that you specified on installation panel DSNTIPR1 and panels DSNTIPRA through DSNTIPRP.

## **Before you begin**

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that runs the DSNTIJRV job requires READ access. To grant READ access to a user, an administrator must submit the following command:

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
```

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that runs the DSNTIJRV job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVFY console that is used in this job. To add a discrete profile for the DSNTRVFY console, an administrator must complete the following steps:

1. Establish a discrete profile for MVS.MCSOPER.DSNTRVFY by issuing the following command:

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNTRVFY UACC(NONE)
```

2. Grant READ access to the user that runs the DSNTIJRV job by issuing the following command:

```
PERMIT MVS.MCSOPER.DSNTRVFY CLASS(OPERCMDS) ID(user) ACCESS(READ)
```

3. Refresh the OPERCMDS class by issuing the following command:

```
SETROPTS RACLIST(OPERCMDS)REFRESH
```

Resource Recovery Services (RRS) is also required for these jobs.

**Important:** Job DSNTIJRT defines, binds, and grants access to stored procedures and user-defined functions. The default setting for GRANT EXECUTE is PUBLIC, meaning that anyone who can access Db2 can use these stored procedures. Use the GRANT EXECUTE fields on panels DSNTIPRB through DSNTIPRP to specify different access lists when you run the installation CLISTS.

Before running job DSNTIRT, review the configuration statements under the CFIGIN DD statement to verify the settings of the WLMENV, GRANTTO, and optional PKGOWNER parameters.

**Remember:** If you copy Db2 library data sets from one system another, such as for installing a related test or production subsystem, ensure that you copy all of the Db2 library data sets to the same location. For example, if you copy the SDNSLOAD data set from one system to another but omit the DBRMLIB data set, the resulting mismatch can cause job DSNTIJRT to fail with SQLCODE -812.

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)” on page 264](#).

## Procedure

To install the Db2-supplied routines:

1. Run job DSNTIJRT.
2. After DSNTIJRT successfully completes, run job DSNTIJRV to validate the installation of the routines.
3. If you did not perform any of the following steps when you originally installed the Db2 subsystem, perform them for any of the following routines that you plan to begin using in Db2 12.
  - [The stored procedures for XML schema support](#)
  - [The administrative task scheduler routines and administrative enablement routines](#)
  - [The CICS transaction invocation procedure](#)
  - [The common SQL API stored procedures](#)
  - [The IBM MQ user-defined functions](#)
  - [The web service user-defined functions](#)

## What to do next

After installing the Db2-supplied routines, you can choose to disable any of the routines that are unnecessary or unusable on your subsystem.

### Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that Db2 supplies.

### Related tasks

[Granting privileges for executing stored procedures and stored procedure packages \(Managing Security\)](#)

[Disabling Db2-supplied routines for validation](#)

Job DSNTIJRT installs all Db2-supplied routines on your subsystem. After installation or migration, you can disable any routines that are unnecessary or unusable so the validation program can exclude it from processing.

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## **Job DSNTIJRT**

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

DSNTIJRT provides a *configuration control statement* for each Db2-supplied routine and the mode for processing those statements. The configuration control statement specifies the WLM environment, list of authorization IDs that are allowed to execute the routine, and optional package owner for the routine. DSNTRIN reads and validates those statements and uses them to create and customize routines and supporting objects.

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)”](#) on page 264.

## **Format**

DSNTRIN accepts the following parameters:

### **DB2SSN**

Identifies the Db2 subsystem on which to install and configure the Db2-supplied routines.

### **MODE**

During SQL processing, DSNTRIN configures each routine with the WLM environment specified in the configuration control statement for that routine. Processing behavior depends on the DSNTRIN run mode, the Db2 catalog mode, and which objects already exist.

### **INSTALL**

This is the normal operating mode. Use it when installing or migrating to Db2.

Create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the routine already exists, it is updated, if necessary, to use the WLM environment specified in the configuration control statement for that routine. If the package for a routine already exists, it is not bound again unless the DBRM has been updated or the package has been invalidated.

If the package for a routine already exists and the DBRM has not been updated and the package has not been invalidated, the package is rebound if its APPLCOMPAT level does not match the DB2OPT parameter RTN\_PKG\_APPLCOMPAT specified (VvvRrMmmm or V11R1).

Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **REINSTALL**

This mode behaves like INSTALL mode, except that existing Db2-supplied routines and created global temporary tables are dropped ahead of other processing. Existing related databases, table spaces, tables, and indexes are not dropped, except as discussed in the special notices section of the DSNTIJRT job prolog.

Use REINSTALL mode only if you have a specific need to drop and re-create all Db2-supplied routines. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines and any related created global temporary tables are first dropped before they are re-created. Related databases are not dropped if they already exist, but they are created if they do not exist. If a supporting object is used by more than one routine, the object is created when one of

those routines is first created. Drop processing of routines and related objects that do not exist is bypassed.

### **REINITIALIZE**

This mode behaves like REINSTALL mode, except that existing databases, table spaces, tables, and indexes used by the Db2-supplied routines are also dropped ahead of other processing.

REINITIALIZE mode drops and reinitializes databases such as the XSR database that may contain information needed by Db2 for other processing. Therefore, use REINITIALIZE mode only when advised to do so by IBM Support. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines, existing related created global temporary tables, and existing related databases are first dropped before they are re-created. After each SQL statement, a COMMIT statement is issued. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **INSTALL-PREVIEW**

Simulate INSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINSTALL-PREVIEW**

Simulate REINSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINITIALIZE-PREVIEW**

Simulate REINITIALIZE mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **AUTHID**

DSNTRIN uses this value as the CURRENT SQLID for creating and configuring most Db2-supplied routines. If DEFPKOWN is not specified, DSNTRIN also uses this value as the default OWNER for binding packages for the Db2-supplied routines that do not have the PKGOWNER specified in the configuration control statement.

When the AUTHID parameter is set to SYSINSTL, and you use the installation SYSADM authority or the installation SYSOPR authority to run this job for Db2 installation, Db2 identifies the Db2-supplied routines created or altered by DSNTRIN as system-defined in the SYSIBM.SYSROUTINES catalog table.

### **SECDEFID**

DSNTRIN uses this value as the CURRENT SQLID setting when creating and configuring Db2-supplied routines that are defined with the SECURITY DEFINER option.

The ID that you specify for SECDEFID must be an ID that can be used as a logon ID, because WLM uses the ID to execute Db2-supplied routines that are defined with SECURITY DEFINER.

### **DEFPKOWN**

Specifies the default OWNER for binding the package for a Db2-supplied routine when the PKOWNER parameter of the routine's configuration control statement is not specified. If DEFPKOWN is not specified, DSNTRIN uses the AUTHID value as the default package owner.

The DEFPKOWN parameter is required only when the AUTHID parameter is set to SYSINSTL. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set DEFPKOWN during the editing of DSNTIJRT. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRT prolog to explain additional requirements.

Specify an installation system administrator ID if you use the installation SYSOPR authority to execute this job for Db2 installation. Specify an authorization ID that is granted the system DBADM and

DATAACCESS authorities if you use the installation SYSOPR authority to execute this job for Db2 migration.

## Input

DSNTRIN allocates the following DD statements for input:

### **DBRMLIB**

Location of the DBRMs for Db2-supplied routines. This is typically the *prefix.SDSNDBRM* target library.

### **SYSUT1**

Internal work file for the Db2 installation bind interface (DSNTRBI).

### **CFIGIN**

Location of the configuration control statements for Db2-supplied routines.

### **DB2OPT**

This required DD can contain the following optional parameters:

#### **STOGROUP**

Specifies a storage group to use for creating databases and table spaces that are used by the routines that are supplied with Db2. If this parameter is not specified, the default SYSDEFLT storage group is used.

#### **INDEXSTOG**

Specifies a storage group to use for creating indexes instead of the default SYSDEFLT storage group.

#### **BP4K**

Specifies an alternate 4-KB buffer pool for base table spaces that are created by DSNTRIN. The default 4-KB buffer pool is BP0.

#### **BP8K**

Specifies an alternate 8-KB buffer pool for base table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

#### **BP16K**

Specifies an alternate 16-KB buffer pool for base table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

#### **BP32K**

Specifies an alternate 32-KB buffer pool for base table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K.

#### **LOBBP8K**

Specifies an alternate 8-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

#### **LOBBP16K**

Specifies an alternate 16-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

#### **LOBBP32K**

Specifies an alternate 32-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K0.

#### **IMS\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied IMS routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 IMS routines are altered if needed to conform with the SECURITY type that is specified here.

#### **MQ\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied MQ routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 MQ routines are altered if needed to conform with the SECURITY type that is specified here.



## SOAP\_SECURITY

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied web services/SOAP routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 SOAP routines are altered if needed to conform with the SECURITY type that is specified here.

## RTN\_PKG\_APPLCOMPAT

The APPLCOMPAT bind option (DEFAULT, *Db2-function-level*, V11R1) to be used for binding or rebinding packages for Db2-supplied routines.

### DEFAULT

Specifies the following actions:

- DSNTIJRT/DSNTRIN omit the APPLCOMPAT bind option from generated BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN bypass checking the APPLCOMPAT level of valid “current” packages for Db2-supplied routines to see if a REBIND is needed, where “current” means that the package CONTOKEN matches that of the current DBRM

The result of this option matches the behavior before [APAR PH50704](#).

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

### **Db2-function-level, V11R1**

*Db2-function-level* is a *VvvRrMmmm* format value equivalent to or lower than the current function level of the Db2 subsystem.

Specifies the following actions.

- DSNTIJRT/DSNTRIN add the APPLCOMPAT bind option, with the valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, to generate BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN generate REBIND statements with the APPLCOMPAT option set to a valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, for “current” packages for Db2-supplied routines because the APPLCOMPAT level of the valid “current” package does not agree with the DB2OPT RTN\_PKG\_APPLCOMPAT, where “current” means that the package CONTOKEN matches that of the current DBRM. For example, DSNTRIN generates the following REBIND statement with DB2OPT RTN\_PKG\_APPLCOMPAT=V12R1M509:

```
REBIND PACKAGE(DSNADM.DSNADMCD.(V13R1))
        APPLCOMPAT(V12R1M509)
```

RTN\_PKG\_APPLCOMPAT(DEFAULT) is assumed if RTN\_PKG\_APPLCOMPAT is not specified.

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

## RTN\_PKG\_PLANMGMT

The PLANMGMT bind option (DEFAULT, EXTENDED, BASIC, OFF) for rebinding packages for Db2-supplied routines.

### DEFAULT

DSNTIJRT/DSNTRIN do not add the PLANMGMT rebind option to generated REBIND statements for packages for Db2-supplied routines.

### EXTENDED, BASIC, OFF

DSNTIJRT and DSNTRIN add the PLANMGMT rebind option, with the valid DB2OPT RTN\_PKG\_PLANMGMT setting, to generated REBIND statements for packages for Db2-supplied routines.

For more information see [PLANMGMT bind option \(Db2 Commands\)](#).

RTN\_PKG\_PLANMGMT(DEFAULT) is assumed if RTN\_PKG\_PLANMGMT is not specified.

**Note:** DSNTRIN does not create or activate this storage group or any of these buffer pools.

## Output

DSNTRIN allocates the following DD statements for output:

### SYSPRINT

Destination for echo of configuration control statements that are read and for messages that are generated during processing. Each processed routine generates at least one status message.

### SYSTSPRT

Internal message file for the Db2 installation bind interface (DSNTRBI).

### CFIGOUT

Destination for configuration control statements that are read by DSNTRIN. This output is useful for diagnostic purposes when DSNTRIN reports an error in a configuration control statement.

### SQLOUT

Destination for DDL statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### BINDOUT

Destination for bind statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### JCLOUT

Destination for a generated sample job that is generated when one of the PREVIEW modes is specified. The job contains steps that process inline DDL and bind statements that are needed to install and configure missing, down-level, or incorrectly configured Db2-supplied routines. This DD is required if you specify a PREVIEW mode.

Example of executing DSNTRIN in INSTALL mode:

```
//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
//          PARM=('DB2SSN(DSN) MODE(INSTALL)',
//          ' AUTHID(ADMFO01) SECDEFID(ADMFO02)',
//          ' DEFPKOWN(SYSADM)')

//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//        DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
.....
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
```

```

WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

/*

```

Example of executing DSNTTRIN in INSTALL-PREVIEW mode:

```

//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
//          PARM=('DB2SSN(DSN) MODE(INSTALL-PREVIEW)',
//              ' AUTHID(ADMFO01) SECDEFID(ADMFO02)',
//              ' DEFPKOWN(SYSADM)')

//DBRMLIB DD DISP=SHR,DSN=DSN! !0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//        DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//JCLOUT DD DSN=USER.JCLLIB(DB2INST),DISP=SHR
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
          .
          .
          .
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

/*

```

## Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTTRIN program, which installs and configures all routines that Db2 supplies.

[Installation and migration jobs that the CLIST tailors](#)

The installation CLIST uses the values that you specify on the installation panels to tailor and load the installation or migration jobs. Each job is composed of one or more JCL procedures or job steps.

## Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Job DSNTIJRV

Job DSNTIJRV validates the Db2-supplied routines by executing program DSNTRVFY. You should validate these routines after Db2 installation and after each phase of migration.

DSNTRVFY validates a single routine, multiple routines, or all Db2-supplied routines. DSNTRVFY produces a report that identifies routines that passed the validation and possible problem areas for routines that failed.

## Authorizations

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that submits this job requires READ access.

If the RACF OPERCMDS class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that submits this job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVfy console that is used in this job.

## Format

DSNTRVfy accepts the following required parameters:

### DB2SSN(ssid)

Identifies which Db2 subsystem to connect to for validating the Db2-supplied routines.

### ROUTINE(name)

Identifies which Db2-supplied routine needs to be validated. The following values are supported for *name*:

- A routine name in the form of *schema-name.routine-specific-name*.
- The keyword **DD:SYSIN** to specify a list of routines. List the routines in the form of *schema-name.routine-specific-name* under the SYSIN DD statement with one routine per line.
- The keyword **ALL** to specify all Db2-supplied routines.

DSNTRVfy also accepts the following optional parameters:

### AUTHID(authorization ID)

DSNTRVfy uses this value as the CURRENT SQLID for issued SQL statements. Also, if PKOWNER(*pkowner*) is not specified, DSNTRVfy uses this value as the OWNER for BIND PACKAGE and BIND PLAN statements. If this value is not specified, the primary authorization ID is used for BIND PACKAGE, BIND PLAN, and issued SQL statements.

### PKOWNER(pkowner)

Specifies the default owner for binding the DSNTRVfy plan and package. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set PKOWNER(*pkowner*) during the editing of DSNTIJRV. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRV prolog to explain additional requirements.

If you use an authorization ID with the installation SYSOPR authority to execute job DSNTIJRV, the ID must be explicitly granted the MONITOR2 system privilege. If you set AUTHID to SYSINSTL for running the SYSPROC.WLM\_REFRESH stored procedure, you must also define SYSINSTL in RACF.

## Output

DSNTRVfy allocates the following required DD statements for output:

### SYSPRINT

Contains messages generated during verification processing. Each processed routine can generate one or more messages.

### SYSTSPRT

DSNTRVfy writes bind output to SYSTSPRT if an error occurs during bind processing.

The following JCL example is for validating a single routine:

```
//DSNTJVfy EXEC PGM=DSNTRVfy,  
//          PARM='DB2SSN(VA1A) ROUTINE(SYSPROC.DSNUTILS)'  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *
```

The following JCL example is for validating multiple routines:

```
//DSNTJVFY EXEC PGM=DSNTRVfy,
//          PARM='DB2SSN(VA1A) ROUTINE(DD:SYSIN) '
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
          SYSPROC.DSNWZP
          SYSPROC.DSNACCOR
          SYSPROC.DSNUTILS
          SYSPROC.DSNUTILU
```

The following JCL example is for validating all routines:

```
//DSNTRVfy EXEC PGM=DSNTRVfy,COND=(4,LT),
//          PARM=('DB2SSN(DSN) AUTHID(SYSINSTL) ',
//              'PKOWNER(ADMFO01) ROUTINE(ALL) ')
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR
//SYSUT1 DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
```

## Processing

DSNTRVfy completes the following validation:

- Verifies that the routine is defined to the SYSIBM.SYSROUTINES catalog.
- Verifies that the collection ID defined in the SYSIBM.SYSROUTINES catalog table matches the collection ID used to bind the package.
- Verifies that the routine is currently defined with the Db2-reserved WLM application environment name DSNWLM\_NOT\_ENABLED, indicating that it is not enabled to run on the current Db2 subsystem. If it is, then a warning message is issued and the validation is bypassed.
- Verifies if the routine can be executed on the current Db2 catalog mode.
- Verifies the APF authorization requirements.
- Verifies if the WLM application environment is defined and available for use.
- Verifies if the NUMTCB setting is valid or within the recommended range.
- Verifies if the required DD statements for some of the routines are defined.
- Verifies if the WLM environment assigned to Java routines is enabled for Java.
- Verifies security coexistence requirements (for example, some routines should run on only their own WLM application environment).
- Verifies that the selected routine can be called successfully. Certain routines such as DSNACICS, DSNAIMS, IBM MQ functions, and most debugger routines are restricted to basic validation and are not called.

During the running of this job, the following message might be issued on the system console:

```
IEFC452I DB2UDSMD - JOB NOT RUN - JCL ERROR
```

In most cases, this message is normal and can be disregarded.

If the validation is successful, the following message is issued:

```
DSNT027I DSNTRVfy VALIDATION FOR schema.routine-specific-name SUCCESSFUL
```

If the validation fails, messages are issued to explain the reasons for failure. Examine these messages and make necessary adjustments before running the validation job again.

## Input

DSNTRVfy requires the following DD statements for input:

### DBRMLIB

Identifies the library where the DBRM for the DSNTRVfy program is located. This is typically the *prefix.SDSNDBRM* target library.

### SYSIN

Contains the list of Db2 routines. This is required when the validation type is for multiple routines (DD:SYSIN).

### SYSUT1

Work data set required for bind processing.

## Limitations

The following limitations apply to the DSNTRVfy program:

- The name of the routine in the form *schema-name.routine-specific-name* is limited to 72 characters, the maximum line length in JCL.
- Only Db2 12 Db2-supplied routines are supported for validation.
- Some routines, if enabled, receive basic validation to ensure that they are defined correctly and assigned to a valid WLM application environment. However, validation will not extend to calling these routines for one or more of the following reasons:
  - Optional system support such as CICS, IMS, or IBM MQ is required.
  - External setup on a remote server or workstation is required.
  - A call could introduce or modify data unexpectedly in a production environment.

The Db2-supplied routines that are restricted to basic validation are:

- DB2DEBUG.CREATE\_SESSION
- DB2DEBUG.DESTROY\_SESSION
- DB2DEBUG.GET\_REPORT
- DB2DEBUG.LIST\_SESSION
- DB2DEBUG.PUT\_COMMAND
- SYSFUN.SYSTS\_ENCRYPT
- SYSFUN.XSLTRANSFORM
- SYSPROC.ADMIN\_COMMAND\_UNIX
- SYSPROC.ADMIN\_JOB\_CANCEL
- SYSPROC.ADMIN\_JOB\_FETCH
- SYSPROC.ADMIN\_JOB\_QUERY
- SYSPROC.ADMIN\_JOB\_SUBMIT
- SYSPROC.DBG\_ENDSESSIONMANAGER
- SYSPROC.DBG\_INITIALIZECLIENT
- SYSPROC.DBG\_RECVCLIENTREPORTS
- SYSPROC.DBG\_SENDCLIENTREQUESTS
- SYSPROC.DBG\_SENDCLIENTCOMMANDS
- SYSPROC.DBG\_TERMINATECLIENT
- SYSPROC.DSNACICS
- SYSPROC.DSNAIMS
- SYSPROC.DSNAIMS2

- SYSPROC.DSNLEUSR
- SYSPROC.SET\_MAINT\_MODE\_RECORD\_NO\_TEMPORALHISTORY
- SYSPROC.SYSTS\_ALTER
- SYSPROC.SYSTS\_CREATE
- SYSPROC.SYSTS\_DROP
- SYSPROC.SYSTS\_RESTORE
- SYSPROC.SYSTS\_START
- SYSPROC.SYSTS\_STOP
- SYSPROC.SYSTS\_TAKEOVER
- SYSPROC.SYSTS\_UPDATE
- All IBM MQ, web services, and SOAP functions (those with schema DB2MQ, DB2MQ1C, DB2MQ2C, or DB2XML)

## Notes

### Temporary stored procedures used by DSNTIJRV

DSNTRVfy creates, calls, and drops two temporary stored procedures. These temporary stored procedures are SYSPROC.DSNWLM\_INSTALL\_INFOJ and SYSPROC.DSNWLM\_INSTALL\_INFO. Both of these stored procedures exist only when DSNTRVfy is executing. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFOJ to validate the WLM environment that is assigned to each Db2-supplied Java routine. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFO to validate the WLM environment that is assigned to each Db2-supplied non-Java routine that runs in a WLM environment.

### Using DSNTIJRV to verify 64-bit Java routines

Java on z/OS has two types of architectures: a 31-bit version and a 64-bit version. If your Java routines run in a 31-bit Java virtual machine (JVM), the startup procedure for the WLM environment in which the routines run must initialize a 31-bit environment. If you are running Java routines in a 64-bit JVM, the startup procedure for the WLM environment in which your Java routines run must initialize a 64-bit environment. The program that initializes a 31-bit WLM environment is DSNX9WLM. The program that initializes a 64-bit WLM environment is DSNX9WJM.

For example, you might use the Db2 core Java WLM environment, DSNWLM\_JAVA, for your Java routines. By default, the DSNWLMJ startup procedure for DSNWLM\_JAVA runs program DSNX9WLM. If your JAVA\_HOME environment variable specifies the path to a 31-bit JVM, such as /usr/lpp/java/IBM/J8.0, you need to run program DSNX9WLM to initialize the WLM environment. However, if your JAVA\_HOME variable specifies a path to a 64-bit JVM, such as /usr/lpp/java/8.0\_64, you need to run program DSNX9WJM to initialize the WLM environment. If you switch to a 64-bit JVM for your Java stored procedures, but do not update the initialization program to DSNX9WJM, DSNTIJRV fails.

### Related concepts

[WLM address space startup procedure for Java routines \(Db2 Application Programming for Java\)](#)

## Migration step 25: Convert EXPLAIN tables to the current format

When you migrate to Db2 12, you should convert your EXPLAIN tables to the current (Db2 12) format. A table that is not in the current format has fewer columns than are available in the current release, or it has columns that have a different length or data type than expected in the current release.

### About this task

In Db2 12, statements or commands that invoke EXPLAIN processing return SQLCODE +20520 reason code 2 if an EXPLAIN table is in Db2 11 format.

Db2 returns SQLCODE -20008 reason code 2 for statements or commands that invoke EXPLAIN processing if the EXPLAIN tables are in a pre-DB2 10 format. In Db2 11, EXPLAIN tables are required to be encoded in Unicode. If an EXPLAIN table is encoded in EBCDIC, SQLCODE -878 is returned.

**Note:** This migration step updates the EXPLAIN tables to the format supported by Db2 12 at function level 100.

## Procedure

To convert EXPLAIN tables, complete the following steps:

1. You can identify EXPLAIN tables that are in a pre-Db2 12 format by running the following query:

**GUIP**

```
WITH OLD_FORMAT_EXPLAIN_TABLES (FULL_NAME) AS
( SELECT STRIP(TBCREATOR) || '.' || STRIP(TBNAME)
  FROM SYSIBM.SYSCOLUMNS
  WHERE TBNAME IN( 'DSN_COLDIST_TABLE'
, 'DSN_DETCOST_TABLE'
, 'DSN_FILTER_TABLE'
, 'DSN_FUNCTION_TABLE'
, 'DSN_KEYTGTDIST_TABLE'
, 'DSN_PGRANGE_TABLE'
, 'DSN_PGROUP_TABLE'
, 'DSN_PREDICAT_TABLE'
, 'DSN_PREDICATE_SELECTIVITY'
, 'DSN_PROFILE_HISTORY'
, 'DSN_PROFILE_TABLE'
, 'DSN_PTASK_TABLE'
, 'DSN_QUERY_TABLE'
, 'DSN_QUERYINFO_TABLE'
, 'DSN_SORT_TABLE'
, 'DSN_SORTKEY_TABLE'
, 'DSN_STAT_FEEDBACK'
, 'DSN_STATEMENT_CACHE_TABLE'
, 'DSN_STATEMNT_TABLE'
, 'DSN_STRUCT_TABLE'
, 'DSN_VIEWREF_TABLE'
, 'DSN_VIRTUAL_INDEXES'
, 'DSN_VIRTUAL_KEYTARGETS'
, 'PLAN_TABLE'
)
)
GROUP BY TBCREATOR, TBNAME
HAVING (TBNAME = 'DSN_COLDIST_TABLE'
AND MAX(COLNO) < 21)
OR (TBNAME = 'DSN_DETCOST_TABLE'
AND MAX(COLNO) < 136)
OR (TBNAME = 'DSN_FILTER_TABLE'
AND MAX(COLNO) < 18)
OR (TBNAME = 'DSN_FUNCTION_TABLE'
AND MAX(COLNO) < 20)
OR (TBNAME = 'DSN_KEYTGTDIST_TABLE'
AND MAX(COLNO) < 21)
OR (TBNAME = 'DSN_PGRANGE_TABLE'
AND MAX(COLNO) < 15)
OR (TBNAME = 'DSN_PGROUP_TABLE'
AND MAX(COLNO) < 42)
OR (TBNAME = 'DSN_PREDICAT_TABLE'
AND MAX(COLNO) < 42)
OR (TBNAME = 'DSN_PREDICATE_SELECTIVITY'
AND MAX(COLNO) < 16)
OR (TBNAME = 'DSN_PROFILE_HISTORY'
AND MAX(COLNO) < 15)
OR (TBNAME = 'DSN_PROFILE_TABLE'
AND MAX(COLNO) < 15)
OR (TBNAME = 'DSN_PTASK_TABLE'
AND MAX(COLNO) < 25)
OR (TBNAME = 'DSN_QUERY_TABLE'
AND MAX(COLNO) < 16)
OR (TBNAME = 'DSN_QUERYINFO_TABLE'
AND MAX(COLNO) < 18)
OR (TBNAME = 'DSN_SORT_TABLE'
AND MAX(COLNO) < 16)
OR (TBNAME = 'DSN_SORTKEY_TABLE'
AND MAX(COLNO) < 21)
OR (TBNAME = 'DSN_STATEMENT_CACHE_TABLE'
AND MAX(COLNO) < 79)
OR (TBNAME = 'DSN_STATEMNT_TABLE'
AND MAX(COLNO) < 16)
OR (TBNAME = 'DSN_STRUCT_TABLE'
AND MAX(COLNO) < 20)
OR (TBNAME = 'DSN_VIEWREF_TABLE'
```



```

AND MAX(COLNO) < 13)
OR (TBNAME = 'DSN_VIRTUAL_INDEXES'
AND MAX(COLNO) < 150)
OR (TBNAME = 'DSN_VIRTUAL_KEYTARGETS'
AND MAX(COLNO) < 16)
OR (TBNAME = 'PLAN_TABLE'
AND MAX(COLNO) < 66)
UNION
SELECT STRIP(TBCREATOR) || '.' || STRIP(TBNAME)
FROM SYSIBM.SYSCOLUMNS
WHERE TBNAME IN( 'DSN_DETCOST_TABLE'
, 'DSN_FILTER_TABLE'
, 'DSN_FUNCTION_TABLE'
, 'DSN_PGRANGE_TABLE'
, 'DSN_PGROUP_TABLE'
, 'DSN_PREDICAT_TABLE'
, 'DSN_PROFILE_HISTORY'
, 'DSN_PROFILE_TABLE'
, 'DSN_PTASK_TABLE'
, 'DSN_QUERY_TABLE'
, 'DSN_SORT_TABLE'
, 'DSN_SORTKEY_TABLE'
, 'DSN_STATEMENT_CACHE_TABLE'
, 'DSN_STATEMENT_RUNTIME_INFO'
, 'DSN_STATEMNT_TABLE'
, 'DSN_STRUCT_TABLE'
, 'DSN_VIEWREF_TABLE'
, 'DSN_VIRTUAL_INDEXES'
, 'PLAN_TABLE'
)
AND ( (NAME = 'ACCESSCREATOR' AND LENGTH <> 128)
OR (NAME = 'ACCESSNAME' AND LENGTH <> 128)
OR (NAME = 'APPLNAME' AND LENGTH <> 24)
OR (NAME = 'COLLID' AND LENGTH <> 128)
OR (NAME = 'CORRELATION_NAME' AND LENGTH <> 128)
OR (NAME = 'CREATOR' AND LENGTH <> 128)
OR (NAME = 'FUNCTION_NAME' AND LENGTH <> 128)
OR (NAME = 'FUNCTION_TEXT' AND LENGTH <> 1500)
OR (NAME = 'GROUP_MEMBER' AND LENGTH <> 24)
OR (NAME = 'HINTUSED' AND LENGTH <> 128)
OR (NAME = 'OPHTINT' AND LENGTH <> 128)
OR (NAME = 'PATH' AND LENGTH <> 2048)
OR (NAME = 'PLANNAME' AND LENGTH <> 24)
OR (NAME = 'PROGNAME' AND LENGTH <> 128)
OR (NAME = 'REMARKS' AND LENGTH <> 762)
OR (NAME = 'SCHEMA_NAME' AND LENGTH <> 128)
OR (NAME = 'SPEC_FUNC_NAME' AND LENGTH <> 128)
OR (NAME = 'TNAME' AND LENGTH <> 128)
OR (NAME = 'VERSION' AND LENGTH <> 122)
OR (NAME = 'VIEW_CREATOR' AND LENGTH <> 128)
OR (NAME = 'VIEW_NAME' AND LENGTH <> 128)
)
)
SELECT DISTINCT(FULL_NAME)
FROM OLD_FORMAT_EXPLAIN_TABLES
ORDER BY FULL_NAME;

```

### GUPI

2. If the query identifies any EXPLAIN tables that are not in Db2 12 format, customize and run job DSNTIJXA.

Job DSNTIJXA calls REXX exec DSNTXTA, which alters to the Db2 12 format all EXPLAIN tables or EXPLAIN tables that belong to the specified creator ID.

To customize the job, provide the creator ID of the tables to migrate to the Db2 12 format, a Db2 subsystem name, and an authorization ID. To migrate all EXPLAIN tables, specify an asterisk as the creator ID.

## What to do next

Before you activate function level 501 or higher, customize and run job DSNTIJXA to update EXPLAIN tables and related objects to the format for Db2 12 function level 500 or higher.

**Important:** Verify that the PTF is applied for [APAR PH48053](#) before completing this step.

For more information, see [“Activating Db2 12 new function at migration”](#) on page 545.

## Related reference

[EXPLAIN tables \(Db2 Performance\)](#)

## Migration step 26: Verify views: DSNTIJVR

During migration to Db2 12, some views might be marked with view regeneration errors. If any views are marked with view regeneration errors, you can regenerate those views again.

### Procedure

**GUI** To identify views that are marked with regeneration errors, and generate the ALTER VIEW REGENERATE statements to correct them:

1. Run job DSNTIJVR.
2. Use dynamic SQL processing tools, such as SPUFI or DSNTDP2, to process any statements that are generated by DSNTIJVR. **GUI**

## Migration step 27: Take an image copy of the Db2 12 catalog : DSNTIJIC

For backup purposes, create a copy of the Db2 12 catalog and directory.

### Procedure

Run the Db2 12 DSNTIJIC job.

## Migration step 28: Verify migration of Db2 11 IVP objects to Db2 12 (optional)

Verify the migration of IVP objects to Db2 12 by running some of the sample jobs from your previous release.

### About this task

If all of the local Db2 objects from Db2 11 still exist (that is, if you have not run job DSNTJ0), follow this procedure.

### Procedure

To verify the migration of IVP objects in your Db2 12 system:

1. Change the JOBLIB statements to point to *prefix*.SDSNLOAD.
2. Ensure that the DSN8EAE1 module that you created when you originally ran the Db2 11 sample jobs is copied to *prefix*.SDSNEXIT. DSN8EAE1 is an EDITPROC that is used by the employee sample table.
3. Edit the Db2 11 sample jobs before running them. Do not run all the sample jobs. Run only the specific jobs and job steps that are listed in the following steps.
4. Test the migration of the IVP phase 2 applications from your previous version:
  - a. DSNTJ2A: Perform all except the first two steps of job DSNTJ2A. Expect a return code of 4 because table spaces DSN8D11U.NEWDEPT and DSN8D11U.NEWPHONE are placed in COPY-pending states.
  - b. DSNTJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH11) statement in step PH02CS04.
  - c. DSNTJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD11) statement in step PH02DS03.
  - d. DSNTJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE11) statement in step PH02ES04.

- e. DSNTJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF11) statement in step PH02FS03.
  - f. DSNTJ2P: Run only step PH02PS05.
5. Test the migration of the IVP phase 3 applications from your previous version:
- a) Do not run job DSNTJ3C or DSNTJ3P.
  - b) If you want to test the Db2 11 ISPF-CAF applications under Db2 12, place the Db2 11 SDSNSPFP panel library ahead of the Db2 12 SDSNSPFP panel library in the ISPLIB concatenation.  
This placement is necessary so that the plans that are migrated from Db2 11 can be used. Remove the Db2 11 SDSNSPFP library from your ISPLIB concatenation when you are finished testing the Db2 11 IVP applications under Db2 12.

## What to do next

Do not run any other Db2 11 sample jobs.

### Related concepts

[Dynamic SQL and the ISPF/CAF application](#)

The Phase 3 jobs of the installation or migration verification process install the ISPF/CAF sample application. This sample consists of an assembler or COBOL call attachment facility (CAF) interface, a connection manager program, and the phone application. The sample also includes the distributed application that uses DRDA access.

### Related tasks

[Ensure that sample objects from your previous release are available](#)

If you no longer have the IVP jobs from your previous release, you need to run the previous release's installation CLIST to regenerate them.

## Activating Db2 12 new function at migration

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

### Before you begin

**Important:** In data sharing, ensure that the data sharing group has no active Db2 11 members. For instructions for migrating data sharing members to Db2 12, see [“Migrating subsequent members of a group to Db2 12” on page 707](#).

**Important:** Do not issue the ACTIVATE command or run job DSNTIJAF for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the ACTIVATE command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.

**Important:** Apply the for fallback SPE ([APAR PI33871](#)) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration” on page 3](#).

Ensure that no incompatible applications will interfere with the catalog update. For details, see [Identifying applications that are incompatible with catalog updates \(Db2 for z/OS What's New?\)](#).

Determine the function level to activate. In most cases, you can activate a higher function level without separately activating each lower function level above the currently activated function level. However, activating a higher function level also results in the activation of all lower function levels. Before activating

a function level, familiarize yourself with the new capabilities and changes that all lower function levels introduce:

- [Db2 12 function levels \(Db2 for z/OS What's New?\)](#)
- 
- [Incompatible changes summary for function levels 501 and higher \(Db2 for z/OS What's New?\)](#)
- [Changes to plan for in Db2 12 \(Db2 for z/OS What's New?\)](#)

## About this task

The Db2 12 migration process uses the following function levels:

### Function level 100

Db2 12 starts at function level 100 during migration to Db2 12. In function level 100, fallback to Db2 11 and coexistence with Db2 11 in data sharing remain possible, and most new capabilities in Db2 12 remain deactivated. Function level 100 is comparable in many respects to conversion mode in previous Db2 releases. For more information, see [Function level 100 \(migration\) \(Db2 for z/OS What's New?\)](#)

### Function level 500

Function level 500 (V12R1M500) represents the first opportunity for applications to take advantage of most new capabilities in the Db2 12 initial release, including new SQL capabilities and many new subsystem parameter settings. Activation of function level 500 prevents any future fallback to Db2 11. Function level 500 is comparable in many respects to new-function mode in previous releases. For more information, see [Function level 500 \(installation or migration - October 2016\) \(Db2 for z/OS What's New?\)](#)

Before you can tailor the Db2 catalog for function level 502, function level 500 or 501 must be activated first. However, activating a lower star (\*) function level does not prevent the catalog from being tailored for function level 502.

The availability of new function depends on the type of enhancement, the activated function level, and the application compatibility levels of applications. In the initial Db2 12 release, most new capabilities are enabled only after the activation of function level 500 or higher.

### Virtual storage enhancements

Virtual storage enhancements become available at the activation of the function level that introduces them or higher. Activation of function level 100 introduces all virtual storage enhancements in the initial Db2 12 release. That is, activation of function level 500 introduces no virtual storage enhancements.

### Subsystem parameters

New subsystem parameter settings are in effect only when the function level that introduced them or a higher function level is activated. Many subsystem parameter changes in the initial Db2 12 release take effect in function level 500. For more information about subsystem parameter changes in Db2 12, see [Subsystem parameter changes in Db2 12 \(Db2 for z/OS What's New?\)](#).

### Optimization enhancements

Optimization enhancements become available after the activation of the function level that introduces them or higher, and full prepare of the SQL statements. When a full prepare occurs depends on the statement type:

- For static SQL statements, after bind or rebind of the package
- For non-stabilized dynamic SQL statements, immediately, unless the statement is in the dynamic statement cache
- For stabilized dynamic SQL statements, after invalidation, free, or changed application compatibility level

Activation of function level 100 introduces all optimization enhancements in the initial Db2 12 release. That is, function level 500 introduces no optimization enhancements.

## SQL capabilities

New SQL capabilities become available after the activation of the function level that introduces them or higher, for applications that run at the equivalent application compatibility level or higher. New SQL capabilities in the initial Db2 12 release become available in function level 500 for applications that run at the equivalent application compatibility level or higher. You can continue to run SQL statements compatibly with lower function levels, or previous Db2 releases, including Db2 11 and DB2 10. For details, see [Application compatibility levels in Db2 12 \(Db2 Application programming and SQL\)](#)

## Procedure

To activate Db2 12 new function for the first time, complete the following steps:

1. Issue a DISPLAY GROUP command to check that the code level of the Db2 subsystem or each data sharing group member supports your target function level.  
In the DSN7100I message, the DB2 LVL column indicates the code level. For more information and examples, see [Determining the Db2 code level, catalog level, and function level \(Db2 for z/OS What's New?\)](#).
2. If necessary, apply maintenance, such as PTFs and RSUs, to bring your Db2 subsystem or data sharing group members up to the required code level for your target function level.
3. Run the Db2 installation CLIST, as described in [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,”](#) on page 43. Then complete the following steps:
  - a. On panel DSNTIPA1, specify values in the ACTIVATE, INPUT MEMBER, and OUTPUT MEMBER fields.
    - In the INSTALL TYPE field, specify ACTIVATE.
    - In the INPUT MEMBER field, specify the name of the CLIST output member that you created when you installed or migrated to Db2 12, or most recently activated a Db2 12 function level.
    - In the OUTPUT MEMBER field, specify a new member name, to save your changes for future use.
  - b. On panel DSNTIPT, verify the SAMPLE LIBRARY field value, which is the name of the output data set that is to be created. An asterisk appears at the far left of this field if the data set already exists. If the data set already exists, the CLIST replaces the members that it customizes for activation of the new function level.
  - c. On panel DSNTIP00, specify V12R1M5nn in the TARGET FUNCTION LEVEL field, where 5nn is the function level that you want to activate. The format is VvvRrMmmm, where vv is the version, r is the release, and mmm is the modification level. The value is used in the ACTIVATE command in the DSNTIJAF job and in the CATMAINT utility control statement in the DSNTIJTC job.
  - d. If all Db2 applications can be bound and run at the target function level, modify the APPLCOMPAT and SQLLEVEL subsystem parameter settings. Otherwise, leave these fields unchanged.
  - e. Proceed through the remaining panels, and wait for the CLIST to tailor the jobs for the activation process. The output data set contains the tailored jobs for the activation process.
4. If the target function level is V12R1M502 or higher, run the following jobs:
  - a) Run the DSNTIJA1 job to issue an ACTIVATE command to activate function level 501.  
Activation of function level 500 or 501 is required before you can tailor the Db2 catalog for function level 502 or higher.
  - b) Run the DSNTIJIC job to take an image copy of the Db2 catalog and directory.
  - c) Run the DSNTIJTC job to run the CATMAINT utility to tailor the Db2 catalog for the target function level.  
**Important:** Do not attempt to start Db2 at a lower code level after any part of the CATMAINT job for a higher function level completes. Run the CATMAINT job only after you are satisfied that Db2 can continue to run at the necessary code level. The code to tolerate catalog changes is contained in the code level that delivers the CATMAINT job.
  - d) If the target function level is V12R1M510, complete the steps described in [Function level 510 \(V12R1M510\) \(PH33727 - April 2021\) \(Db2 for z/OS What's New?\)](#).

5. Optional: Test the activation of the target function level, as described in [Testing Db2 function level activation \(Db2 for z/OS What's New?\)](#).
6. Run the DSNTIJAF job to issue an ACTIVATE command for the target function level.

If the command completes successfully, Db2 issues message DSN9022I. However, if any active member of the data sharing group is running on a previous release, the command fails, and Db2 issues message DSN9039I. Message DSNU757I indicates the result of the activate command.

For example, the following message indicates successful activation of function level 500:

```
DSNU757I  -DB2A DSNUGCCA
*** BEGIN ACTIVATE FUNCTION LEVEL (V12R1M500)
          FUNCTION LEVEL (V12R1M500) SUCCESSFULLY ACTIVATED
          CATALOG LEVEL (V12R1M500)
          CURRENT FUNCTION LEVEL (V12R1M500)
          HIGHEST ACTIVATED FUNCTION LEVEL (V12R1M100)
          HIGHEST POSSIBLE FUNCTION LEVEL (V12R1M500)
DSN9022I  -DB2A DSNZACMD '-ACTIVATE FUNC' NORMAL COMPLETION
```

More actions are required after the ACTIVATE command completes successfully before most types of new capabilities and enhancements in the function level can be used. For example, new SQL capabilities require that applications use the appropriate application compatibility level, and optimization enhancements apply only after full prepare of the SQL statements.

7. After you are ready for applications to use the new capabilities in the function level, rebind them at the corresponding application compatibility level. For more information, see [Controlling the Db2 application compatibility level \(Db2 for z/OS What's New?\)](#).

**Tip:** Proceed with the following steps only if all Db2 applications can be bound and run at the target function level.

Optionally, when you are ready for all applications to use the new capabilities of the target function level, you can run the following jobs:

- a. Run DSNTIJUZ to modify the subsystem parameter module with the APPLCOMPAT value that was specified on panel DSNTIP00.
  - b. Run DSNTIJOZ job to issue SET SYSPARM command to bring the APPLCOMPAT subsystem parameter changes online.
  - c. Run DSNTIJUA job to modify the Db2 data-only application defaults module with the SQLLEVEL value that was specified on panel DSNTIP00.
8. Customize and run job DSNTIJXA to update EXPLAIN tables and related objects to the format for Db2 12 function level 501 or higher.

**Important:** Verify that the PTF is applied for [APAR PH48053](#) before completing this step.

## What to do next

Complete any of the following actions:

- If the new function level includes optimization enhancements, Db2 must process a full prepare before any SQL statements can benefit. Whether a full prepare occurs depends on the statement type:
  - For static SQL statements, after bind or rebind of the package
  - For non-stabilized dynamic SQL statements, immediately, unless the statement is in the dynamic statement cache
  - For stabilized dynamic SQL statements, after invalidation, free, or changed application compatibility level
- If you did not run the jobs to update the APPLCOMPAT and SQLLEVEL subsystem parameters, resolve any application incompatibilities and increase the application compatibility level of your applications after you are satisfied that Db2 is stable at the target function level, as described in [Controlling the Db2 application compatibility level \(Db2 for z/OS What's New?\)](#).

- If you encounter regressions or other problems when you activate a Db2 12 function level, minimize the impact to your applications while you resolve the problems by following the general approaches described in [Responding to problems after function level activation \(Db2 for z/OS What's New?\)](#).
- You might need to update COPY, RECOVER, and REBUILD INDEX utility jobs to add new or remove obsolete Db2 catalog objects. When a utility encounters the following situations for Db2 catalog objects, it issues message DSNU1530I:

- The object is no longer used or no longer exists.
- The object is created in a higher catalog level or function level.

For best results, make these updates the utility jobs after you activate the function level that the changes support. For more information about the catalog changes in Db2 12, see [Catalog changes in Db2 12 \(Db2 for z/OS What's New?\)](#).

#### **Related reference**

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

[Function level 500 \(installation or migration - October 2016\) \(Db2 for z/OS What's New?\)](#)

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

[CATMAINT \(Db2 Utilities\)](#)

#### **Related information**

[DSNU757I \(Db2 Messages\)](#)

[DSN9022I \(Db2 Messages\)](#)

[DSN9039I \(Db2 Messages\)](#)

[Video: Db2 for z/OS—Delivering New Capabilities Faster \(YouTube: 1:33:25\)](#)

## **Installing and configuring Db2-supplied routines that use new function: DSNTIJRT**

You must run the DSNTIJRT job to install and configure Db2-supplied routines that depend on new function in Db2 12.

### **Before you begin**

Activate Db2 12 new function, as described in [“Activating Db2 12 new function at migration”](#) on page 545.

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)”](#) on page 264.

### **Procedure**

1. Run job DSNTIJRT to install and configure supplied routines that depend on Db2 12 new function.  
Job DSNTIJRT executes DSNTRIN, which installs and customizes all Db2-supplied routines and supporting objects that were deferred until new function is activated. This job was customized when the CLIST was run in MIGRATE mode.
2. Run job DSNTIJRV to validate supplied routines that depend on new function.  
Job DSNTIJRV validates all Db2-supplied routines and augments existing installation verification procedures (IVPs) for specific Db2-supplied routines. It also provides a report that identifies successful validations, warnings, and failures. This job was customized when the CLIST was run in MIGRATE mode.

### **What to do next**

See [“Verifying successful migration to Db2 12”](#) on page 560.

## Related tasks

[Installing Db2-supplied routines during migration](#)

## Related reference

[Installation information for procedures and functions that are supplied with Db2](#)

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

## Job DSNTIJRT

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

DSNTIJRT provides a *configuration control statement* for each Db2-supplied routine and the mode for processing those statements. The configuration control statement specifies the WLM environment, list of authorization IDs that are allowed to execute the routine, and optional package owner for the routine. DSNTRIN reads and validates those statements and uses them to create and customize routines and supporting objects.

**Tip:** Job DSNTIJRT issues certain GRANT statements, which causes an abend situation if it is run with the AUTH subsystem parameter set to NO. The NO setting of the AUTH subsystem parameter is not recommended because it disables all authorization checking in Db2 and disables the GRANT statement. For more information, see [“USE PROTECTION field \(AUTH subsystem parameter\)”](#) on page 264.

## Format

DSNTRIN accepts the following parameters:

### DB2SSN

Identifies the Db2 subsystem on which to install and configure the Db2-supplied routines.

### MODE

During SQL processing, DSNTRIN configures each routine with the WLM environment specified in the configuration control statement for that routine. Processing behavior depends on the DSNTRIN run mode, the Db2 catalog mode, and which objects already exist.

### INSTALL

This is the normal operating mode. Use it when installing or migrating to Db2.

Create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the routine already exists, it is updated, if necessary, to use the WLM environment specified in the configuration control statement for that routine. If the package for a routine already exists, it is not bound again unless the DBRM has been updated or the package has been invalidated.

If the package for a routine already exists and the DBRM has not been updated and the package has not been invalidated, the package is rebound if its APPLCOMPAT level does not match the DB2OPT parameter RTN\_PKG\_APPLCOMPAT specified (*VvvRrMmmm* or *V11R1*).

Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### REINSTALL

This mode behaves like INSTALL mode, except that existing Db2-supplied routines and created global temporary tables are dropped ahead of other processing. Existing related databases, table spaces, tables, and indexes are not dropped, except as discussed in the special notices section of the DSNTIJRT job prolog.

Use REINSTALL mode only if you have a specific need to drop and re-create all Db2-supplied routines. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated



or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines and any related created global temporary tables are first dropped before they are re-created. Related databases are not dropped if they already exist, but they are created if they do not exist. If a supporting object is used by more than one routine, the object is created when one of those routines is first created. Drop processing of routines and related objects that do not exist is bypassed.

### **REINITIALIZE**

This mode behaves like REINSTALL mode, except that existing databases, table spaces, tables, and indexes used by the Db2-supplied routines are also dropped ahead of other processing.

REINITIALIZE mode drops and reinitializes databases such as the XSR database that may contain information needed by Db2 for other processing. Therefore, use REINITIALIZE mode only when advised to do so by IBM Support. Before running the job, verify that each GRANTTO statement in DSNTIJRT specifies all users who are authorized to use that routine.

In particular, use this mode to create, bind, and grant access to the Db2-supplied routine according to the WLMENV and GRANTTO parameters of the configuration control statement. If the package for a routine already exists, it is not rebound unless the DBRM has been updated or the package has been invalidated. Create, initialize, and grant access to any related objects required by the routine, such as a database or created global temporary table. Existing routines, existing related created global temporary tables, and existing related databases are first dropped before they are re-created. After each SQL statement, a COMMIT statement is issued. If a supporting object is used by more than one routine, the object is created when one of those routines is first created.

### **INSTALL-PREVIEW**

Simulate INSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINSTALL-PREVIEW**

Simulate REINSTALL mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **REINITIALIZE-PREVIEW**

Simulate REINITIALIZE mode without updating the system. Generated JCL with embedded DDL and bind statements is outputted to the JCLOUT DD statement.

### **AUTHID**

DSNTRIN uses this value as the CURRENT SQLID for creating and configuring most Db2-supplied routines. If DEFPKOWN is not specified, DSNTRIN also uses this value as the default OWNER for binding packages for the Db2-supplied routines that do not have the PKGOWNER specified in the configuration control statement.

When the AUTHID parameter is set to SYSINSTL, and you use the installation SYSADM authority or the installation SYSOPR authority to run this job for Db2 installation, Db2 identifies the Db2-supplied routines created or altered by DSNTRIN as system-defined in the SYSIBM.SYSROUTINES catalog table.

### **SECDEFID**

DSNTRIN uses this value as the CURRENT SQLID setting when creating and configuring Db2-supplied routines that are defined with the SECURITY DEFINER option.

The ID that you specify for SECDEFID must be an ID that can be used as a logon ID, because WLM uses the ID to execute Db2-supplied routines that are defined with SECURITY DEFINER.

### **DEFPKOWN**

Specifies the default OWNER for binding the package for a Db2-supplied routine when the PKOWNER parameter of the routine's configuration control statement is not specified. If DEFPKOWN is not specified, DSNTRIN uses the AUTHID value as the default package owner.

The DEFPKOWN parameter is required only when the AUTHID parameter is set to SYSINSTL. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set

DEFPKOWN during the editing of DSNTIJRT. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRT prolog to explain additional requirements.

Specify an installation system administrator ID if you use the installation SYSOPR authority to execute this job for Db2 installation. Specify an authorization ID that is granted the system DBADM and DATAACCESS authorities if you use the installation SYSOPR authority to execute this job for Db2 migration.

## Input

DSNTRIN allocates the following DD statements for input:

### **DBRMLIB**

Location of the DBRMs for Db2-supplied routines. This is typically the *prefix.SDSNDBRM* target library.

### **SYSUT1**

Internal work file for the Db2 installation bind interface (DSNTRBI).

### **CFIGIN**

Location of the configuration control statements for Db2-supplied routines.

### **DB2OPT**

This required DD can contain the following optional parameters:

#### **STOGROUP**

Specifies a storage group to use for creating databases and table spaces that are used by the routines that are supplied with Db2. If this parameter is not specified, the default SYSDEFLT storage group is used.

#### **INDEXSTOG**

Specifies a storage group to use for creating indexes instead of the default SYSDEFLT storage group.

#### **BP4K**

Specifies an alternate 4-KB buffer pool for base table spaces that are created by DSNTRIN. The default 4-KB buffer pool is BP0.

#### **BP8K**

Specifies an alternate 8-KB buffer pool for base table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

#### **BP16K**

Specifies an alternate 16-KB buffer pool for base table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

#### **BP32K**

Specifies an alternate 32-KB buffer pool for base table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K.

#### **LOBBP8K**

Specifies an alternate 8-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 8-KB buffer pool is BP8K0.

#### **LOBBP16K**

Specifies an alternate 16-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 16-KB buffer pool is BP16K0.

#### **LOBBP32K**

Specifies an alternate 32-KB buffer pool for LOB table spaces that are created by DSNTRIN. The default 32-KB buffer pool is BP32K0.

#### **IMS\_SECURITY**

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied IMS routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 IMS routines are altered if needed to conform with the SECURITY type that is specified here.

## MQ\_SECURITY

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied MQ routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 MQ routines are altered if needed to conform with the SECURITY type that is specified here.

## SOAP\_SECURITY

The SECURITY type (Db2, DEFINER, or USER) for the Db2-supplied web services/SOAP routines. SECURITY Db2 is assumed when this keyword is not specified. Existing Db2 SOAP routines are altered if needed to conform with the SECURITY type that is specified here.

## RTN\_PKG\_APPLCOMPAT

The APPLCOMPAT bind option (DEFAULT, *Db2-function-level*, V11R1) to be used for binding or rebinding packages for Db2-supplied routines.

### DEFAULT

Specifies the following actions:

- DSNTIJRT/DSNTRIN omit the APPLCOMPAT bind option from generated BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN bypass checking the APPLCOMPAT level of valid “current” packages for Db2-supplied routines to see if a REBIND is needed, where “current” means that the package CONTOKEN matches that of the current DBRM

The result of this option matches the behavior before [APAR PH50704](#).

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

### *Db2-function-level, V11R1*

*Db2-function-level* is a VvvRrMmmm format value equivalent to or lower than the current function level of the Db2 subsystem.

Specifies the following actions.

- DSNTIJRT/DSNTRIN add the APPLCOMPAT bind option, with the valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, to generate BIND statements for Db2-supplied routines with missing valid packages whose CONTOKEN matches that of the current DBRM.
- DSNTIJRT/DSNTRIN generate REBIND statements with the APPLCOMPAT option set to a valid DB2OPT RTN\_PKG\_APPLCOMPAT setting, for “current” packages for Db2-supplied routines because the APPLCOMPAT level of the valid "current" package does not agree with the DB2OPT RTN\_PKG\_APPLCOMPAT, where “current” means that the package CONTOKEN matches that of the current DBRM. For example, DSNTRIN generates the following REBIND statement with DB2OPT RTN\_PKG\_APPLCOMPAT=V12R1M509:

```
REBIND PACKAGE(DSNADM.DSNADMCD.(V13R1))
        APPLCOMPAT(V12R1M509)
```

RTN\_PKG\_APPLCOMPAT(DEFAULT) is assumed if RTN\_PKG\_APPLCOMPAT is not specified.

**Important:** If RTN\_PKG\_APPLCOMPAT(DEFAULT) is specified or applied by default, the APPLCOMPAT subsystem parameter is used to bind the packages. If the APPLCOMPAT subsystem parameter is V10R1 and DSNTIJRT/DSNTRIN has to bind a down-level DSNADMEM package, the bind fails.

## RTN\_PKG\_PLANMGMT

The PLANMGMT bind option (DEFAULT, EXTENDED, BASIC, OFF) for rebinding packages for Db2-supplied routines.

### DEFAULT

DSNTIJRT/DSNTRIN do not add the PLANMGMT rebind option to generated REBIND statements for packages for Db2-supplied routines.

## EXTENDED, BASIC, OFF

DSNTIJRT and DSNTRIN add the PLANMGMT rebind option, with the valid DB2OPT RTN\_PKG\_PLANMGMT setting, to generated REBIND statements for packages for Db2-supplied routines.

For more information see [PLANMGMT bind option \(Db2 Commands\)](#).

RTN\_PKG\_PLANMGMT(DEFAULT) is assumed if RTN\_PKG\_PLANMGMT is not specified.

**Note:** DSNTRIN does not create or activate this storage group or any of these buffer pools.

## Output

DSNTRIN allocates the following DD statements for output:

### SYSPRINT

Destination for echo of configuration control statements that are read and for messages that are generated during processing. Each processed routine generates at least one status message.

### SYSTSPRT

Internal message file for the Db2 installation bind interface (DSNTRBI).

### CFIGOUT

Destination for configuration control statements that are read by DSNTRIN. This output is useful for diagnostic purposes when DSNTRIN reports an error in a configuration control statement.

### SQLOUT

Destination for DDL statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### BINDOUT

Destination for bind statements that are generated and processed by DSNTRIN. These statements are useful for diagnostic purposes.

### JCLOUT

Destination for a generated sample job that is generated when one of the PREVIEW modes is specified. The job contains steps that process inline DDL and bind statements that are needed to install and configure missing, down-level, or incorrectly configured Db2-supplied routines. This DD is required if you specify a PREVIEW mode.

Example of executing DSNTRIN in INSTALL mode:

```
//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
//          PARM=('DB2SSN(DSN) MODE(INSTALL)',
//              ' AUTHID(ADMFO01) SECDEFID(ADMFO02)',
//              ' DEFPKOWN(SYSADM)')
//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//        DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPRT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
```

```

    . . .
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

    . . .
/*

```

Example of executing DSNTRIN in INSTALL-PREVIEW mode:

```

//DSNTRIN EXEC PGM=DSNTRIN,COND=(4,LT),
//          PARM=('DB2SSN(DSN) MODE(INSTALL-PREVIEW)',
//          ' AUTHID(ADMF001) SECDEFID(ADMF002)',
//          ' DEFPKOWN(SYSADM)')
//
//DBRMLIB DD DISP=SHR,DSN=DSN!!0.SDSNDBRM
//SYSUT1 DD UNIT=SYSDA,SPACE=(27930,(10,5)),
//        DCB=(RECFM=FB,LRECL=133)
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=FB,LRECL=133)
//SYSTSPT DD SYSOUT=*
//CFIGOUT DD SYSOUT=*
//SQLOUT DD SYSOUT=*
//BINDOUT DD SYSOUT=*
//JCLOUT DD DSN=USER.JCLLIB(DB2INST),DISP=SHR
//DB2OPT DD *
STOGROUP(DB2_ROUTINES_GROUP)
INDEXSTOG(DB2_INDEX_GROUP)
BP4K(BP0)
BP8K(BP8K0)
BP16K(BP16K0)
BP32K(BP32K)
LOBBP8K(BP8K0)
LOBBP16K(BP16K0)
LOBBP32K(BP32K0)
IMS_SECURITY(DB2)
MQ_SECURITY(DB2)
SOAP_SECURITY(DB2)
RTN_PKG_APPLCOMPAT(DEFAULT)
RTN_PKG_PLANMGMT(DEFAULT)
/*
//CFIGIN DD *
    . . .
SYSPROC.DSNWSPM
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

SYSPROC.DSNWZP
WLMENV(DSNWLM_NUMTCB1)
GRANTTO(PUBLIC)

    . . .
/*

```

## Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that Db2 supplies.

[Installation and migration jobs that the CLIST tailors](#)

The installation CLIST uses the values that you specify on the installation panels to tailor and load the installation or migration jobs. Each job is composed of one or more JCL procedures or job steps.

## Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Job DSNTIJRV

Job DSNTIJRV validates the Db2-supplied routines by executing program DSNTRVFY. You should validate these routines after Db2 installation and after each phase of migration.

DSNTRVFY validates a single routine, multiple routines, or all Db2-supplied routines. DSNTRVFY produces a report that identifies routines that passed the validation and possible problem areas for routines that failed.

### Authorizations

If the RACF facility class is active and a profile was defined for MVSADMIN.WLM.POLICY, the user that submits this job requires READ access.

If the RACF OPERCMD5 class is active and a profile was defined for MVS.MCSOPER.\*, the user ID that submits this job requires READ access. Alternatively, you can add a discrete profile for the DSNTRVFY console that is used in this job.

### Format

DSNTRVFY accepts the following required parameters:

#### **DB2SSN(ssid)**

Identifies which Db2 subsystem to connect to for validating the Db2-supplied routines.

#### **ROUTINE(name)**

Identifies which Db2-supplied routine needs to be validated. The following values are supported for *name*:

- A routine name in the form of *schema-name.routine-specific-name*.
- The keyword **DD:SYSIN** to specify a list of routines. List the routines in the form of *schema-name.routine-specific-name* under the SYSIN DD statement with one routine per line.
- The keyword **ALL** to specify all Db2-supplied routines.

DSNTRVFY also accepts the following optional parameters:

#### **AUTHID(authorization ID)**

DSNTRVFY uses this value as the CURRENT SQLID for issued SQL statements. Also, if PKOWNER(*pkowner*) is not specified, DSNTRVFY uses this value as the OWNER for BIND PACKAGE and BIND PLAN statements. If this value is not specified, the primary authorization ID is used for BIND PACKAGE, BIND PLAN, and issued SQL statements.

#### **PKOWNER(pkowner)**

Specifies the default owner for binding the DSNTRVFY plan and package. If the INSTALL PKG OWNER field on panel DSNTIPG is specified, the installation CLIST uses that value to set PKOWNER(*pkowner*) during the editing of DSNTIJRV. Otherwise, it uses the value specified in the ROUTINES CREATOR field on panel DSNTIPG. If SYSINSTL is specified on panel DSNTIPG, the installation CLIST adds a notice to the DSNTIJRV prolog to explain additional requirements.

If you use an authorization ID with the installation SYSOPR authority to execute job DSNTIJRV, the ID must be explicitly granted the MONITOR2 system privilege. If you set AUTHID to SYSINSTL for running the SYSPROC.WLM\_REFRESH stored procedure, you must also define SYSINSTL in RACF.

### Output

DSNTRVFY allocates the following required DD statements for output:

## **SYSPRINT**

Contains messages generated during verification processing. Each processed routine can generate one or more messages.

## **SYSTSPRT**

DSNTRVfy writes bind output to SYSTSPRT if an error occurs during bind processing.

The following JCL example is for validating a single routine:

```
//DSNTJVfy EXEC PGM=DSNTRVfy,  
//          PARM='DB2SSN(VA1A) ROUTINE(SYSPROC.DSNUTILS) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *
```

The following JCL example is for validating multiple routines:

```
//DSNTJVfy EXEC PGM=DSNTRVfy,  
//          PARM='DB2SSN(VA1A) ROUTINE(DD:SYSIN) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *  
          SYSPROC.DSNWZP  
          SYSPROC.DSNACCOR  
          SYSPROC.DSNUTILS  
          SYSPROC.DSNUTILU
```

The following JCL example is for validating all routines:

```
//DSNTRVfy EXEC PGM=DSNTRVfy,COND=(4,LT),  
//          PARM=('DB2SSN(DSN) AUTHID(SYSINSTL) ',  
//          'PKOWNER(ADMFO01) ROUTINE(ALL) '  
//DBRMLIB DD DSN=DB2A.SDSNDBRM,DISP=SHR  
//SYSUT1  DD UNIT=SYSDA,SPACE=(32000,(30,30)),DCB=(RECFM=VB,LRECL=133)  
//SYSTSPRT DD SYSOUT=*  
//SYSPRINT DD SYSOUT=*  
//SYSIN   DD *
```

## **Processing**

DSNTRVfy completes the following validation:

- Verifies that the routine is defined to the SYSIBM.SYSROUTINES catalog.
- Verifies that the collection ID defined in the SYSIBM.SYSROUTINES catalog table matches the collection ID used to bind the package.
- Verifies that the routine is currently defined with the Db2-reserved WLM application environment name DSNWLM\_NOT\_ENABLED, indicating that it is not enabled to run on the current Db2 subsystem. If it is, then a warning message is issued and the validation is bypassed.
- Verifies if the routine can be executed on the current Db2 catalog mode.
- Verifies the APF authorization requirements.
- Verifies if the WLM application environment is defined and available for use.
- Verifies if the NUMTCB setting is valid or within the recommended range.
- Verifies if the required DD statements for some of the routines are defined.
- Verifies if the WLM environment assigned to Java routines is enabled for Java.
- Verifies security coexistence requirements (for example, some routines should run on only their own WLM application environment).

- Verifies that the selected routine can be called successfully. Certain routines such as DSNACICS, DSNAIMS, IBM MQ functions, and most debugger routines are restricted to basic validation and are not called.

During the running of this job, the following message might be issued on the system console:

```
IEFC452I DB2UDSMD - JOB NOT RUN - JCL ERROR
```

In most cases, this message is normal and can be disregarded.

If the validation is successful, the following message is issued:

```
DSNT027I DSNTRVFY VALIDATION FOR schema.routine-specific-name SUCCESSFUL
```

If the validation fails, messages are issued to explain the reasons for failure. Examine these messages and make necessary adjustments before running the validation job again.

## Input

DSNTRVFY requires the following DD statements for input:

### DBRMLIB

Identifies the library where the DBRM for the DSNTRVFY program is located. This is typically the *prefix.SDSNDBRM* target library.

### SYSIN

Contains the list of Db2 routines. This is required when the validation type is for multiple routines (DD:SYSIN).

### SYSUT1

Work data set required for bind processing.

## Limitations

The following limitations apply to the DSNTRVFY program:

- The name of the routine in the form *schema-name.routine-specific-name* is limited to 72 characters, the maximum line length in JCL.
- Only Db2 12 Db2-supplied routines are supported for validation.
- Some routines, if enabled, receive basic validation to ensure that they are defined correctly and assigned to a valid WLM application environment. However, validation will not extend to calling these routines for one or more of the following reasons:
  - Optional system support such as CICS, IMS, or IBM MQ is required.
  - External setup on a remote server or workstation is required.
  - A call could introduce or modify data unexpectedly in a production environment.

The Db2-supplied routines that are restricted to basic validation are:

- DB2DEBUG.CREATE\_SESSION
- DB2DEBUG.DESTROY\_SESSION
- DB2DEBUG.GET\_REPORT
- DB2DEBUG.LIST\_SESSION
- DB2DEBUG.PUT\_COMMAND
- SYSFUN.SYSTS\_ENCRYPT
- SYSFUN.XSLTRANSFORM
- SYSPROC.ADMIN\_COMMAND\_UNIX
- SYSPROC.ADMIN\_JOB\_CANCEL
- SYSPROC.ADMIN\_JOB\_FETCH
- SYSPROC.ADMIN\_JOB\_QUERY



- SYSPROC.ADMIN\_JOB\_SUBMIT
- SYSPROC.DBG\_ENDSESSIONMANAGER
- SYSPROC.DBG\_INITIALIZECLIENT
- SYSPROC.DBG\_RECVCLIENTREPORTS
- SYSPROC.DBG\_SENDCLIENTREQUESTS
- SYSPROC.DBG\_SENDCLIENTCOMMANDS
- SYSPROC.DBG\_TERMINATECLIENT
- SYSPROC.DSNACICS
- SYSPROC.DSNAIMS
- SYSPROC.DSNAIMS2
- SYSPROC.DSNLEUSR
- SYSPROC.SET\_MAINT\_MODE\_RECORD\_NO\_TEMPORALHISTORY
- SYSPROC.SYSTS\_ALTER
- SYSPROC.SYSTS\_CREATE
- SYSPROC.SYSTS\_DROP
- SYSPROC.SYSTS\_RESTORE
- SYSPROC.SYSTS\_START
- SYSPROC.SYSTS\_STOP
- SYSPROC.SYSTS\_TAKEOVER
- SYSPROC.SYSTS\_UPDATE
- All IBM MQ, web services, and SOAP functions (those with schema DB2MQ, DB2MQ1C, DB2MQ2C, or DB2XML)

## Notes

### Temporary stored procedures used by DSNTIJRV

DSNTRVfy creates, calls, and drops two temporary stored procedures. These temporary stored procedures are SYSPROC.DSNWLM\_INSTALL\_INFOJ and SYSPROC.DSNWLM\_INSTALL\_INFO. Both of these stored procedures exist only when DSNTRVfy is executing. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFOJ to validate the WLM environment that is assigned to each Db2-supplied Java routine. DSNTRVfy calls SYSPROC.DSNWLM\_INSTALL\_INFO to validate the WLM environment that is assigned to each Db2-supplied non-Java routine that runs in a WLM environment.

### Using DSNTIJRV to verify 64-bit Java routines

Java on z/OS has two types of architectures: a 31-bit version and a 64-bit version. If your Java routines run in a 31-bit Java virtual machine (JVM), the startup procedure for the WLM environment in which the routines run must initialize a 31-bit environment. If you are running Java routines in a 64-bit JVM, the startup procedure for the WLM environment in which your Java routines run must initialize a 64-bit environment. The program that initializes a 31-bit WLM environment is DSNX9WLM. The program that initializes a 64-bit WLM environment is DSNX9WJM.

For example, you might use the Db2 core Java WLM environment, DSNWLM\_JAVA, for your Java routines. By default, the DSNWLMJ startup procedure for DSNWLM\_JAVA runs program DSNX9WLM. If your JAVA\_HOME environment variable specifies the path to a 31-bit JVM, such as /usr/lpp/java/IBM/J8.0, you need to run program DSNX9WLM to initialize the WLM environment. However, if your JAVA\_HOME variable specifies a path to a 64-bit JVM, such as /usr/lpp/java/8.0\_64, you need to run program DSNX9WJM to initialize the WLM environment. If you switch to a 64-bit JVM for your Java stored procedures, but do not update the initialization program to DSNX9WJM, DSNTIJRV fails.

### Related concepts

[WLM address space startup procedure for Java routines \(Db2 Application Programming for Java\)](#)

## Verifying successful migration to Db2 12

---

After you activate function level 500, you can run the sample applications to verify that your migration process was successful.

### Before you begin



#### Attention:

When migrating from Db2 11, do not run the Db2 12 IVP jobs before activating new function as described in [“Activating Db2 12 new function at migration” on page 545](#). That is, activate function level V12R1M500 or V12R1M501 before running the Db2 12 IVP jobs.

Before running the Db2 12 sample applications, activate function level 500 or higher, as described in [“Activating Db2 12 new function at migration” on page 545](#).

Until you complete this task, continue to use sample applications such as DSNTIAUL, DSNTEP2, and DSNTEP4 from Db2 11.

### Procedure

Tailor and run jobs for the sample applications, as described in Chapter 9, [“Verifying successful Db2 12 installation or migration with sample applications,” on page 727](#).

You can select the phases that you need to run based on the attachment facilities you installed, the languages you use, and whether the sample objects exist.

#### Related concepts

[Migrating to Db2 12](#)

*Migration* is the process of upgrading from Db2 11 to Db2 12.

[Dynamic SQL programs: DSNTIAD, DSNTEP2, DSNTIAUL](#)

DSNTIAD, DSNTEP2, and DSNTIAUL are sample dynamic SQL programs and must be compiled, link-edited, and bound as usual.

## Falling back to Db2 11

---

If you encounter serious errors after tailoring the catalog and directory for Db2 12, you can return to Db2 11. Fallback to Db2 11 is only supported if Db2 12 is at function level 100.

### Before you begin

Fallback to Db2 11 is not supported after activation of function level 500 in Db2 12.

Before you fall back to your previous Db2 version, consider the implications of doing so. For details, see [“Implications of falling back” on page 565](#).

### About this task

*Fallback* is the process of returning to Db2 11 after migrating the catalog and directory to Db2 12, as described in [“Migration step 19: Tailor Db2 12 catalog: DSNTIJTC” on page 515](#). It is best to fall back only if you encounter severe errors while operating in Db2 12. After fallback, the catalog remains a Db2 12 catalog.

You cannot fall back to Db2 11 after you activate function level 500.

*Remigrating* is the process of returning to Db2 12 after falling back.

### Procedure

To fall back to Db2 11, complete the following steps:

1. Stop Db2 12.

2. Run job DSNTIJFV to rename the cataloged procedures and reactivate Db2 11 code.
3. Reconnect TSO, IMS, and CICS to Db2 11.
4. Start Db2 11.
5. Run the Db2 11 installation verification jobs (DSNTEJxx).

## What to do next

You can save your Db2 12 TSO logon procedures and JCL for remigration to Db2 12.

### Related tasks

[Installation step 16: Tailor the Db2 catalog: DSNTIJTC](#)

Job DSNTIJTC invokes the CATMAINT utility to tailor your Db2 12 catalog, which you must do to fully install Db2. DSNTIJTC performs site-specific tailoring of the catalog.

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

[Remigrating to Db2 12](#)

Remigrating (returning to Db2 12 after falling back to Db2 11) is simpler than the initial migration process.

## Fallback step 1: Stop Db2 12 activity

Before you can fall back, you must stop Db2 12 activity and ensure that no recovery is required on system databases.

### Procedure

To stop Db2 12 work:

1. Issue the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

The QUIESCE keyword allows Db2 to complete processing of currently executing programs. This activity might require some processing time.

2. Issue the following command:

**GUIP**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP**

This command allows only the installation-defined system administrators and system operators to access Db2.

If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Check to see that you started Db2 with the correct subsystem parameter load module.

3. Ensure that all work is complete.
  - Ensure that no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

#### GUIP

Then use RECOVER INDOUBT for any indoubt threads.

- Ensure that no utility work remains. Issue the following command:

#### GUIP

```
-DSN1 DISPLAY UTILITY(*)
```

#### GUIP

Then, either allow utilities to complete before proceeding, or stop all utility processing with the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the Db2 directory (DSNDB01) or the Db2 catalog (DSNDB06) have write error ranges or deferred restart states. Issue the following command:

#### GUIP

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

#### GUIP

A user with installation-defined system administrator or system operator authority also must enter this command.

Recover any table spaces and index spaces with write error range or deferred restart states.

4. To stop Db2, issue the following command:

#### GUIP

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

#### GUIP

A user with SYSADM or SYSOPR authority also must enter this command.

If IRLM does not stop automatically when Db2 stops, stop IRLM manually. To stop IRLM, issue the following command, where *irlmproc* is the name you assigned to the IRLM startup procedure:

```
STOP irlmproc
```

## Fallback step 2: Reactivate Db2 11 code: DSNTIJFV

After you stop your Db2 12 activity, continue the fallback process by using job DSNTIJFV to reactivate the code of your previous Db2 version.

### About this task

Job DSNTIJFV renames procedures to activate Db2 11 and deactivate Db2 12.

### Procedure

To reactivate the code of your previous Db2 version:

1. (Optional) Tailor job DSNTIJFV.

SYS1.PROCLIB is the default target for JCL procedures. Add statements to rename other procedures, such as your IMS, CICS, TSO logon procedures, and batch procedures.

You might want two sets of procedures, such as DSN1xxxx and DSN2xxxx, at all times, with an alias for the current release level.

2. Run job DSNTIJFV.
3. Ensure that job DSNTIJFV completed successfully.
  - If DSNTIJFV runs successfully, it produces a return code of 0. Check that all renames executed successfully.
  - If DSNTIJFV fails or abends, rerun only the renames that failed. If some of the procedures already exist, check carefully to ensure that procedures for the two releases are not mixed.

## Fallback step 3: Reconnect TSO, IMS, and CICS to Db2 11

After you reactivate your Db2 11 code during fallback, reconnect TSO, IMS, and CICS to Db2 11.

### Procedure

To reconnect TSO, IMS, and CICS to Db2:

1. Re-establish your Db2 11 TSO logon procedures and JCL.
2. For CICS connections, complete one of the following actions:
  - If you overwrote the load module during migration to Db2 12, reassemble the resource control table (RCT) with the Db2 11 libraries.
  - If you did not overwrite the load module, change the STEPLIB statements in Db2 CICS jobs so that they refer to the Db2 11 libraries.
3. For IMS connections, change the STEPLIB statements in Db2 IMS jobs and address spaces so that they refer to the Db2 11 libraries

## Fallback step 4: Start Db2 11

During fallback, you can start Db2 11 after you re-establish your Db2 11 TSO logon procedures, CICS connections, and IMS connections.

### Procedure

To start Db2 11:

1. Start the IRLM.

If you have not requested that Db2 automatically start the IRLM, start it before you start Db2. Use the following command, where *irlmproc* is the name that you assigned to the IRLM startup procedure:

```
START irlmproc
```

This is the value that you specified for the PROC NAME option on installation panel DSNTIPI.

If you specified YES for the AUTO START option on installation panel DSNTIPI, Db2 starts the IRLM automatically.

2.  Start Db2 from the z/OS console by using the following command:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

In this command, *-DSN1* is the subsystem command prefix that you defined for Db2, and *DSNZPxxx* is the name of the Db2 11 subsystem parameter module. If you used the default name, DSNZPARM, you can omit the PARM parameter.

If Db2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, and possibly *ssnmDIST* and *irlmproc*, where *ssnm* is the Db2 subsystem name and *irlmproc* is the IRLM procedure name.

If Db2 starts successfully, the series of restart messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

**GUPI**

3. Complete one of the following actions:

Option	Description
<p><b>If you have done distributed processing with your Db2 12 subsystem</b></p>	<p><b>GUPI</b> Check message DSNR005I for the number of indoubt threads after you start Db2. If you find no indoubt threads, continue falling back as if you had not done any distributed processing. If you find indoubt threads, issue the following command:</p> <pre data-bbox="560 577 1047 619">-DSN1 DISPLAY THREAD(*) TYPE(INDOUBT)</pre> <p>If the number of indoubt threads that are reported in the DSNV408I messages is equal to the number of threads that are reported in the DSNR005I message, continue falling back as if you had not done any distributed processing. If fewer indoubt threads are reported by DSNV408I messages than in message DSNR005I, proceed as follows:</p> <ol style="list-style-type: none"> <li>Stop Db2 11.</li> <li>Determine which units of work are incomplete by scanning the Db2 recovery log with the Db2 12 DSN1LOGP utility. Use the SUMMARY option of this utility.</li> <li>Examine the DSN1LOGP output to find all the DSN1162I messages that have a COORDINATOR name in a remote location. Each of these messages identify an indoubt DBAT. Record the LUWID that is displayed in each message.</li> <li>Decide whether to commit or abort each indoubt DBAT. One way to do this is by contacting the COORDINATOR location. If it is another Db2 subsystem, use the DISPLAY THREAD command to help you decide.</li> <li>If you have not already done so during migration, apply the fallback PTF that is supplied with Db2 12.</li> <li>Start Db2 11 again.</li> <li>Issue the RECOVER INDOUBT ACTION(<i>correct decision</i>) LUWID(<i>luwid</i>) command to resolve each indoubt DBAT.</li> </ol> <p><b>GUPI</b></p>
<p><b>If you have not done distributed processing with your Db2 12 subsystem</b></p>	<p>Check outstanding restrictions after you start Db2. Identify databases whose uses are restricted by issuing the following command:</p> <p><b>GUPI</b></p> <pre data-bbox="560 1585 1161 1617">-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT</pre> <p><b>GUPI</b></p> <p>You can start some of these databases at this time.</p>

4. If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the startup procedure is pointing to the correct BSDS and subsystem parameter. Also, check that the subsystem parameter member that you specified (or is used by default) when you started Db2 is the one that job DSNTIJUZ built. Check the JCL for the Db2 startup procedure.

5. Optional: Start TSO. If you want to use the TSO SUBMIT command to do housekeeping and fallback verification, you must start TSO (if it is not already started).

### Related tasks

[Starting a table space or index space that has restrictions \(Db2 Administration Guide\)](#)

## Fallback step 5: Verify fallback

After you start Db2 11, you must complete some of your own testing to determine if the fallback was successful.

### About this task

You cannot run the Db2 12 samples on Db2 11.

### Procedure

To verify fallback:

1. Test the IVP phase 2 applications:
  - a. DSNTSJ2A: Perform all except the first two steps of job DSNTSJ2A. Expect a return code of 4 because table spaces DSN8D11U.NEWDEPT and DSN8D11U.NEWPHONE are placed in COPY-pending states.
  - b. DSNTSJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH11) statement in step PH02CS04.
  - c. DSNTSJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD11) statement in step PH02DS03.
  - d. DSNTSJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE11) statement in step PH02ES04.
  - e. DSNTSJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF11) statement in step PH02FS03.
  - f. DSNTSJ2P: Run only step PH02PS05.
2. Test the IVP phase 3 applications.  
Do not run job DSNTSJ3C or DSNTSJ3P.
3. Run the Db2 11 sample applications.
4. Test your own applications.
5. Retry the problem for which you decided to fall back.

### Related tasks

[Migration step 28: Verify migration of Db2 11 IVP objects to Db2 12 \(optional\)](#)

Verify the migration of IVP objects to Db2 12 by running some of the sample jobs from your previous release.

## Implications of falling back

---

Before you fall back to your previous Db2 version, consider the implications of doing so.

### Data sharing

If any member of a data sharing group needs to fall back, consider the implications for data sharing. For more information about falling back in a data sharing environment, see [“Falling back in a data sharing environment”](#) on page 715.

## Frozen objects

Falling back does not undo changes that the migration process made to the catalog. Db2 uses the migrated catalog after fallback. Some objects in this catalog that have been affected by Db2 12 function might become *frozen* objects after fallback. Frozen objects are unavailable, and they are marked with the release dependency marker Q. If an object is marked with a release dependency, it remains marked forever. The release dependency marker is listed in the IBMREQD column of catalog tables. The following table lists the objects that are frozen when you fall back to a previous release.

Table 41. Objects that are frozen after fallback

RELEASE DEPENDENT MARK = Q
<ul style="list-style-type: none"><li>Plans, packages, or views that use any new syntax, objects, or bind options</li><li>DBRMs that are produced by a precompile in Db2 12 with a value of V12 for the NEWFUN option and when any new Db2 12 functions are being used</li></ul>

Plans and packages become frozen objects when they use new SQL syntax, use new BIND options and attributes, or reference frozen objects. When plans and packages become frozen objects, the automatic rebind process is adversely affected.

**GUIP** After falling back, you can determine if any of your objects are frozen by issuing the following statement:

```
SELECT * FROM catalog table
WHERE IBMREQD = 'Q'
```

**GUIP**

## Automatic rebind

After fallback, if you specified YES or COEXIST for the ABIND subsystem parameter, plans or packages that are bound in Db2 12 are automatically rebound on their first execution in Db2 11. If you specified NO for the ABIND subsystem parameter, this automatic rebind fails.

The automatic rebind also fails if you try to use plans or packages that are frozen. To make available the plans and packages that were not automatically rebound on Db2 11, change the SQL statements or remove the reference to a frozen object, precompile the application programs, and explicitly bind the plans and packages on Db2 11.

## Administrative task scheduler tasks

After fallback, all tasks that are managed by the administrative task scheduler in Db2 Db2 12 are not manageable by the administrative task scheduler in Db2 Db2 11 because of the higher task version. Use ADMIN\_TASK\_ADD in Db2 11 to delete and reinsert all tasks. You can use the ADMIN\_TASK\_LIST table user-defined function to read and store the characteristics of the tasks in a user table before you fall back.

## Related concepts

[Falling back and remigrating in a data sharing environment](#)

In a data sharing environment, you can fall back from Db2 12 or remigrate one member at a time or all members at the same time.

[Automatic rebinds \(Db2 Application programming and SQL\)](#)



## Remigrating to Db2 12

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Remigrating (returning to Db2 12 after falling back to Db2 11) is simpler than the initial migration process.

### Before you begin

Before you remigrate, refer to [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#) because many of those considerations apply to remigration, too. Whether each consideration applies to your subsystem depends on the type of activity that took place on your Db2 11 subsystem after falling back.

Regardless of the ABIND subsystem parameter value, plans and packages continue to run on Db2 12 as bound on Db2 11, until you explicitly rebind them on Db2 12. It is best to do so only after you are certain that Db2 12 is stable and release coexistence and fallback are no longer a concern.

**Recommendation:** Avoid automatic rebinds during migration and remigration. After your remigrated system is stable, you can rebind your packages with PLANMGMT(EXTENDED). If a new package does not perform adequately, you can rebind with SWITCH(PREVIOUS) to return to the old package.

### Procedure

To remigrate your subsystem to Db2 12:

1. Check the integrity of your Db2 11 catalog and directory:
  - Run the DSN1COPY utility with the CHECK option on your catalog table spaces.
  - Run the CHECK DATA utility.
  - Run the queries in member DSNTESQ of *prefix.SDSNSAMP*.
2. **Optional:** Ensure that your Db2 11 DSNTIJIC job has been modified to copy new Db2 12 catalog table spaces, and then use DSNTIJIC to take an image copy of your Db2 11 catalog.  
This step is not required, but it is recommended.
3. Stop Db2 11.
4. Reconnect TSO, IMS, and CICS to Db2.  
Re-establish your Db2 12 logon procedures and JCL, as well as your Db2 12 CICS and IMS connections.
5. Rebuild Db2 12 cataloged procedures.  
Rename the Db2 12 procedures that were renamed by job DSNTIJFV during fallback. If job DSNTIJFV was not run, you need to rerun job DSNTIJMV. Comment out step 1 (DSNTIMP), which defines Db2 12 to z/OS, and run the job. (You do not need to define Db2 12 to z/OS a second time.)
6. Start Db2 12. Ensure that you are using your Db2 12 subsystem parameter load module.
7. Take an image copy of the Db2 12 catalog by using the DSNTIJIC job.
8. Verify your Db2 12 system.

### Related tasks

[Migration step 2: Verify the integrity of Db2 table spaces \(optional\)](#)

Use the DSN1COPY and CHECK INDEX utilities to verify the integrity of the Db2 directory and catalog table spaces on the subsystem that you are migrating.

[Migration step 5: Take image copies of the directory and catalog: DSNTIJIC](#)

For backup purposes, create a copy of the catalog and directory of the system that you are migrating.

[Migration step 28: Verify migration of Db2 11 IVP objects to Db2 12 \(optional\)](#)

Verify the migration of IVP objects to Db2 12 by running some of the sample jobs from your previous release.



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## Chapter 7. Automating Db2 installation or migration with z/OS Management Facility

You can use z/OSMF to automate the process of installing or migrating to Db2 12 for z/OS.

### Before you begin

You must use SMP/E to load the required Db2 12 libraries, as described in [Chapter 3, “Making the Db2 product code available,” on page 33](#). At minimum, generating Db2 installation, migration, or function level activation jobs requires the following Db2 load libraries:

- *prefix*.SDSNCLST
- *prefix*.SDSNSPFM
- *prefix*.SDSNSPFP
- *prefix*.SDSNSAMP
- *prefix*.SDSNIVPD (only if generating z/OSMF artifacts)

For migrations to Db2 12, this process uses new and modified panels for the installation CLIST. The panels reside in the Db2 12 SDSNSPFP library. You must make the panels available to TSO, ISPF, and the Db2 12 installation CLIST. For more information, see [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43](#).

### About this task

By using z/OSMF, you can automate the process of migrating or installing Db2 by creating workflow definition and variable files that you can define one time for reuse across many different Db2 subsystems.

#### Related concepts

[About workflows \(z/OS Management Facility\)](#)

[Installing or migrating to Db2 12](#)

The essential steps are similar for both installing Db2 12 and migrating to Db2 12. When you migrate to Db2 12, you must also activate function levels 500 and 501 before many new capabilities can be used.

#### Related tasks

[Activating Db2 function levels by using z/OSMF \(Db2 for z/OS What's New?\)](#)

#### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

[IBM z/OS Management Facility Online Help](#)

#### Related information

[Automating Db2 for z/OS Migration With z/OS Management Facility \(white paper\)](#)

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## Automating Db2 installation by using z/OS Management Facility

You can use z/OSMF to automate the process of installing Db2 12 for z/OS subsystems.

### Before you begin

You must have appropriate authority to complete this task. For details, see [“Required authorization for installation or migration” on page 4](#).

You must use SMP/E to load the required Db2 12 libraries, as described in [Chapter 3, “Making the Db2 product code available,” on page 33](#). At minimum, generating Db2 installation, migration, or function level activation jobs requires the following Db2 load libraries:

- *prefix*.SDSNCLST

- *prefix*.SDSNSPFM
- *prefix*.SDSNSPFP
- *prefix*.SDSNSAMP
- *prefix*.SDSNIVPD (only if generating z/OSMF artifacts)

## About this task

By using z/OSMF, you can automate the process of installing Db2 by creating workflow definition and variable files that you can define one time for reuse across many different Db2 subsystems.

## Procedure

To install Db2 subsystems by using z/OSMF, use the following general approach:

1. Identify an existing Db2 subsystem that is the model for your new installations, or install one as described in [Chapter 5, “Installing Db2 12,” on page 427](#).
2. Create the workflow definition files:
  - a) On the existing Db2 subsystem that is the model for the new installations, run the DSNTXAZP tool to update the CLIST defaults input member, as described in [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44](#).

**Important:** The DSNTXAZP tool does not update the DSNTIDxx CLIST input member with current settings for the following parameters or panel fields. Update the values as you complete the CLIST, or modify the values directly in the DSNTIDxx member:

*Table 42. Settings not updated by the DSNTXAZP tool in Db2 12*

CLIST Panel	Field Name (DSNTIDxx entry)
<u>DSNTIPA2</u>	The following fields: CATALOG ALIAS (VCATALOG) DEFINE CATALOG (VCATSTAT)
<u>DSNTIPA3</u>	All fields: PERMANENT UNIT NAME (VOLSDEVT) TEMPORARY UNIT NAME (TVOLSDEVT) CLIST ALLOCATION: VOL/SER (VOLSDAT1) CLIST ALLOCATION: DATA CLASS (DATACLS1) CLIST ALLOCATION: MGMT CLASS (MGMTCLS1) CLIST ALLOCATION: STOR CLASS (STORCLS1) NON-VSAM DATA: VOL/SER (VOLSDAT2) NON-VSAM DATA: DATA CLASS (DATACLS2) NON-VSAM DATA: MGMT CLASS (MGMTCLS2) NON-VSAM DATA: STOR CLASS (STORCLS2) VSAM CATALOG, ...: VOL/SER (VOLSDAT3) VSAM CATALOG, ...: DATA CLASS (DATACLS3) VSAM CATALOG, ...: MGMT CLASS (MGMTCLS3) VSAM CATALOG, ...: STOR CLASS (STORCLS3)

Table 42. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPA4</u>	BSDS AND ACTIVE LOG ICF CATALOG ALIAS (VBSDSLOG) LOG COPY 1, BSDS 2: VOL/SER (VOLSDAT6) LOG COPY 1, BSDS 2: DATACLASS (DATACLS6) LOG COPY 1, BSDS 2: MGMTCLASS (MGMTCLS6) LOG COPY 1, BSDS 2: STOR CLASS (STORCLS6) LOG COPY 2, BSDS 1: VOL/SER (VOLSDAT7) LOG COPY 2, BSDS 1: DATA CLASS (DATACLS7) LOG COPY 2, BSDS 1: MGMT CLASS (MGMTCLS7) LOG COPY 2, BSDS 1: STOR CLASS (STORCLS7)
<u>DSNTIPK</u>	The following fields: WORK FILE DB (WKDBNAME) SUBGRP ATTACH (SGRPATNM)
<u>DSNTIPG1</u>	All fields: INSTALL IC PREFIX (INSICPRE) INSTALL DS PREFIX (INSDSPRE) IC DATA SET UNIT NAME (ICDSDEV) IC TEMPLATE EXPRESSION (ICDSTPLT) IC TEMPLATE DATA CLASS (ICSDSC) IC TEMPLATE MGMT CLASS (ICDSMC) IC TEMPLATE STOR CLASS (ICDSSC)
<u>DSNTIPH</u>	The following fields: COPY 1 NAME (BSDSNAM1) COPY 2 NAME (BSDSNAM2) Archive logs: COPY 1 PREFIX (ARCHPRE1) Archive logs: COPY 2 PREFIX (ARCHPRE2)

Table 42. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPT</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>TEMP CLIST LIBRARY (NEWCL)</li> <li>SAMPLE LIBRARY (NEWSAMP)</li> <li>CLIST LIBRARY (OUTCL)</li> <li>APPLICATION DBRM (DBRMLIB)</li> <li>APPLICATION LOAD (RUNLIB)</li> <li>DECLARATION LIBRARY (SRCLIB)</li> <li>LINK LIST LIBRARY (DSNLINK)</li> <li>LOAD LIBRARY (DSNLOAD)</li> <li>JDBC AND SQLJ DLLS (DSNLOD2)</li> <li>MACRO LIBRARY (DSNMACS)</li> <li>LOAD DISTRIBUTION (DSNALOAD)</li> <li>EXIT LIBRARY (DSNEXIT)</li> <li>DBRM LIBRARY (DSNDBRM)</li> <li>IRLM LOAD LIBRARY (DSNIRLM)</li> <li>IVP DATA LIBRARY (DSNIVPD)</li> <li>INCLUDE LIBRARY (DSNCHDRS)</li> </ul>
<u>DSNTIPU</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>IBM LE RUNTIME LIBRARY (LERUN)</li> <li>IBM LE RUNTIME LIBRARY 2 (LERUN2)</li> <li>IBM LE LINK EDIT LIB (LELKED)</li> <li>IBM LE PRELINK MSG LIB (LEPLMSG)</li> <li>HIGH LEVEL ASSEMBLER LIB (IASMLIB)</li> <li>C/CPP COMPILER MODULE (CPROG)</li> <li>C/CPP COMPILER LIBRARY (CCOMP)</li> <li>C/CPP HEADER LIBRARY (CHDRS)</li> <li>C/370 COMPILER MESSAGES (CMSGS)</li> <li>C LE PRELINKER PHASE (CPRLK)</li> <li>CPP LE PRELINKER PHASE (CPPPRLK)</li> <li>CPP CLASS LIB HEADERS (CPPHDRS)</li> <li>CPP AUTO CALL LIBRARY (CPPAUTCL)</li> <li>CPP CLASS LIBRARY (CPPCLASS)</li> <li>CPP PROCEDURE LIBRARY (CPPPROC)</li> </ul>
<u>DSNTIPU1</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>COBOL COMPILER LIBRARY (ICOBCOMP)</li> <li>COBOL LE PRELINKER PHASE (ICOBPRLK)</li> <li>FORTRAN COMPILER LIBRARY (FORTCOMP)</li> <li>FORTRAN LINK EDIT LIB (FORTLINK)</li> <li>PL/I COMPILER LIBRARY (PLICOMP)</li> <li>PL/I LE PRELINKER PHASE (PLIPRLK)</li> </ul>

Table 42. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPW</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>SYSTEM MACLIB (MACLIB)</li> <li>SYSTEM PROCEDURES (PROCLIB)</li> <li>SORT LIBRARY (SORTLIB)</li> <li>IMS RESLIB (RESLIB)</li> <li>ISPF ISPLINK MODULE (ISPLOAD)</li> <li>GDDM MACLIB (GDDMMACS)</li> <li>GDDM LOAD MODULES (GDDMLOAD)</li> <li>CICS LOAD LIBRARY (CICSMOD)</li> <li>CICS MACRO LIBRARY (CICSMAC)</li> <li>CICS COBOL LIBRARY (CICSCOB)</li> <li>CICS PL/I LIBRARY (CICSPLI)</li> <li>CICS EXCI LIBRARY (CICSEXCI)</li> </ul>
<u>DSNTIPD</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>DATABASES (NUMDATAB)</li> <li>TABLES (NUMTABLE)</li> <li>COLUMNS (NUMCOLUM)</li> <li>VIEWS (NUMVIEWS)</li> <li>TABLE SPACES (NUMTABSP)</li> <li>PLANS (NUMPLANS)</li> <li>PLAN STATEMENTS (NUMSTMTS)</li> <li>PACKAGES (NUMPKGS)</li> <li>PACKAGE STATEMENTS (NUMPKSTS)</li> <li>PACKAGE LISTS (NUMPLPL)</li> <li>EXECUTED STMTS (NUMSTMTE)</li> </ul>
<u>DSNTIP9</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>4K SORT PRIMARY SPACE (S4KSPAC)</li> <li>4K SORT WORK TS'S (S4KNOTS)</li> <li>4K SORT WORK SEG SIZE (S4KSGSZ)</li> <li>32K SORT PRIMARY SPACE (S32KSPAC)</li> <li>32K SORT WORK TS'S (S32KNOTS)</li> <li>32K SORT WORK SEG SIZE (S32KSGSZ)</li> <li>4K TEMP PRIMARY SPACE (T4KSPAC )</li> <li>4K TEMP WORK TS'S (T4KNOTS)</li> <li>4K TEMP WORK SEG SIZE (T4KSGSZ)</li> <li>32K TEMP PRIMARY SPACE (T32KSPAC)</li> <li>32K TEMP WORK TS'S (T32KNOTS)</li> <li>32K TEMP WORK SEG SIZE (T32KSGSZ)</li> </ul>
<u>DSNTIPM</u>	<p>The following fields:</p> <ul style="list-style-type: none"> <li>SUBSYSTEM NAME (MVSNAME)</li> <li>DB2 VTAM PASSWORD (DDPASS)</li> </ul>
<u>DSNTIPX</u>	<p>The following fields:</p> <ul style="list-style-type: none"> <li>WLMENV (WLMENV)</li> </ul>

- b) Run the installation CLIST, and specify the following field values of panel DSNTIPA1: USE Z/OSMF WORKFLOW ===> YES and INSTALL TYPE ===> INSTALL.

The CLIST runs with modified panels and extra panels to support generation of a z/OSMF workflow.

**Tip:** You can specify an HFS or zFS directory for storing the z/OSMF artifacts. Specify the directory in the PATH FOR Z/OSMF ARTIFACTS field on panel DSNTIPM1.

For more information about the specific panels, see [“Installation panels for installing or migrating with z/OSMF”](#) on page 583.

- c) Complete the CLIST as described in [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,”](#) on page 43. As you complete the CLIST, select each installation parameter that you want to include in the input variable file for the z/OSMF workflow.

You can more easily change values in the input variable file when you reuse the workflow for different subsystems. For each field that you do not select, the value that you specify in the panel is hardcoded into the workflow definition file.

**Tip:** To reduce the size and difficulty of managing your input variable files, choose only input fields that are likely to be different across different Db2 subsystems in your environment.

- d) If you are installing multiple Db2 subsystems, run the CLIST again and specify the following field values on panel DSNTILA1: USE Z/OSMF WORKFLOW ===> YES and INSTALL TYPE ===> UPDATE.

The CLIST runs with an abbreviated set of panels to create input variable files for subsystems after the first subsystem.

Repeat this step for each subsystem after the first.

### 3. Create the workflow instances in z/OSMF.

- a) Specify the path of the workflow definition file and the input variable file.

The path of the input variable file is optional, but it is best to always specify it. Otherwise, z/OSMF prompts you to provide the variable values during execution, preventing full automation of the process.

- b) Specify a name for the workflow instance.

**Tip:** Specify a name that describes the purpose of the workflow and includes the name of the target system. For example, you might use the following name: V10 to V11 CM non-data-sharing - DB2A, where "DB2A" is the name of the target subsystem.

- c) Assign all workflow steps to the same person to fully automate the migration process.
- d) Validate the JCL job and the substituted input variables.

You can find the input variable files and the JCL jobs with the substituted input variables on the **Perform** tab for the workflow in z/OSMF.

- i) Review the input variables. You can edit the values of input variables during your review, but any changes that you make apply only to this workload instance only.
- ii) In the Create JOB statement step, z/OSMF prompts you to review and update the JOB statement JCL. You can specify appropriate CLASS or MSGCLASS values.

If installation or migration step requires authorization, you can also specify the USERNAME and PASSWORD. For detailed information about required authorizations see [“Required authorization for installation or migration”](#) on page 4.

- iii) Review the JCL including the JOB statement. You can click **Edit JCL** to make changes. However, any changes that you make apply only to this workflow instance. It is best to make any changes that apply to all instances in the JCL template before you create the instances.

### 4. Start running the workflow steps.

You can run the workflow steps in z/OSMF, or by embedding z/OSMF REST services in your own automation programs.

- a) After any prerequisite manual steps are complete, select **Automatically perform the selected step, and all subsequent steps...** on the **Perform Automated Step** page.



z/OSMF runs all subsequent steps in order until all steps complete successfully, or until an error is encountered.

b) If errors are encountered, check the job output on the z/OSMF **Status** tab.

The maximum return code that a step tolerates is defined the workload definition file, and it might be a return code other than 0. The maximum return code for most steps is 0 or 4.

### Related concepts

[About workflows \(z/OS Management Facility\)](#)

[Migrating to Db2 12](#)

*Migration* is the process of upgrading from Db2 11 to Db2 12.

### Related tasks

[Installing Db2 12](#)

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

### Related reference

DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

[IBM z/OS Management Facility Online Help](#)

## Automating Db2 migration by using z/OS Management Facility

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

### Before you begin

For migrations to Db2 12, this process uses new and modified panels for the installation CLIST. The panels reside in the Db2 12 SDSNSPFP library. You must make the panels available to TSO, ISPF, and the Db2 12 installation CLIST. For more information, see [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,”](#) on page 43.

You must have appropriate authority to complete this task. For details, see [“Required authorization for installation or migration”](#) on page 4.

You must use SMP/E to load the required Db2 12 libraries, as described in [Chapter 3, “Making the Db2 product code available,”](#) on page 33. At minimum, generating Db2 installation, migration, or function level activation jobs requires the following Db2 load libraries:

- *prefix*.SDSNCLST
- *prefix*.SDSNSPFP
- *prefix*.SDSNSPFP
- *prefix*.SDSNSAMP
- *prefix*.SDSNIVPD (only if generating z/OSMF artifacts)

Read the white paper about this process [Automating Db2 for z/OS Migration With z/OS Management Facility \(white paper\)](#).

### About this task

By using z/OSMF, you can automate the process of migrating Db2 by creating workflow definition and variable files that you can define one time for reuse across many different Db2 subsystems.

In summary, you run the installation CLIST with certain options to generate the artifacts that define the z/OSMF workflow, including workflow definition files and input variable files. For more information about specific sample workflow artifacts, see [“Sample workflow artifacts for installation and migration with z/OS Management Facility”](#) on page 596.

The number of workflow definition and input variable files that you create depends on the environment that you are migrating. You run the CLIST again to generate each workflow definition file. For example, to migrate a single Db2 subsystem, only DSNTIWMS is required. For data sharing groups, you must also create the DSNITWMD workflow definition file to migrate members other than the first member to Db2 12.

Each workflow can use one or more input variable files. Each time that you run the CLIST to generate the workflow artifacts, subsystem parameters that you select are included in the generated input variable file. You can more easily change values in the input variable file when you reuse the workflow for different subsystems. Values for fields that you do not select are hardcoded into the workflow definition file. You might also create extra input variable files to support the efficient migration of several subsystems in your environment.

## Procedure

To migrate to Db2 12 by using z/OSMF, use the following general approach:

1. Prepare for creating workflow definition files by running the DSNTXAZP tool to update the CLIST defaults input member, as described in [“Updating the CLIST defaults input member: job DSNTIJXZ ” on page 44.](#)

**Important:** The DSNTXAZP tool does not update the DSNTIDxx CLIST input member with current settings for the following parameters or panel fields. Update the values as you complete the CLIST, or modify the values directly in the DSNTIDxx member:

*Table 43. Settings not updated by the DSNTXAZP tool in Db2 12*

CLIST Panel	Field Name (DSNTIDxx entry)
<a href="#">DSNTIPA2</a>	The following fields: CATALOG ALIAS (VCATALOG) DEFINE CATALOG (VCATSTAT)
<a href="#">DSNTIPA3</a>	All fields: PERMANENT UNIT NAME (VOLSDEVT) TEMPORARY UNIT NAME (TVOLSDEVT) CLIST ALLOCATION: VOL/SER (VOLSDAT1) CLIST ALLOCATION: DATA CLASS (DATACLS1) CLIST ALLOCATION: MGMT CLASS (MGMTCLS1) CLIST ALLOCATION: STOR CLASS (STORCLS1) NON-VSAM DATA: VOL/SER (VOLSDAT2) NON-VSAM DATA: DATA CLASS (DATACLS2) NON-VSAM DATA: MGMT CLASS (MGMTCLS2) NON-VSAM DATA: STOR CLASS (STORCLS2) VSAM CATALOG, ...: VOL/SER (VOLSDAT3) VSAM CATALOG, ...: DATA CLASS (DATACLS3) VSAM CATALOG, ...: MGMT CLASS (MGMTCLS3) VSAM CATALOG, ...: STOR CLASS (STORCLS3)

Table 43. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPA4</u>	BSDS AND ACTIVE LOG ICF CATALOG ALIAS (VBSDSLOG) LOG COPY 1, BSDS 2: VOL/SER (VOLSDAT6) LOG COPY 1, BSDS 2: DATACLASS (DATACLS6) LOG COPY 1, BSDS 2: MGMTCLASS (MGMTCLS6) LOG COPY 1, BSDS 2: STOR CLASS (STORCLS6) LOG COPY 2, BSDS 1: VOL/SER (VOLSDAT7) LOG COPY 2, BSDS 1: DATA CLASS (DATACLS7) LOG COPY 2, BSDS 1: MGMT CLASS (MGMTCLS7) LOG COPY 2, BSDS 1: STOR CLASS (STORCLS7)
<u>DSNTIPK</u>	The following fields: WORK FILE DB (WKDBNAME) SUBGRP ATTACH (SGRPATNM)
<u>DSNTIPG1</u>	All fields: INSTALL IC PREFIX (INSICPRE) INSTALL DS PREFIX (INSDSPRE) IC DATA SET UNIT NAME (ICDSDEV) IC TEMPLATE EXPRESSION (ICDSTPLT) IC TEMPLATE DATA CLASS (ICSDSC) IC TEMPLATE MGMT CLASS (ICDSMC) IC TEMPLATE STOR CLASS (ICDSSC)
<u>DSNTIPH</u>	The following fields: COPY 1 NAME (BSDSNAM1) COPY 2 NAME (BSDSNAM2) Archive logs: COPY 1 PREFIX (ARCHPRE1) Archive logs: COPY 2 PREFIX (ARCHPRE2)

Table 43. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

CLIST Panel	Field Name (DSNTIDxx entry)
<u>DSNTIPT</u>	All fields: TEMP CLIST LIBRARY (NEWCL) SAMPLE LIBRARY (NEWSAMP) CLIST LIBRARY (OUTCL) APPLICATION DBRM (DBRMLIB) APPLICATION LOAD (RUNLIB) DECLARATION LIBRARY (SRCLIB) LINK LIST LIBRARY (DSNLINK) LOAD LIBRARY (DSNLOAD) JDBC AND SQLJ DLLS (DSNL0D2) MACRO LIBRARY (DSNMACS) LOAD DISTRIBUTION (DSNALOAD) EXIT LIBRARY (DSNEXIT) DBRM LIBRARY (DSNDBRM) IRLM LOAD LIBRARY (DSNIRLM) IVP DATA LIBRARY (DSNIVPD) INCLUDE LIBRARY (DSNCHDRS)
<u>DSNTIPU</u>	All fields: IBM LE RUNTIME LIBRARY (LERUN) IBM LE RUNTIME LIBRARY 2 (LERUN2) IBM LE LINK EDIT LIB (LELKED) IBM LE PRELINK MSG LIB (LEPLMSG) HIGH LEVEL ASSEMBLER LIB (IASMLIB) C/CPP COMPILER MODULE (CPROG) C/CPP COMPILER LIBRARY (CCOMP) C/CPP HEADER LIBRARY (CHDRS) C/370 COMPILER MESSAGES (CMMSG) C LE PRELINKER PHASE (CPRLK) CPP LE PRELINKER PHASE (CPPPRLK) CPP CLASS LIB HEADERS (CPPHDRS) CPP AUTO CALL LIBRARY (CPPAUTCL) CPP CLASS LIBRARY (CPPCLASS) CPP PROCEDURE LIBRARY (CPPPROC)
<u>DSNTIPU1</u>	All fields: COBOL COMPILER LIBRARY (ICOBCOMP) COBOL LE PRELINKER PHASE (ICOBPRLK) FORTRAN COMPILER LIBRARY (FORTCOMP) FORTRAN LINK EDIT LIB (FORTLINK) PL/I COMPILER LIBRARY (PLICOMP) PL/I LE PRELINKER PHASE (PLIPRLK)

Table 43. Settings not updated by the DSNTXAZP tool in Db2 12 (continued)

<b>CLIST Panel</b>	<b>Field Name (DSNTIDxx entry)</b>
<u>DSNTIPW</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>SYSTEM MACLIB (MACLIB)</li> <li>SYSTEM PROCEDURES (PROCLIB)</li> <li>SORT LIBRARY (SORTLIB)</li> <li>IMS RESLIB (RESLIB)</li> <li>ISPF ISPLINK MODULE (ISpload)</li> <li>GDDM MACLIB (GDDMMACS)</li> <li>GDDM LOAD MODULES (GDDMLOAD)</li> <li>CICS LOAD LIBRARY (CICSMOD)</li> <li>CICS MACRO LIBRARY (CICSMAC)</li> <li>CICS COBOL LIBRARY (CICSCOB)</li> <li>CICS PL/I LIBRARY (CICSPLI)</li> <li>CICS EXCI LIBRARY (CICSEXCI)</li> </ul>
<u>DSNTIPD</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>DATABASES (NUMDATAB)</li> <li>TABLES (NUMTABLE)</li> <li>COLUMNS (NUMCOLUMN)</li> <li>VIEWS (NUMVIEWS)</li> <li>TABLE SPACES (NUMTABSP)</li> <li>PLANS (NUMPLANS)</li> <li>PLAN STATEMENTS (NUMSTMTS)</li> <li>PACKAGES (NUMPKGS)</li> <li>PACKAGE STATEMENTS (NUMPKSTS)</li> <li>PACKAGE LISTS (NUMPLPL)</li> <li>EXECUTED STMTS (NUMSTMTE)</li> </ul>
<u>DSNTIP9</u>	<p>All fields:</p> <ul style="list-style-type: none"> <li>4K SORT PRIMARY SPACE (S4KSPAC)</li> <li>4K SORT WORK TS'S (S4KNOTS)</li> <li>4K SORT WORK SEG SIZE (S4KSGSZ)</li> <li>32K SORT PRIMARY SPACE (S32KSPAC)</li> <li>32K SORT WORK TS'S (S32KNOTS)</li> <li>32K SORT WORK SEG SIZE (S32KSGSZ)</li> <li>4K TEMP PRIMARY SPACE (T4KSPAC )</li> <li>4K TEMP WORK TS'S (T4KNOTS)</li> <li>4K TEMP WORK SEG SIZE (T4KSGSZ)</li> <li>32K TEMP PRIMARY SPACE (T32KSPAC)</li> <li>32K TEMP WORK TS'S (T32KNOTS)</li> <li>32K TEMP WORK SEG SIZE (T32KSGSZ)</li> </ul>
<u>DSNTIPM</u>	<p>The following fields:</p> <ul style="list-style-type: none"> <li>SUBSYSTEM NAME (MVSNAME)</li> <li>DB2 VTAM PASSWORD (DDPASS)</li> </ul>
<u>DSNTIPX</u>	<p>The following fields:</p> <ul style="list-style-type: none"> <li>WLMENV (WLMENV)</li> </ul>

2. Create the workflow definition files and input variable files by running the installation CLIST and specifying `USE Z/OSMF WORKFLOW ===> YES` on panel DSNTIPA1.

When you specify that option, the CLIST runs with modified and extra panels that support generation of the z/OSMF workflow artifacts.

**Tip:** You can specify an HFS or zFS directory for storing the z/OSMF artifacts. Specify the directory in the `PATH FOR Z/OSMF ARTIFACTS` field on panel DSNTIPM1.

For more information about the specific panels that support the generation of z/OSMF workflow artifacts, see [“Installation panels for installing or migrating with z/OSMF”](#) on page 583.

- a) Create the workflow definition file for migrating the first subsystem to Db2 12 by running the installation CLIST and specifying the following field values on panel DSNTIPA1:

```
USE Z/OSMF WORKFLOW ===> YES
INSTALL TYPE ===> MIGRATE
DATA SHARING ===> YES, with option 1. Group selected on DSNTIPOA
```

As you complete the CLIST, select each subsystem parameter that you want to include in the input variable file.

When you complete the CLIST, the DSNTIWMS and DSNTIWMN workflow definition files and associated input variable files are created.

- b) If you are migrating a data sharing group, create the workflow definition file for migrating other data sharing members (DSNITWMD) by running the CLIST again and setting the following options on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ===> YES
INSTALL TYPE ===> MIGRATE
DATA SHARING ===> YES, with option 2. Member selected on DSNTIPOA
```

As you complete the CLIST, select each subsystem parameter that you want to include in the input variable file.

When you complete the CLIST, the DSNITWMD workflow definition file and the DSNTIVMD input variable file are created.

3. Create extra input variable files, as required to support the efficient migration of your environment.

The goal is to structure the input variable files so that you can specify subsystem parameters that are common across many subsystems in a single file.

For an example of how you might structure and name a set of input variable files for migrating a particular environment, see [“Example of migrating a data sharing group to Db2 12 by using z/OSMF”](#) on page 582.

**Important:** All input variable files must include the following variables, with supported values:

**INSTYPE=**

The installation type. The following values are accepted:

**ACTV**

Activating a Db2 12 function level.

**MNDS**

Migration of a non-data-sharing subsystem to Db2 12.

**MDS1**

Migration of the first member of a data sharing group to Db2 12.

**MDSS**

Migration of subsequent members of a data sharing group to Db2 12

**MNFM**

Activation of Db2 12 new function. (Function level 500 or higher.)

**INDS**

Installation of a non-data-sharing Db2 subsystem.

## IDS1

Installation of the first member of a data sharing group

## IDSS

Adding a member to a data sharing group

## NEWSAMP2=

NEWSAMP2 is the partitioned data that contains tailored JCL templates for the z/OSMF workflow. You must change this value if the workflow artifacts are moved to a different location.

## B=

The indicator for line breaks in z/OSMF. Do not change or remove this variable in a generated input variable file.

### 4. Create the workflow instances in z/OSMF.

- a) Specify the path of the workflow definition file and the input variable file.

The path of the input variable file is optional, but it is best to always specify it. Otherwise, z/OSMF prompts you to provide the variable values during execution, preventing full automation of the process.

- b) Specify a name for the workflow instance.

**Tip:** Specify a name that describes the purpose of the workflow and includes the name of the target system.

- c) Assign all workflow steps to the same person to fully automate the migration process.

- d) Validate the JCL job and the substituted input variables.

You can find the input variable files and the JCL jobs with the substituted input variables on the **Perform** tab for the workflow in z/OSMF.

- i) Review the input variables. You can edit the values of input variables during your review, but any changes that you make apply to this workflow instance only.
- ii) In the Create JOB statement step, z/OSMF prompts you to review and update the JOB statement JCL. You can specify appropriate CLASS or MSGCLASS values.

If installation or migration step requires authorization, you can also specify the USERNAME and PASSWORD. For detailed information about required authorizations see [“Required authorization for installation or migration”](#) on page 4.

- iii) Review the JCL including the JOB statement. You can click **Edit JCL** to make changes. However, any changes that you make apply only to this workflow instance. It is best to make any changes that apply to all instances in the JCL template before you create the instances.

### 5. Start running the workflow steps.

You can run the workflow steps in z/OSMF, or by embedding z/OSMF REST services in your own automation programs.

- For a single Db2 subsystem, run the migration steps in the following order:
    - a. Run DSNTIWMS to migrate to subsystem to Db2 12.
    - b. Run DSNTIWMN to activate Db2 12 new function (function level 500 or higher).
  - For a data sharing group, run the migration steps in the following order:
    - a. Run DSNTIWMS to migrate the first member to Db2 12.
    - b. Run DSNTIWMD to migrate each subsequent member to Db2 12.
    - c. Run DSNTIWMN to migrate the data sharing group to activate Db2 12 new function (function level 500 or higher).
- a) Certain workflow steps, such as the pre-migration job DSNTIJPM, might need to be run repeatedly. For such repeated steps, you can select **Manually perform the selected step**. After you run the step, it is marked "Completed" in z/OSMF. However, you can still rerun this step. That is, you can take the required actions that are identified in the premigration reports, and then return to z/OSMF to repeat this step until all premigration tasks are completed.

- b) After any manual steps are complete, select **Automatically perform the selected step, and all subsequent steps...** on the **Perform Automated Step** page.  
z/OSMF runs all subsequent steps in order until all steps complete successfully, or until an error is encountered.
- c) If errors are encountered, check the job output on the z/OSMF **Status** tab.  
The maximum return code that a step tolerates is defined the workload definition file, and it might be a return code other than 0. The maximum return code for most steps is 0 or 4.

### **Example of migrating a data sharing group to Db2 12 by using z/OSMF**

Assume that a data sharing group contains members, 12 members that for online transaction processing (OLTP) workloads, and 4 members for online analytics processing (OLAP) workloads.

- The group consists of 16 members named like DBxA, where x is numbers 1–9 and letters A–G.
- Twelve members, DB1A - DBCA, process OLTP workloads.
- Four members, DBDA - DBGA, process OLAP workloads.
- For migration to Db2 12 function level 100, the following artifacts are used:
  - Member DB1A uses the DSNTIWMS workflow.
  - All other members use the DSNTIWMD workflow.
  - Members that process OLTP workloads share the DSNTIVTP input variable file.
  - Members that process OLAP workloads share the DSNTIVAP input variable file.
  - Every member also has an input variable file for member-specific parameters, each named like DSNTIVxA, where x corresponds to the matching character in the subsystem name.
- For the activation of function level 500 or higher, a single members uses the DSNTIWMN workflow and the DSNTVNTP input variable file.

The following table shows the members of the example data sharing group and the workflow artifacts that can be used to migrate each subsystem.



Table 44. Workflow artifacts for migrating an example 16-member data sharing group

Subsystem use	Subsystem name	Workflow files	Variables files
OLTP	DB1A	DSNTIWMS and DSNTIWMN	DSNTIV1A and DSNTVNTP
	DB2A	DSNTIWMD	DSNTIV2A
	DB3A		DSNTIV3A
	DB4A		DSNTIV4A
	DB5A		DSNTIV5A
	DB6A		DSNTIV6A
	DB7A		DSNTIV7A
	DB8A		DSNTIV8A
	DB9A		DSNTIV9A
	DBAA		DSNTIVAA
	DBBA		DSNTIVBA
	DBCA		DSNTIVCA
	OLAP		DBDA
DBEA			DSNTIVEA
DBFA		DSNTIVFA	
DBGA		DSNTIVGA	

### What to do next

Activate function level 500 or higher, as described in [Activating Db2 function levels by using z/OSMF \(Db2 for z/OS What's New?\)](#)

### Related concepts

[About workflows \(z/OS Management Facility\)](#)

[Migrating to Db2 12](#)

*Migration* is the process of upgrading from Db2 11 to Db2 12.

### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

[IBM z/OS Management Facility Online Help](#)

## Installation panels for installing or migrating with z/OSMF

If you specify `USE Z/OSMF WORKFLOW ===> YES` on panel DSNTIPA1, panel DSNTILA1 opens, and the CLIST uses a modified set of installation panels.

### Panel DSNTILA1

This panel opens to replace panel DSNTIPA1 when you specify `USE Z/OSMF WORKFLOW ===> YES`. It is a variant of DSNTIPA1, but you can select certain fields to tailor the values as variables in the z/OSMF input variable files. For more information, see [“DSNTIPA1 or DSNTILA1: Main panel”](#) on page 58

## Panels DSNTIPxx

When you run the CLIST to prepare z/OSMF workflow definition files, the CLIST panels are modified so that you can select fields to tailor the values as variables in the z/OSMF input variable file.

You can find the variable names for each panel field and subsystem parameter in [“Directory of subsystem parameters, panel fields, and application default values”](#) on page 406.

For example, the following figure shows the DSNTIPA2 panel. You can select each of the panel fields except for DEFINE CATALOG, which is not eligible to be selected as an input variable. In this example, the CATALOG ALIAS field is selected as an input variable.

```
DSNTIPA2          INSTALL DB2 - CATALOG AND DIRECTORY
====>

Check parameters and reenter to change:
 1 CATALOG ALIAS      ====> DSNCAT  Alias of VSAM catalog for DB2 subsystem
                        data sets
 2 DEFINE CATALOG     ====> YES     YES or NO

                        ----- SMS -----
                        DATA CLASS  MGMT CLASS  STOR CLASS
                        -----
 3 DIRECTORY AND CATALOG ====>      ====>      ====>
  DATA
 4 DIRECTORY AND CATALOG ====>      ====>      ====>
  INDEXES
 5 COMPRESS DB2 DIR LOBS ====> NO     Compress LOB table spaces in the DB2
                        directory (NO or YES)

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

## Panel DSNTIPM1

Contains fields for specifying that data sets for the tailored jobs, the workflow definition file, and the input variable file.

```
DSNTIPM1          MIGRATE DB2 - Z/OSMF ARTIFACTS CONFIGURATION PANEL
====>

z/OSMF artifacts allocated by the installation CLIST for edited output:
 1 WORKFLOW DEFINITION LIBRARY ====>
 2 JCL TEMPLATE LIBRARY      ====>
 3 PATH FOR Z/OSMF ARTIFACTS  ====>

For migration only: input the information of the prior release:
 4 PRIOR RELEASE SDSNLOAD LIBRARY ====>
 5 PRIOR RELEASE SDSNEXIT LIBRARY ====>
 6 PRIOR RELEASE PARAMETER MODULE ====>

PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

Figure 79. The Install Db2 - z/OSMF artifacts configuration panel: DSNTIPM1

### WORKFLOW DEFINITION LIBRARY

The data set that stores the generated workflow definition files and input variable files.

### JCL TEMPLATE LIBRARY

The data set that stores the tailored jobs for the z/OSMF workflow.

### PATH FOR Z/OSMF ARTIFACTS

The name of the HFS or zFS path where CLIST processing places the generated z/OSMF variable file, workflow file, and JCL templates. The default setting of blank indicates that the installation CLIST does not copy generated z/OSMF artifacts into HFS or zFS. When the field is not blank, the entry is validated to ensure that the specified path does not already exist as a file, and the user ID running the CLIST is authorized to create the specified directory and to write content into it.

### **PRIOR RELEASE SDSNLOAD LIBRARY**

For migration only, the location of the SDSNLOAD library from the previous Db2 release. The field is blank because the CLIST cannot determine the name of this library. You must specify a value for this field.

### **PRIOR RELEASE SDSNEXIT LIBRARY**

For migration of a Db2 subsystem or the first or subsequent members of a data sharing group, the name of the Db2 SDSNEXIT library from the previous Db2 release. This field cannot be blank. Its initial value is set as follows:

- The OLDEXIT setting from the current release DSNTIDXA/XB input parameter, if it is not blank.
- Otherwise, the EXIT LIBRARY field on panel DSNTIPT, which is the current release Db2 SDSNEXIT library.

You can modify this field and select this field to tailor its value as a variable in the z/OSMF variable input file. The PRIOR RELEASE SDSNEXIT LIBRARY field is only relevant when migrating a Db2 subsystem or the first or subsequent members of a data sharing group. Otherwise, this field is set to blank. You cannot modify the setting nor can you select it to tailor its value as a variable in the z/OSMF variable input file.

### **PRIOR RELEASE PARAMETER MODULE**

For migration of a Db2 subsystem or the first member of a data sharing group only, the name of the Db2 subsystem parameter module from the previous Db2 release. This field cannot be blank.

The initial values is set based on the following settings:

1. The OLDZPARM setting from the current release DSNTIDXA or DSNTIDXB input parameter, unless it is blank.
2. The PARAMETER MODULE field on panel DSNTIPO3, which is the Db2 subsystem parameter module from the current release.

You can modify this field and select this field to tailor its value as a variable in the z/OSMF variable input file.

## **Panels DSNTIPM3 and DSNTIPM4**

Contain fields for the subsystem parameters that do correspond to fields on any DSNTIPxx panels. For descriptions of the parameters on these panels, see [“Subsystem parameters that are not on installation panels”](#) on page 380.

You can select each panel field to specify that the value is tailored as a variable and stored in the z/OSMF input variable file.

## **Panel DSNTIPM5**

Contains parameters to tailor the following installation jobs:

- [DSNTIJPM](#)
- DSNTIJSA
- DSNTIJSO

Like the DSNTIPxx panels, you can select each panel field to specify that the value is tailored as a variable that is stored in the z/OSMF input variable file.

## **Panels for choosing z/OSMF workflow steps**

On the following scenario-specific panels you can choose the steps to include in z/OSMF workflows for completing Db2 12 installation or migration tasks.

Each such panel indicates the required and optional steps, and whether they are selected by default, for example:

**s** indicates a required step.

**S** indicates an optional step that is selected by default.

An empty selection field indicates an optional step that is not selected by default.

## Panel DSNTIPMS

Panel DSNTIPMS is a scenario-specific panel for choosing steps for migrating a non-data sharing Db2 subsystem or the first member of a data sharing group to Db2 12.

```
DSNTIPMS REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION (PANEL 1)
====>
```

Select the steps which should be included in the workflow definition:

- S Actions to complete before migration (DSNTIJPM) ["1" on page 586](#)
  - Convert BSDS records to support 10-byte RBA and LRSN fields ["2" on page 586](#) (DSNTIJCB)
- S Take image copies of the directory and catalog (DSNTIJIB) ["3" on page 586](#)
- S Make DB2 CLISTs available to TSO and batch users (DSNTIJVC)
- s Stop DB2 Version 11 activity (DSNTIJSO)
- s Define the DB2 subsystem parameter module (DSNTIJUZ)
- s Define the DB2 application defaults module (DSNTIJUA)
- s Define the DB2 offline message CCSIDs module (DSNTIJUM)
  - Define DB2 12 to z/OS (DSNTIJMV)
  - Add DB2 12 address space startup JCL procedures (DSNTIJMA)
  - Add DB2 program preparation and utilities invocation JCL procs (DSNTIJMP)
  - Add address space JCL procs for the DB2-supplied WLM environments (DSNTIJMW)
  - Add environment files for the DB2-supplied Java WLM environment (DSNTIJMJ)
- s Define system data sets (DSNTIJIN)
  - Define user authorization exit routines (DSNTIJEX)

PRESS: ENTER to continue RETURN to exit HELP for more information

### Notes:

1. Complete this step before migration.
2. If this job is selected, job DSNTIJSO runs before to stop Db2, and job DSNTIJSB runs after to start Db2.
3. DSNTIJIB is tailored based on DSNTIJIC, using the Db2 11 SDSNLOAD library.

The steps on panel DSNTIPMS continue on panel DSNTIPMT:

```
DSNTIPMT REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION (PANEL 2)
====>
```

Select additional steps which should be included in the workflow definition:

- s Start DB2 Version 12 (DSNTIJSB)
- s Tailor DB2 Version 12 catalog (DSNTIJTC)
  - Ensure that the catalog indexes have no problems (DSNTIJCX)
- s Prepare dynamic SQL program (DSNTIJTM)
- s Bind SPUFI and DCLGEN and user-maintained DB activity (DSNTIJSG)
  - Set up DB2-supplied routines (DSNTIJRW)
- s Configure DB2 for running SPs and user-defined routines (DSNTIJRT)
- S Validate the installation of DB2-supplied routines (DSNTIJRV)
- S Convert EXPLAIN tables to the current format (DSNTIJXA)
- s Take an image copy of the DB2 catalog (DSNTIJIC)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see ["Migrating your Db2 subsystem to Db2 12" on page 484](#).

Panels DSNTIPMS and DSTIPMT are shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ====> YES

INSTALL TYPE ====> MIGRATE

DATA SHARING ====> NO, or DATA SHARING ====> YES with option 1 selected in the DSNTIPOB window.

## Panel DSNTIPMN

Panel DSNTIPMN scenario-specific panel for choosing steps for completing the Db2 12 migration process.

```
DSNTIPMN REVIEW STEPS IN Z/OSMF COMPLETING MIGRATION WORKFLOW DEFINITION
====>
```

```
Select the steps which should be included in the workflow definition:
S Back up the DB2 directory and catalog (DSNTIJIC)
  Activate DB2 function level V12R1M501 (DSNTIJA1)
S Tailor the DB2 catalog (DSNTIJTC)
s Activate a DB2 function level (DSNTIJAF)
S Rebuild the subsystem parameter module to change APPLCOMPAT level
  (DSNTIJUZ)
S Bring the APPLCOMPAT change online (DSNTIJOZ)
S Rebuild the application defaults module to change SQLLEVEL setting
  (DSNTIJUA)
s Install and configure DB2-supplied routines that use new function
  (DSNTIJRT)
S Convert EXPLAIN tables to the current format (DSNTIJXA)
S Validate DB2-supplied routines (DSNTIJRV)
s Remove sample applications and sample schema authorizations (DSNTEJ0)
S Create and load sample tables (DSNTEJ1)
S Prepare and invoke program DSNTJEP2 (DSNTEJ1L)
S Prepare and invoke program DSNTIAUL (DSNTEJ2A)
```

```
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

For more information about the steps, see [“Migrating your Db2 subsystem to Db2 12”](#) on page 484 , beginning with [“Migration step 27: Take an image copy of the Db2 12 catalog : DSNTIJIC”](#) on page 544.

DSNTIPMN is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
INSTALL TYPE ====> MIGRATE
DATA SHARING ====> NO, or DATA SHARING ====> YES with option 1 selected in the DSNTIPOB
window.
```

## Panel DSNTIPMD

A scenario-specific panel for choosing steps for migrating subsequent data sharing group members to Db2 12.

```
DSNTIPMD REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION
====>
```

```
Select the steps which should be included in the workflow definition:
_ Stop DB2 Version 11 activity (DSNTIJS0)
_ Convert BSDS records to support 10-byte RBA and LRSN fields
  (DSNTIJCB)
_ Define the DB2 subsystem parameter module (DSNTIJUZ)
_ Add DB2 12 address space startup JCL procedures (DSNTIJMA)
_ Start DB2 Version 12 (DSNTIJS1)
S Create additional work file table spaces (DSNTIJTM)
```

```
PRESS:  ENTER to continue  RETURN to exit  HELP for more information
```

For more information about the steps, see [“Migrating subsequent members of a group to Db2 12”](#) on page 707. The workflow supports only steps that are shown in the panel.

DSNTIPMD is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
INSTALL TYPE ====> MIGRATE
DATA SHARING ====> YES with option 2 selected in the DSNTIPOB window.
```

## Panel DSNTIPMI

Panel DSNTIPMI is a scenario-specific panel for choosing steps to include when installing a new Db2 subsystem.

```
DSNTIPMI REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION (PANEL 1)
====>

Select the steps which should be included in the workflow definition:
s Define DB2 to z/OS (DSNTIJMV)
s Add DB2 for z/OS address space startup JCL procedures (DSNTIJMA)
s Add DB2 program preparation and utilities invocation JCL procs (DSNTIJMP)
s Add address space JCL procs for the DB2-supplied WLM environments (DSNTIJMW)
s Add environment files for the DB2-supplied Java WLM environment (DSNTIJMJ)
s Define the ICF catalog and alias (DSNTIJCA)
s Define system data sets (DSNTIJIN)
s Define the DB2 subsystem parameter module (DSNTIJUZ)
s Define the DB2 application defaults module (DSNTIJUA)
s Define the DB2 offline message CCSIDs module (DSNTIJUM)
s Update DDF related information in the BSDS (DSNTIJUL)
s Initialize system data sets - 1 (DSNTIJID)
s Initialize system data sets - 2 (DSNTIJIE)
s Initialize system data sets - 3 (DSNTIJIF)
_ Define user authorization exit routines (DSNTIJEX)
_ Connect DB2 to TSO (DSNTIJVC)

PRESS:  ENTER to continue   RETURN to exit   HELP for more information
```

The steps on panel DSNTIJPMI continue on panel DSNTIPMJ.

```
DSNTIPMJ REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION (PANEL 2)
====>

Select the steps which should be included in the workflow definition:
s Start the DB2 subsystem (DSNTIJSA)
s Tailor the DB2 catalog (DSNTIJTC)
S Activate a DB2 function level (DSNTIJAF)
s Create default storage group, define temporary work files, and
  bind DB2 REXX Language Support (DSNTIJTM)
s Define and bind DB2 objects (DSNTIJSG)
s Setting up the DB2 core WLM environments during migration (DSNTIJRW)
s Installing DB2-supplied routines during migration (DSNTIJRT)
s Validate the installation of DB2-supplied routines (DSNTIJRV)
  Back up the DB2 directory and catalog (DSNTIJIC)

PRESS:  ENTER to continue   RETURN to exit   HELP for more information
```

For more information about the steps, see [Chapter 5, “Installing Db2 12,”](#) on page 427.

DSNTIPMI is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
INSTALL TYPE ====> INSTALL
DATA SHARING ====> NO, or DATA SHARING ====> YES with option 1 selected in the DSNTIPOA
window.
```

## Panel DSNTIPMA

Panel DSNTIPMA is scenario-specific panel for choosing steps for adding a Db2 subsystem to a data sharing group.

```
DSNTIPMA REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION
====>
```

Select the steps which should be included in the workflow definition:

- Define DB2 to z/OS (DSNTIJMV)
- Add DB2 address space startup JCL procedures (DSNTIJMA)
- s Define system data sets (DSNTIJIN)
- s Define the DB2 subsystem parameter module (DSNTIJUZ)
- s Update DDF related information in the BSDS (DSNTIJUL)
- s Initialize system data sets (DSNTIJID/DSNTIJIE/DSNTIJIF)
- Define user authorization exit routines (DSNTIJEX)
- s Start the DB2 subsystem (DSNTIJSA)
- s Create default storage group, define temporary work files, and bind DB2 REXX Language Support (DSNTIJTM)
- S Back up the DB2 directory and catalog (DSNTIJIC)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see [“Adding a new data sharing member” on page 675](#). The workflow supports only steps that are shown in the panel.

DSNTIPMA is shown only when you specify the following values on panel DSNTILA1:

- USE Z/OSMF WORKFLOW ====> YES
- INSTALL TYPE ====> INSTALL
- DATA SHARING ====> YES with option 2 selected in the DSNTIPOA window.

## Panel DSNTIPMV

Panel DSNTIPMV is a scenario-specific panel for choosing steps to include when running installation verification jobs.

```
DSNTIPMV REVIEW STEPS IN Z/OSMF IVP WORKFLOW DEFINITION
====>
```

Select the IVP steps which should be included in the workflow definition:

- \_ Remove sample applications and sample schema authorizations (DSNTEJ0)
- S Create and load sample tables (DSNTEJ1)
- S Prepare and invoke program DSNTEP2 (DSNTEJ1L)
- S Prepare and invoke program DSNTIAUL (DSNTEJ2A)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see [Chapter 9, “Verifying successful Db2 12 installation or migration with sample applications,” on page 727](#).

DSNTIPMV is shown only when you specify the following values on panel DSNTILA1:

- USE Z/OSMF WORKFLOW ====> YES
- INSTALL TYPE ====> INSTALL or MIGRATE
- DATA SHARING ====>

## Panel DSNTIPMF

Panel DSNTIPMF is a scenario-specific panel for choosing steps to include when activating a Db2 function level.

DSNTIPMF REVIEW STEPS IN Z/OSMF ACTIVATION WORKFLOW DEFINITION  
====>

Select the steps which should be included in the workflow definition:  
S Back up the DB2 directory and catalog (DSNTIJIC)  
S Tailor the DB2 catalog (DSNTIJTC)  
s Activate a DB2 function level (DSNTIJAF)  
S Rebuild the subsystem parameter module to change APPLCOMPAT level  
(DSNTIJUZ)  
S Bring the APPLCOMPAT change online (DSNTIJJZ)  
S Rebuild the application defaults module to change SQLLEVEL setting  
(DSNTIJUA)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see [“Activating Db2 12 new function at migration” on page 545](#)

This panel is shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ====> YES  
INSTALL TYPE ====> ACTVATE  
DATA SHARING ====>

## DSNTIPMU

Contains fields for specifying source and target workflow input variable files, for use when creating input variable files for installing or migrating members of a data sharing group after the first one.

This panel is shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ====> YES  
INSTALL TYPE ====> UDPATE

### Related concepts

[About workflows \(z/OS Management Facility\)](#)

[Sample workflow artifacts for installation and migration with z/OS Management Facility](#)

Db2 provides sample z/OSMF workflow artifacts for Db2 installation and migration. The artifacts include several sample workflow definition files, and an associated a set of sample JCL templates and a sample workflow input variable file for each definition file.

## Sample jobs for installing and migrating with z/OSMF

The following sample jobs are used by z/OSMF workflows for automating the installation or migration of Db2 subsystems.

### Job DSNTIJDC

The DSNTIJDC sample job creates image copies of the Db2 catalog and directory. It is used by z/OSMF workflows for automating the installation or migration of Db2 subsystems.

### Job DSNTIJSO

The DSNTIJSO sample job stops Db2 by calling the DSNTMVS stand-alone program. It is used by z/OSMF workflows for automating the installation or migration of Db2 subsystems.

### Job DSNTIJS A

The DSNTIJS A sample job starts Db2 by calling the DSNTMVS stand-alone program. It is used by z/OSMF workflows for automating the installation or migration of Db2 subsystems.



## Job DSNTIJMB

Job DSNTIJMB runs the DSNTMVSDB batch program tool to issue START DB2 and STOP DB2 commands.

### Related tasks

[Automating Db2 installation or migration with z/OS Management Facility](#)

You can use z/OSMF to automate the process of installing or migrating to Db2 12 for z/OS.

### Related reference

[DSNTMVSDB tool](#)

The DSNTMVSDB tool provides a batch interface for starting and stopping Db2. This tool is invoked by sample jobs DSNTIJSA and DSNTIJSO to support z/OSMF workflows for automating installation and migration of Db2 subsystems.

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

[-STOP DB2 command \(Db2\) \(Db2 Commands\)](#)

## DSNTMVSDB tool

The DSNTMVSDB tool provides a batch interface for starting and stopping Db2. This tool is invoked by sample jobs DSNTIJSA and DSNTIJSO to support z/OSMF workflows for automating installation and migration of Db2 subsystems.

### DD statements for DSNTMVSDB

The DSNTMVSDB batch program allocates the following DD statements:

#### Input DD statements for DSNTMVSDB

##### **CMDOPT**

For command and command parameters used to generate the command to be executed:

##### **TYPE***type*

Specifies the type of command: Db2

Required.

##### **COMMAND\_PREFIX***command-prefix*

Specifies the command prefix that identifies which Db2 subsystem to direct the command to.

Required.

##### **REMOTE\_SYSTEM***remote-system*

Specifies the z/OS system in the sysplex to which the Db2 command is to be routed.

Required if the Db2 command will be routed to a z/OS system that is different from the system where the batch program DSNTMVSDB is executing.

##### **COMMAND***command*

Specifies the command to be executed: START or STOP

Required.

##### **PARAMETERS***parameters*

Specifies the parameters of the command. START DB2 options, such as PARM(DB2AZNS), if COMMAND=START

STOP DB2 options, such as MODE(FORCE), if COMMAND=STOP

Optional.

##### **SUBPARAMETERS***subparameters*

Specifies the subparameters of the command, represented as keyword-value pairs separated by commas:

**CONSNAME=consame**

Where *consame* is the name of the console used to issue the command. If not specified, the default is DSNTMVSB. The specified console must not already be active.

Optional.

**IRLMPROC=irlmproc**

Where *irlmproc* is the procedure name of the connected IRLM. If specified, the batch program will poll the status of the specified IRLM job and will report the end of Db2 normal termination when the IRLM job has ended within the specified *wait-timeout*.

Optional. Valid if COMMAND=STOP and SSNM keyword is not specified.

**SSNM=ssnm**

Where *ssnm* is the Db2 subsystem name. If specified, the batch program will poll the status of the specified *ssnm*MSTR job and will report the end of Db2 normal termination when the *ssnm*MSTR job has ended within the specified *wait-timeout*.

Optional. Valid if COMMAND=STOP and IRLMPROC keyword is not specified.

**WAIT\_TIMEOUTwait-timeout**

Specifies the amount of time in seconds that this batch program waits for the command to complete and for the command messages to be routed to the console. It includes time spent waiting for the console to be available and polling the *irlmproc* or *ssnm*MSTR job status.

1 -900. The default value is 180 seconds.

**Output DD statements used by DSNTIMVSB****SYSPRINT**

For DSNTMVSB messages.

**CMDOUT**

For command messages.

**DSNTRACE**

For trace messages.

**DSNTMVSB return codes**

DSNTMVSB sets the following *return-code* and *command-completion-code* variables to describe the execution status of the command:

**return-code****0**

The batch program did not encounter any errors during processing.

*command-completion-code* is set to 0 or 4.

**4**

The batch program issued the command but was unable, within the prescribed wait time, to determine the command execution status based on the command messages retrieved. All command messages and any *ssnm*MSTR or *irlmproc* job status messages retrieved within the prescribed wait time are written to DD:CMDOUT.

*command-completion-code* is set to 8 or 16.

**8**

The batch program issued the command but was unable to determine the command execution status due to an internal error. All the command messages and any *ssnm*MSTR or *irlmproc* job status messages retrieved so far are written to DD:CMDOUT.

*command-completion-code* is set to 8 or 16.

**12**

The batch program encountered an error during processing. A message describing the error is written to SYSPRINT.

**16**

The batch program did not encounter any errors during processing. However, the command completed abnormally.

*command-completion-code* is set to 12.

***command-completion-code*****0**

The command completed successfully.

*Table 45. Details for command-completion-code 0*

<b>Command</b>	<b><i>command-completion-code</i> meaning</b>	<b>Message received</b>
START DB2	Successful completion	DSN9022I <i>cmd_prefix</i>
STOP DB2	Successful completion	DSN9022I <i>cmd_prefix</i>  If system services address space ( <i>ssnmMSTR</i> ) termination monitoring is requested: message ' <i>ssnmMSTR</i> NOT FOUND' was found in the 'D J, <i>ssnmMSTR</i> ' command output.

**4**

The command was not processed. For example, Db2 was already stopped when STOP DB2 was requested.

*Table 46. Details for command-completion-code 4*

<b>Command</b>	<b><i>command-completion-code</i> meaning</b>	<b>Message received</b>
START DB2	Db2 was already active when the command was issued.	DSNY003I <i>cmd_prefix</i>

Table 46. Details for command-completion-code 4 (continued)

<b>Command</b>	<b>command-completion-code meaning</b>	<b>Message received</b>
STOP DB2	When the command was issued, Db2 was already stopped or Db2 was in the process of stopping and it stopped successfully.	<p>If Db2 MSTR or IRLM address space termination monitoring is not requested, any of the following messages are received:</p> <ul style="list-style-type: none"> <li>• DSN3106I <i>cmd_prefix</i></li> <li>• DSNY004I <i>cmd_prefix</i> and DSN9022I <i>cmd_prefix</i></li> </ul> <p>If system services address space (<i>ssnm</i>MSTR) termination monitoring is requested, both of the following messages were received:</p> <ul style="list-style-type: none"> <li>• DSNY004I <i>cmd_prefix</i> and DSN9022I <i>cmd_prefix</i></li> <li>• ' <i>ssnm</i>MSTR NOT FOUND' in 'D J, <i>ssnm</i>MSTR' command output</li> </ul> <p>If IRLM address space termination monitoring is requested, both of the following messages were received:</p> <ul style="list-style-type: none"> <li>• DSNY004I <i>cmd_prefix</i> and DSN9022I <i>cmd_prefix</i></li> <li>• ' <i>irlm_job</i> NOT FOUND' in 'D J, <i>irlm_job</i>' command output</li> </ul>

**8**

The command started but the completion status is unknown.

Table 47. Details for command-completion-code 8

<b>Command</b>	<b>command-completion-code meaning</b>	<b>Message received</b>	<b>Expected message not received</b>
START DB2	Db2 is in the process of starting, but the completion status of the START DB2 command is unknown.	DSNY024I <i>cmd_prefix</i>	<p>Any of the following messages:</p> <ul style="list-style-type: none"> <li>• DSN9023I <i>cmd_prefix</i></li> <li>• DSNV086E <i>cmd_prefix</i></li> <li>• DSN3104I <i>cmd_prefix</i></li> <li>• DSN9022I <i>cmd_prefix</i></li> <li>• DSN3100I <i>cmd_prefix</i></li> </ul>

Table 47. Details for command-completion-code 8 (continued)

<b>Command</b>	<b>command-completion-code meaning</b>	<b>Message received</b>	<b>Expected message not received</b>
STOP DB2	Db2 is in the process of stopping, but the completion status of the STOP DB2 command is unknown.	One of the following messages was received: <ul style="list-style-type: none"> <li>• DSNY002I <i>cmd_prefix</i></li> <li>• DSNY004I <i>cmd_prefix</i></li> </ul>	One of the following messages was not received: <ul style="list-style-type: none"> <li>• DSN9022I <i>cmd_prefix</i></li> <li>• DSN9023I <i>cmd_prefix</i></li> </ul> Or DSN9022I <i>cmd_prefix</i> was received along with one of the following conditions: <ul style="list-style-type: none"> <li>• If system services address space (<i>ssnmMSTR</i>) termination monitoring is requested, and 'ssnmMSTR NOT FOUND' was not found in 'D J, <i>ssnmMSTR</i>' command output</li> <li>• If IRLM address space (<i>irlmproc</i>) termination monitoring is requested, and 'irlm_job NOT FOUND' is not found in 'D J, 'irlm_job' command output.</li> </ul>

**12**

The command completed abnormally.

Table 48. Details for command-completion-code 16

<b>Command</b>	<b>command-completion-code meaning</b>	<b>Message received</b>
START DB2	Abnormal completion.	One of the following messages was received: <ul style="list-style-type: none"> <li>• DSN9023I <i>cmd_prefix</i></li> <li>• DSNV086E <i>cmd_prefix</i></li> <li>• DSN3100I <i>cmd_prefix</i></li> <li>• DSN3104I <i>cmd_prefix</i></li> <li>• DSN3106I <i>cmd_prefix</i></li> <li>• DSN3107I <i>cmd_prefix</i></li> </ul>
STOP DB2	Abnormal completion.	One of the following messages was received: <ul style="list-style-type: none"> <li>• DSN9023I <i>cmd_prefix</i></li> <li>• DSN3107I <i>cmd_prefix</i></li> </ul>

The command output does not satisfy the conditions that are listed for *command-completion-code* 0, 4, 8, or 12.

#### Related tasks

[Automating Db2 installation or migration with z/OS Management Facility](#)

You can use z/OSMF to automate the process of installing or migrating to Db2 12 for z/OS.

#### Related reference

[Job DSNTIJMB](#)

Job DSNTIJMB runs the DSNTMVS batch program tool to issue START DB2 and STOP DB2 commands.

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

[-STOP DB2 command \(Db2\) \(Db2 Commands\)](#)

## Job DSNTIJOZ: bring Db2 subsystem parameter changes online

Job DSNTIJOZ runs a SET SYSPARM command to bring subsystem parameter changes online.

The z/OSMF workflows for migrating to Db2 12 and activating Db2 function levels use this job.

#### Related tasks

[Activating Db2 function levels by using z/OSMF \(Db2 for z/OS What's New?\)](#)

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

#### Related reference

[-SET SYSPARM command \(Db2\) \(Db2 Commands\)](#)

## Sample workflow artifacts for installation and migration with z/OS Management Facility

Db2 provides sample z/OSMF workflow artifacts for Db2 installation and migration. The artifacts include several sample workflow definition files, and an associated a set of sample JCL templates and a sample workflow input variable file for each definition file.

You can find the sample z/OSMF workflow artifacts in the *prefix.SDSNIVPD* Db2 SMP/E library.

You can find the steps of each workflow on one or more scenario-specific panels. Each workflow supports only the steps that are shown on the panel.

### Required, optional, and default workflow steps

Each panel indicates the required and optional steps and whether they are selected by default, for example:

**s** indicates a required step.

**S** indicates an optional step that is selected by default.

An empty selection field indicates an optional step that is not selected by default.

### DSNTIWMS and DSNTIVMS: migrate to Db2 12

The DSNTIWMS workflow migrates a non-data sharing Db2 subsystem, or the first Db2 member of a data sharing group, to Db2 12. It uses the DSNTIVMS input variable file.

Panel DSNTIPMS shows the steps of the DSNTIWMS workflow.

DSNTIPMS REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION (PANEL 1)  
====>

Select the steps which should be included in the workflow definition:

- S Actions to complete before migration (DSNTIJPM) ["1" on page 597](#)
  - Convert BSDS records to support 10-byte RBA and LRSN fields ["2" on page 597](#) (DSNTIJCB)
- S Take image copies of the directory and catalog (DSNTIJIB) ["3" on page 597](#)
- S Make DB2 CLISTS available to TSO and batch users (DSNTIJVC)
- s Stop DB2 Version 11 activity (DSNTIJSO)
- s Define the DB2 subsystem parameter module (DSNTIJUZ)
- s Define the DB2 application defaults module (DSNTIJUA)
- s Define the DB2 offline message CCSIDs module (DSNTIJUM)
  - Define DB2 12 to z/OS (DSNTIJMV)
  - Add DB2 12 address space startup JCL procedures (DSNTIJMA)
  - Add DB2 program preparation and utilities invocation JCL procs (DSNTIJMP)
  - Add address space JCL procs for the DB2-supplied WLM environments (DSNTIJMW)
  - Add environment files for the DB2-supplied Java WLM environment (DSNTIJMJ)
- s Define system data sets (DSNTIJIN)
  - Define user authorization exit routines (DSNTIJEX)

PRESS: ENTER to continue RETURN to exit HELP for more information

### Notes:

1. Complete this step before migration.
2. If this job is selected, job DSNTIJSO runs before to stop Db2, and job DSNTIJSB runs after to start Db2.
3. DSNTIJIB is tailored based on DSNTIJIC, using the Db2 11 SDSNLOAD library.

The steps on panel DSNTIPMS continue on panel DSNTIPMT:

DSNTIPMT REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION (PANEL 2)  
====>

Select additional steps which should be included in the workflow definition:

- s Start DB2 Version 12 (DSNTIJSB)
- s Tailor DB2 Version 12 catalog (DSNTIJTC)
  - Ensure that the catalog indexes have no problems (DSNTIJCX)
- s Prepare dynamic SQL program (DSNTIJTM)
- s Bind SPUFI and DCLGEN and user-maintained DB activity (DSNTIJSJ)
  - Set up DB2-supplied routines (DSNTIJRW)
- s Configure DB2 for running SPs and user-defined routines (DSNTIJRT)
- S Validate the installation of DB2-supplied routines (DSNTIJRV)
- S Convert EXPLAIN tables to the current format (DSNTIJXA)
- s Take an image copy of the DB2 catalog (DSNTIJIC)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see ["Migrating your Db2 subsystem to Db2 12" on page 484](#).

Panels DSNTIPMS and DSTIPMT are shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ====> YES

INSTALL TYPE ====> MIGRATE

DATA SHARING ====> NO, or DATA SHARING ====> YES with option 1 selected in the DSNTIPOB window.

### DSNTIWMD and DSNTIVMD: migrate data sharing members to Db2 12

The DSNTIWMD workflow migrates subsequent members of a Db2 data sharing group to Db2 12. It uses the DSNTIVMD input variable file.

Panel DSNTIPMD shows the steps of this workflow.

```
DSNTIPMD REVIEW STEPS IN Z/OSMF MIGRATION WORKFLOW DEFINITION
===>
```

Select the steps which should be included in the workflow definition:

- \_ Stop DB2 Version 11 activity (DSNTIJS0)
- \_ Convert BSDS records to support 10-byte RBA and LRSN fields (DSNTIJCB)
- \_ Define the DB2 subsystem parameter module (DSNTIJUZ)
- \_ Add DB2 12 address space startup JCL procedures (DSNTIJMA)
- \_ Start DB2 Version 12 (DSNTIJSJA)
- S Create additional work file table spaces (DSNTIJTM)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see [“Migrating subsequent members of a group to Db2 12” on page 707](#). The workflow supports only steps that are shown in the panel.

DSNTIPMD is shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ===> YES

INSTALL TYPE ===> MIGRATE

DATA SHARING ===> YES with option 2 selected in the DSNTIPOB window.

### **DSNTIWMN and DSNTIVMN: activate Db2 12 function level 500 or higher**

The DSNTIWMN sample workflow activates Db2 12 new function in the Db2 subsystem. It uses the DSNTIVMN input variable file.

Panel DSNTIPMN shows the steps of the DSNTIWMN workflow.

```
DSNTIPMN REVIEW STEPS IN Z/OSMF COMPLETING MIGRATION WORKFLOW DEFINITION
===>
```

Select the steps which should be included in the workflow definition:

- S Back up the DB2 directory and catalog (DSNTIJIC)
- \_ Activate DB2 function level V12R1M501 (DSNTIJA1)
- S Tailor the DB2 catalog (DSNTIJTC)
- s Activate a DB2 function level (DSNTIJAF)
- S Rebuild the subsystem parameter module to change APPLCOMPAT level (DSNTIJUZ)
- S Bring the APPLCOMPAT change online (DSNTIJOZ)
- S Rebuild the application defaults module to change SQLLEVEL setting (DSNTIJUA)
- s Install and configure DB2-supplied routines that use new function (DSNTIJRT)
- S Convert EXPLAIN tables to the current format (DSNTIJXA)
- S Validate DB2-supplied routines (DSNTIJRV)
- s Remove sample applications and sample schema authorizations (DSNTEJ0)
- S Create and load sample tables (DSNTEJ1)
- S Prepare and invoke program DSNTJEP2 (DSNTEJ1L)
- S Prepare and invoke program DSNTIAUL (DSNTEJ2A)

PRESS: ENTER to continue RETURN to exit HELP for more information

For more information about the steps, see [“Migrating your Db2 subsystem to Db2 12” on page 484](#), beginning with [“Migration step 27: Take an image copy of the Db2 12 catalog : DSNTIJIC” on page 544](#).

DSNTIPMN is shown only when you specify the following values on panel DSNTILA1:

USE Z/OSMF WORKFLOW ===> YES

INSTALL TYPE ===> MIGRATE

DATA SHARING ===> NO, or DATA SHARING ===> YES with option 1 selected in the DSNTIPOB window.

### **DSNTIWAF and DSNTIVAF: activate a Db2 12 function level**

The DSNTIWAF workflow activates a specified Db2 12 function level in the Db2 subsystem. It can also be used to update the default Db2 application compatibility (APPLCOMPAT subsystem parameter) setting and to bring that change online. It uses the DSNTIVAF input variable file.



Panel DSNTIPMF shows the steps of the DSNTIWAF workflow.

```
DSNTIPMF REVIEW STEPS IN Z/OSMF ACTIVATION WORKFLOW DEFINITION
====>
```

```
Select the steps which should be included in the workflow definition:
S Back up the DB2 directory and catalog (DSNTIJIC)
S Tailor the DB2 catalog (DSNTIJTC)
s Activate a DB2 function level (DSNTIJAF)
S Rebuild the subsystem parameter module to change APPLCOMPAT level
  (DSNTIJUZ)
S Bring the APPLCOMPAT change online (DSNTIJOZ)
S Rebuild the application defaults module to change SQLLEVEL setting
  (DSNTIJUA)
```

```
PRESS:  ENTER to continue   RETURN to exit   HELP for more information
```

For more information about the steps, see [“Activating Db2 12 new function at migration” on page 545](#)

This panel is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
INSTALL TYPE ====> ACTVATE
DATA SHARING ====>
```

## DSNTIWIN and DSNTIVIN: install Db2 12

The DSNTIWIN sample workflow definition file installs a new Db2 12 subsystem.

Panel DSNTIPMI shows the steps of the DSNTIWIN workflow.

```
DSNTIPMI REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION (PANEL 1)
====>
```

```
Select the steps which should be included in the workflow definition:
s Define DB2 to z/OS (DSNTIJMV)
s Add DB2 for z/OS address space startup JCL procedures (DSNTIJMA)
s Add DB2 program preparation and utilities invocation JCL procs (DSNTIJMP)
s Add address space JCL procs for the DB2-supplied WLM environments (DSNTIJMW)
s Add environment files for the DB2-supplied Java WLM environment (DSNTIJMJ)
s Define the ICF catalog and alias (DSNTIJCA)
s Define system data sets (DSNTIJIN)
s Define the DB2 subsystem parameter module (DSNTIJUZ)
s Define the DB2 application defaults module (DSNTIJUA)
s Define the DB2 offline message CCSIDs module (DSNTIJUM)
s Update DDF related information in the BSDS (DSNTIJUL)
s Initialize system data sets - 1 (DSNTIJID)
s Initialize system data sets - 2 (DSNTIJIE)
s Initialize system data sets - 3 (DSNTIJIF)
_ Define user authorization exit routines (DSNTIJEX)
_ Connect DB2 to TSO (DSNTIJVC)
```

```
PRESS:  ENTER to continue   RETURN to exit   HELP for more information
```

The steps on panel DSNTIJPMI continue on panel DSNTIPMJ.

```
DSNTIPMJ REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION (PANEL 2)
====>
```

Select the steps which should be included in the workflow definition:

- s Start the DB2 subsystem (DSNTIJSJA)
- s Tailor the DB2 catalog (DSNTIJTC)
- S Activate a DB2 function level (DSNTIJAF)
- s Create default storage group, define temporary work files, and bind DB2 REXX Language Support (DSNTIJTM)
- s Define and bind DB2 objects (DSNTIJSG)
- s Setting up the DB2 core WLM environments during migration (DSNTIJRW)
- s Installing DB2-supplied routines during migration (DSNTIJRT)
- s Validate the installation of DB2-supplied routines (DSNTIJRV)
- Back up the DB2 directory and catalog (DSNTIJIC)

```
PRESS: ENTER to continue RETURN to exit HELP for more information
```

For more information about the steps, see [Chapter 5, “Installing Db2 12,” on page 427](#).

DSNTIPMI is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
```

```
INSTALL TYPE ====> INSTALL
```

```
DATA SHARING ====> NO, or DATA SHARING ====> YES with option 1 selected in the DSNTIPOA window.
```

## DSNTIWIA and DSNTIVIA: add a new data sharing member

The DSNTIWIA sample workflow definition file adds new members to a data sharing group. It uses the DSNTIVIA input variable file.

Panel DSNTIPMA shows the steps of the DSNTIWIA workflow.

```
DSNTIPMA REVIEW STEPS IN Z/OSMF INSTALLATION WORKFLOW DEFINITION
====>
```

Select the steps which should be included in the workflow definition:

- Define DB2 to z/OS (DSNTIJMV)
- Add DB2 address space startup JCL procedures (DSNTIJMA)
- s Define system data sets (DSNTIJIN)
- s Define the DB2 subsystem parameter module (DSNTIJUZ)
- s Update DDF related information in the BSDS (DSNTIJUL)
- s Initialize system data sets (DSNTIJID/DSNTIJIE/DSNTIJIF)
- Define user authorization exit routines (DSNTIJEX)
- s Start the DB2 subsystem (DSNTIJSJA)
- s Create default storage group, define temporary work files, and bind DB2 REXX Language Support (DSNTIJTM)
- S Back up the DB2 directory and catalog (DSNTIJIC)

```
PRESS: ENTER to continue RETURN to exit HELP for more information
```

For more information about the steps, see [“Adding a new data sharing member” on page 675](#). The workflow supports only steps that are shown in the panel.

DSNTIPMA is shown only when you specify the following values on panel DSNTILA1:

```
USE Z/OSMF WORKFLOW ====> YES
```

```
INSTALL TYPE ====> INSTALL
```

```
DATA SHARING ====> YES with option 2 selected in the DSNTIPOA window.
```

### Related tasks

[Automating Db2 installation by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of installing Db2 12 for z/OS subsystems.

[Automating Db2 migration by using z/OS Management Facility](#)

You can use z/OSMF to automate the process of migrating Db2 subsystems to Db2 12 for z/OS.

# Chapter 8. Installing, migrating, and enabling Db2 data sharing

Whether you need to install, migrate, or enable data sharing depends on the type of system that you start with and the type of system that you want to create.

## Before you begin

Familiarize yourself with the following information:

- [“Planning for Db2 data sharing” on page 601](#)
- [“Strategy for creating a Db2 data sharing group” on page 655](#)
- [“Preparing for Db2 12 migration in Db2 data sharing” on page 704](#)

## Procedure

Complete the appropriate task, as described in the following table.

If you have this...	And you want this...	Do this...
No system	Db2 12 data sharing	Install a new data sharing group, as described in <a href="#">“Installing a new data sharing group” on page 661</a> .
A Db2 12 non-sharing Db2 subsystem	The originating member of a data sharing group	Enable Db2 data sharing, as described in <a href="#">“Enabling Db2 data sharing” on page 662</a> .
One member in the group	More members in the group	Add new data sharing members, as described in <a href="#">“Adding a new data sharing member” on page 675</a> .
Separate Db2 subsystems	Merged Db2 subsystems into a single group	Merge existing Db2 data into the group, as described in <a href="#">“Merging existing Db2 data into the group” on page 687</a> .
A Db2 11 data sharing group	A Db2 12 data sharing group	Migrate the existing data sharing group to Db2 12, as described in <a href="#">“Migrating an existing data sharing group to Db2 12” on page 705</a> .

## Related concepts

[Migrating to Db2 12](#)

*Migration* is the process of upgrading from Db2 11 to Db2 12.

[Introduction to Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

## Related tasks

[Installing Db2 12](#)

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

## Planning for Db2 data sharing

Db2 data sharing introduces special requirements for your Db2 and z/OS environments.

## Related concepts

[Release coexistence in Db2 data sharing](#)

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

[Introduction to Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

[Security for Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

#### **Related tasks**

[Preparing for Db2 12 migration in Db2 data sharing](#)

When planning the migration of data sharing members to Db2 12 it is best to take certain actions to reduce or avoid unnecessary operation complexity.

[Installing, migrating, and enabling Db2 data sharing](#)

Whether you need to install, migrate, or enable data sharing depends on the type of system that you start with and the type of system that you want to create.

## **Parallel Sysplex requirements for Db2 data sharing**

Db2 data sharing depends on hardware and software components in the z/OS Parallel Sysplex.

### **Coupling facility**

Install and define at least one coupling facility to z/OS before enabling the Db2 data sharing function. For high availability, more than one coupling facility is required.

Data sharing member names from the subsystem parameter load module (DSNZPARM) are used to connect members to the coupling facility at Db2 startup. The first connector causes the list structure to be allocated in a coupling facility based on the preference list in the active CFRM policy.

#### **Related concepts**

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

#### **Related tasks**

[Specifying the subsystem parameter load module for a member](#)

Every member of a data sharing group must have its own unique load module for subsystem parameters (sometimes called DSNZPARM in a non-data sharing environment).

#### **Related reference**

[Adding MVS systems to a sysplex](#)

## **Cross-system coupling facility component of z/OS**

During startup, the members of a data sharing group join one cross-system coupling facility (XCF) group, and their associated internal resource lock managers (IRLMs) join another XCF group.

The z/OS cross-system extended services (XES) also join an XCF group implicitly on behalf of the IRLM connection to the lock structure. To join a particular group, the data sharing group members and the IRLMs use the names that you specify during Db2 installation.

Db2 uses the XCF for certain intersystem communications. Use both the coupling facility and channel-to-channel connections for XCF signaling. See [Adding MVS systems to a sysplex](#) for more information about configuring the XCF.

### **Coupling facility structures**

Db2 relies on areas of storage in the coupling facility called *structures*.

Three types of structures exist: lock, list, and cache. Each structure type has a unique function. The following figure shows a sample configuration of the coupling facility structures that are used by Db2.

## Coupling facilities

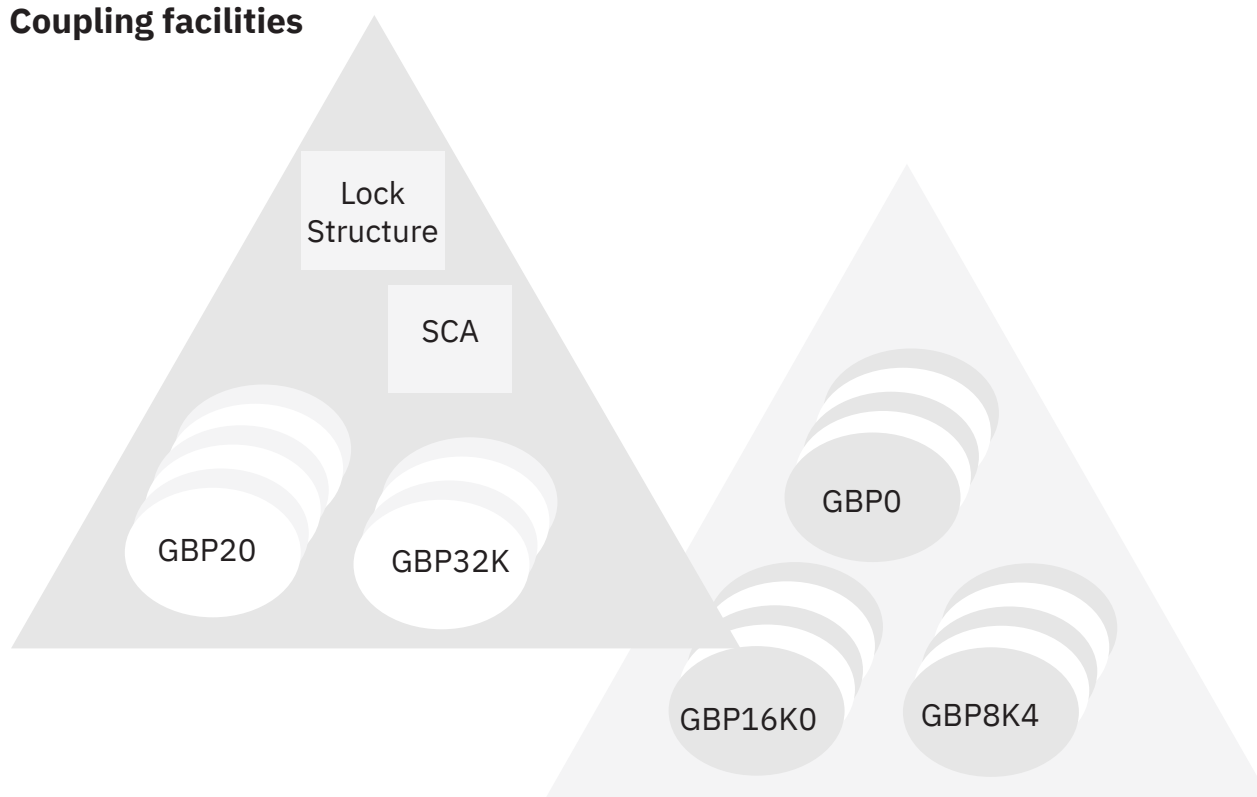


Figure 80. Coupling facility structures that are used by Db2

Members of a data sharing group use the following coupling facility structures to communicate and move data among themselves.

### Lock structure

The lock structure protects shared Db2 resources (such as table spaces and pages) and enables concurrent access to those resources.

The system lock manager (SLM), a component of the z/OS cross-system extended services (XES), presents global lock information to the lock structure on behalf of each member's IRLM.

The lock structure consists of two parts: a coupling facility lock list table (called the *modified resource list*), and a coupling facility lock hash table (called the *lock table*). The modified resource list records locks that protect changed data, thereby protecting the data in case of failure. The lock table contains the lock status information and the owning members of those locks, and is used to provide global lock serialization.

### List structure (SCA)

The list structure contains the Db2 *shared communications area* (SCA). Each member uses the SCA to pass control information to the rest of the members in the group. The SCA contains all database exception status conditions and other information that is necessary for recovery of the group.

### Cache structures (Db2 group buffer pools)

The cache structures are used as group buffer pools (GBPs), caching shared data pages for the members. You have the following options for caching data of interest to more than one member of a group:

- Cache all data (read-only and updated)
- Cache only data that is updated
- Cache only system control pages (specific to LOB table spaces)
- Cache no data; use the group buffer pool only for cross-invalidation

One group buffer pool exists for all member buffer pools of the same name. For example, each member must have a buffer pool 0 (BP0) that contains the catalog and directory table spaces. A group buffer pool 0 (GBP0) must exist on a coupling facility for that data sharing group.

Similarly, if a member creates table space X and associates it with buffer pool 1 (BP1), X is associated with BP1 for every member because there is only one definition of X in the catalog for the entire group. To share the data in X, you must define the cache structure, group buffer pool 1 (GBP1). If you do not define the group buffer pool, a single member can update X or more than one member can read X, but there can be no inter-Db2 read/write activity for X.

**Recommendation:** For data that is private to each member, such as work files or user data that only one member reads, define that data to a buffer pool for non-shared page sets. For example, assume that you want to associate all non-shared page sets with buffer pool 6 (BP6). If you want only member DB2A to access a non-shared table space Y, then define Y (and any indexes) to BP6. Define BP6 with a size of 0 (zero) and then you do not need to define the coupling facility structure for group buffer pool 6. By moving private data to buffer pools that are separate from buffer pools used by shared data, you can more easily monitor, and provide for more predictable performance of, private data.

## Cross-invalidation of group buffer pools

Group buffer pools use a cross-invalidation mechanism to maintain data consistency across the buffer pools of group members. Shared data pages are registered in a group buffer pool directory in each cache structure, thus enabling the coupling facility control program to cross-invalidate the copies of data pages that are held in individual member buffer pools. Cross-invalidation takes place when a member's own buffer pool does not contain the latest version of the data. In this case, the member must reread the pages from either the group buffer pool or disk, if that member needs to reference the pages again.

## Asynchronous cross-invalidation of group buffer pools

Db2 can perform cross-invalidation asynchronously to the completion of coupling facility write requests. This capability requires that the following conditions are true:

- The operating system is z/OS 2.2 or later, and [z/OS APAR OA54688](#) is applied.
- The coupling facility control code (CFCC) level (CFLEVEL) is 23 or greater.

Asynchronous cross-invalidation can occur for deferred writes or force-at-commit writes, and if at least an internally defined number of pages of a page set are written concurrently to the group buffer pool. Asynchronous cross-invalidation does not occur if the data page size is 32KB.

With asynchronous cross-invalidation, transactions do not need to wait until the invalidation process has completed. Although data sharing groups whose members are far from each other can experience more substantial performance improvement with asynchronous cross-invalidation, data sharing groups whose members are close together can also benefit. The performance improvement can be seen in accounting class 2 elapsed times.

### Related concepts

#### [Coupling facility structure size](#)

When a new coupling facility structure is allocated for a data sharing group, its size is usually taken from the value of the INITSIZE parameter in the CFRM policy.

## Defining coupling facility structures

Before you enable Db2 data sharing, you must define coupling facility structures.

## Before you begin

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ” on page 636](#).

## About this task

You must define one lock structure, one list structure, and at least four cache structures:

- Group buffer pool 0
- Group buffer pool 8K0
- Group buffer pool 16K0
- Group buffer pool 32K

The lock structure and list structures (SCAs) do not need to be in the same coupling facility. Individual structures cannot span coupling facilities.

**Recommendation:** Use a Sysplex Failure Management (SFM) policy to define the availability characteristics of the coupling facility structures for lost connectivity failures, which includes a total failure of the coupling facility.

## Procedure

To define coupling facility structures:

1. Determine the following characteristics of your Db2 coupling facility structures:

**Initial size and maximum size of the structures**

The structures can be dynamically re-sized from INITSIZE up to the value in SIZE.

**Structure names**

Determine the names that you will use for the coupling facility structures.

**Availability characteristics**

You must know the preference list (PREFLIST) for rebuilding or reallocating a structure, if the coupling facility fails.

2. Use the z/OS coupling facility resource management (CFRM) policies to define these structures to the Parallel Sysplex and define a SFM policy.

A CFRM policy determines how and where the structure resources are allocated.

See [Adding MVS systems to a sysplex](#) for information about how to create CFRM and SFM policies.

## Example

A sample CFRM policy is shown in the following figure.

```

//POLICYX JOB MSGCLASS=Z,REGION=2000K,CLASS=A,
//          MSGLEVEL=(1,1)
//STEP1 EXEC PGM=IXCMIAPU
//STEPLIB DD DSN=SYS1.MIGLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
DATA TYPE(CFRM) REPORT(YES)
DEFINE POLICY NAME(POLICYX) REPLACE(YES)
  STRUCTURE NAME(DSNDB0A_LOCK1)
    INITSIZE(32000)
    SIZE(64000)
    REBUILDPERCENT(5)
    PREFLIST(CF01,CF02)
  STRUCTURE NAME(DSNDB0A_GBP0)
    INITSIZE(50000)
    SIZE(100000)
    REBUILDPERCENT(5)
    DUPLEX(ALLOWED)
    PREFLIST(CF02,CF01)
  STRUCTURE NAME(DSNDB0A_GBP1)
    INITSIZE(50000)
    SIZE(100000)
    PREFLIST(CF02,CF01)
    DUPLEX(ENABLED)
  STRUCTURE NAME(DSNDB0A_SCA)
    INITSIZE(10000)
    SIZE(20000)
    REBUILDPERCENT(5)
    PREFLIST(CF01,CF02)

  CF NAME(CF01) TYPE(009674)
    MFG(IBM)
    PLANT(00)
    SEQUENCE(000000040016)
    PARTITION(1)
    CPCID(00)
    DUMPSPACE(1200)

  CF NAME(CF02) TYPE(009674)
    MFG(IBM)
    PLANT(00)
    SEQUENCE(000000040029)
    PARTITION(1)
    CPCID(00)
    DUMPSPACE(1200)

//

```

Figure 81. Sample CFRM policy

## Related concepts

### Coupling facility structure names

Names for coupling facility structures must conform to a strict naming convention that is based on the Db2 group name.

### Duplexed structures

Running some or all of the SCA, lock, and group buffer pool structures in duplex mode is one way to achieve high availability for these structures across many types of failures, including lost connections and damaged structures.

### Storage estimates for data sharing environments

As part of planning for a data sharing environment, you should estimate the storage requirements for coupling facility structures and for Db2 resources.

### How to change structure sizes

You can change the size of individual structures by changing the CFRM policy.

### How Db2 recovers from coupling facility failures (Db2 Data Sharing Planning and Administration)

## Related tasks

### Planning for coupling facility availability for data sharing



If properly configured, Db2 and IRLM can recover very quickly and with very little disruption from any kind of coupling facility failure. If coupling facilities are not properly configured, coupling facility failures can cause serious outages for users.

### **Authorization for Db2 to access coupling facility structures**

Optionally, you can set up a facility class profile to limit access to the structures in the coupling facility.

If you do this, ensure that Db2 does have access by ensuring that the IDs that are associated with the Db2 address spaces have alter access authority to the coupling facility structures through RESOURCE(*IXLSTR.structure\_name*) in SAF class CLASS(FACILITY).

If you do not create a facility class profile, the default allows any authorized user or program (supervisor state and program key mask allowing key 0-7) to issue coupling facility macros for the structure.

## **Sysplex Timer**

Install at least one Sysplex Timer in the Parallel Sysplex.

For high availability, more than one Sysplex Timer is required. The Sysplex Timer synchronizes the timestamps of the IBM zSystems servers for all members of the data sharing group. Db2 data sharing uses a value that is derived from the timestamp (as seen in the log) to recover data.

### **Related concepts**

[Configuration of the recovery site \(Db2 Data Sharing Planning and Administration\)](#)

## **Common z/OS libraries**

Db2 supports a configuration with a SYS1.PARMLIB and SYS1.PROCLIB that is shared by all z/OS systems in the Parallel Sysplex. This configuration lets you add and modify systems more easily.

If you intend to have many members in the Parallel Sysplex, each Db2 and IRLM that you define to the z/OS system in the IEFSSNxx parmlib member **requires** a z/OS system linkage index (LX). The default number of these indexes that z/OS reserves is 165. If you place all of your Db2 and IRLM subsystem definitions in a single IEFSSNxx member, you might need more than 165 LXs to start the members.

If you need more than 165 LXs, use the NSYSLX option on the z/OS IEASYSxx parmlib member to increase this number. For more information, see [z/OS MVS Initialization and Tuning Reference](#).

### **Related tasks**

[Naming in Db2 data sharing](#)

By maintaining a consistent naming convention, you can simplify the process of naming the many items in a Db2 data sharing environment. You also simplify the management of name changes, as you add new members or move existing members to different systems in the future.

## **Connectivity requirements in a Parallel Sysplex**

Db2 data sharing requires that all Db2-related resources reside on shared disks. These resources include the Db2 catalog and directory and any user data, and the integrated catalog for Db2 data sets.

Also, all the members' logs and bootstrap data sets (BSDSs) must be on shared disks for recovery purposes. A member that performs recovery must have access to the logs of other members in the group.

**Recommendation:** Place work files on shared disks for the following reasons:

- A member stays connected to its work file even if you need to restart the member on another processor.
- You can create or drop a work file table space from any other member in the data sharing group.

Ensure that you have physical connectivity by checking the following connections:

- Verify that one user-integrated catalog facility exists for cataloging the data sets of a data sharing group, and that you can access this catalog from each z/OS system in the Parallel Sysplex.
- Verify connectivity to the following entries from each system on which a member resides:
  - A set of Db2 target libraries

- A single Db2 catalog
- A single Db2 directory
- All databases that are shared
- All log data sets
- All BSDS data sets
- All coupling facilities used by the data sharing group
- User integrated catalog facility catalogs for shared databases

## Naming in Db2 data sharing

By maintaining a consistent naming convention, you can simplify the process of naming the many items in a Db2 data sharing environment. You also simplify the management of name changes, as you add new members or move existing members to different systems in the future.

### About this task

You assign names to entities during the process of installing Db2 and enabling data sharing. Some parts of a data sharing system require you to specify a valid name. Other names are generated during the installation process.

After installation, you cannot change some names, such as the group name and member names. To change names of data sharing members you must quiesce existing members and add replacement members with the new name. For more information about that process, see [“Renaming data sharing members” on page 619](#).

Assign names to both IRLM and data sharing groups, and to members within a group. One recommendation is to make names and prefixes unique within the Parallel Sysplex. Although this uniqueness is not required for all names, it helps you avoid problems with identifying and moving entities among z/OS systems in the Parallel Sysplex.

If you are enabling the originating member of the group from an existing Db2 subsystem, you can build a naming scheme around existing names to reduce the disruption to existing applications. However, before enabling data sharing, you might want to change some names to lay the foundation for a solid naming convention. For information about the process for changing the name of the originating member, see [“Renaming the originating Db2 subsystem for a new data sharing group” on page 620](#).

Another name to choose carefully is the catalog alias for the group. It is very difficult to change that name. To change the catalog alias for the group, you must bring the entire group down and perform the single-system procedure for every member of the group.

### Procedure

Consider the following suggestions when naming various Db2 entities:

1. Name subsystems first and use the subsystem names as the basis for creating other names.

Subsystem names are limited to four characters, making them the shortest names.

Four-character names are also needed for the following entities:

- Db2 group name; one per data sharing group
- Member name; one for each Db2 subsystem in the group
- IRLM subsystem name; one for each member of the group

One possible naming convention is a Parallel Sysplex-wide approach to naming. This convention assigns subsystem names of the form "*ctmg*" where:

**c**

Denotes a particular collection of logically related applications or subsystems.

**t**

Denotes a type of resource, such as "B" for Db2 or "J" for IRLM.

**m**

Denotes a particular member within a data sharing group or an IRLM group. This identifier also associates a subsystem with its z/OS system for recovery when you use automatic restart.

**g**

Denotes a particular Db2 group.

This information uses "A" as the group identifier. Therefore, the naming scheme has a subsystem name of DB1A for the first member of the data sharing group. The second member is DB2A, and so on. The following table shows how the member identifier relates to a particular z/OS system and how the group identifier associates members across a Parallel Sysplex system. In each column are the names that are associated with a particular z/OS recovery group (z/OS2, for example). In each row are the names that are associated with the primary components of the data sharing group, such as Db2 subsystems and IRLM subsystems.

*Table 50. Subsystem names in a Parallel Sysplex*

<b>z/OS1</b>	<b>z/OS2</b>	<b>z/OS3</b>	<b>z/OS4</b>
DA11 (CICS)	DA21 (CICS)	DA31 (CICS)	DA41 (CICS)
DB1A (Db2)	DB2A (Db2)	DB3A (Db2)	DB4A (Db2)
DJ1A (IRLM)	DJ2A (IRLM)	DJ3A (IRLM)	DJ4A (IRLM)
DD11 (DBCTL)	DD21 (DBCTL)	DD31 (DBCTL)	DD41 (DBCTL)

- If you enable an existing Db2 subsystem for data sharing, and existing applications already access that Db2 subsystem, consider using the name of the existing Db2 subsystem as the group attachment name. This strategy allows existing applications continue to use the data sharing member. It does not require any changes to those applications in terms of specifying a new subsystem name.
- Use the same name for the Db2 group name, the Db2 location name, and the Db2 integrated catalog alias.  
A data sharing group uses the same catalog alias name. This catalog alias is used as the high-level qualifier for the Db2 directory (DSNDB01), catalog (DSNDB06), default database (DSNDB04), and work file database VSAM data sets.
- Use the same names as the member name and Db2 subsystem name for each member.
- Accept the default command prefix for each member.

### **Example of names for a Db2 data sharing environment**

*Table 51. Db2 data sharing naming example*

<b>Entity</b>	<b>Name</b>
Db2 group name	DSNDB0A
ICF catalog alias	DSNDB0A
Group attachment name	DB0A
Subgroup attachment name	SBG1
Catalog and directory database names	DSNDB0A.DSNDB01 and DSNDB0A.DSNDB06
Application defaults module	DSNHDECP

Table 51. Db2 data sharing naming example (continued)

Entity	Name
Target libraries	DSNDB0A.SDSNCLST DSNDB0A.SDSNLINK DSNDB0A.SDSNLOAD DSNDB0A.SDSNEXIT
Network Address	DOMAIN DSNDB0A.svl.ibm.com AND PORT 446
Group DRDA Port	446
Group Secure DRDA Port	448
Location name	STLEC1
Generic LU name	USIBMSY.SYEC1GLU
Parallel Sysplex domain name	DSNDB0A.svl.ibm.com
Group IPv4 Address	1.1.1.1
Group IPv6 Address	1.1.1.1.1.1.1.1
Member name	DB#A
Db2 subsystem name	DB#A
Location alias name	ALIAS1
Member LU name	LUDB2LA
Member domain name	DSNDB0A.svl.ibm.com
Network address	DOMAIN DSNDB0A.svl.ibm.com AND PORT 5001
Resync Port	5001
Member IPv4 Address	2.2.2.2
Member IPv6 Address	2.2.2.2.2.2.2.2
Command prefix	-DB#A
Work file database	WRKDB#A
Load module for subsystem parameters	DSNZP0#A
Member BSDS names	DSNDB0A.DB#A.BSDS01 DSNDB0A.DB#A.BSDS02
Active log data set prefixes	DSNDB0A.DB#A.LOGCOPY1 DSNDB0A.DB#A.LOGCOPY2
Archive log data set prefixes	DSNDB0A.DB#A.ARC1 DSNDB0A.DB#A.ARC2
SCA and group buffer pool connection names	DB2_DB#A

Table 51. Db2 data sharing naming example (continued)

Entity	Name
Procedure names	DB#AMSTR DB#ADBM1 DB#ADIST DB#ASPAS
XCF member name	DB0A
IRLM group name	DXRDB0A
IRLM subsystem name	DJ#A
IRLM procedure name	DB#AIRLM
IRLM member ID	Number 1-12 corresponding to #
IRLM XCF member name	DXRDB0A\$DJ#A12
Lock structure connection name	DXRDB0A\$DJ#A12
Cache structure (group buffer pools)	DSNDB0A_GBPO
Lock structure	DSNDB0A_LOCK1
List structure (shared communications area)	DSNDB0A_SCA

## What to do next

Consider a convention for names for distributed processing. Those naming conventions are probably be part of a much broader convention. See your network administrator for more information about choosing names for distributed access.

## Data sharing group names

Group names are shared by all members of the data sharing group. Db2 group names include the generic LU name, group attachment name, location name, and coupling facility structure names.

The following names are considered group names:

### Db2 group name

The name that encompasses the entire data sharing group. The coupling facility structure names are based on this name.

The Db2 group name must be unique within the Parallel Sysplex. If you use this name as a basis for the location name, the Db2 group name must be unique within the network.

This name can be up to eight characters long, it must begin with an alphabetic character, and it can consist of the characters A-Z, 0-9, \$, #, and @. An example of a Db2 group name is DSNDB0A.

**Restrictions:** To avoid names that IBM uses for its XCF groups, do not begin Db2 group names with the letters A-I unless the first three characters are DSN. Do not use the string SYS as the first three characters, and do not use the string UNDESIG as the group name.

**Important:** Never reuse a Db2 group name, even if a data sharing group that previously used the name no longer exists. Some data sharing information, such as the Db2 group name, is retained in the Parallel Sysplex couple data set (CDS). To determine what Db2 group names exist, execute the z/OS command DISPLAY XCF,GROUP.

### ICF catalog alias

The name of the Integrated Catalog Facility (ICF) catalog alias that you must place in the z/OS master catalog. This name can be up to 8 characters long, and it should be the same as the Db2 group name. An example of an ICF catalog alias name is DSNDB0A.

**Group attachment name**

The name that is used by the TSO/batch attachment, the call attachment facility (CAF), DL/I batch, utilities, and the Resource Recovery Services attachment facility (RRSAF) as a "generic" attachment name. This name can be up to four characters long. An example of a group attachment name is DBOA.

**Subgroup attachment name**

The name that is used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections requests to identify which subgroup attachment to use. This name can be up to four characters long. An example of a subgroup attachment name is SBG1.

**Catalog and directory database names**

All Db2 subsystems in the group share the same catalog and directory. Examples of the catalog and directory database names are *catalias.DSNDB01* and *catalias.DSNDB06*.

**Application defaults module>**

The name of the module that contains the application programming defaults. This module resides in SDSNEXIT. The name can be up to eight characters long. DSNHDECP is an example module name.

**Target libraries**

Target libraries can be shared among Db2 group members or can be replicated. Example names for target libraries are *catalias.SDSNCLST*, *catalias.SDSNLINK*, *catalias.SDSNLOAD*, and *catalias.SDSNEXIT*.

**Network Address**

The group DVIPA and port number. It can be an IPv4 address, an IPv6 address, or both.

**DRDA port number**

The port number that is used by the distributed data facility (DDF) to accept incoming SQL connection requests, if the data sharing group uses TCP/IP. 446 is the recommended DRDA port.

**Secure DRDA port number**

The secure port identifies the TCP/IP port number that is used by DDF to accept inbound secure DRDA connection requests.

**Location name**

The name that is used when the data sharing group processes distributed requests. The group is treated as a single location by remote requesters. Requesters use this name in their SQL applications. This name can be up to 16 characters long.

**Generic LU name**

This name lets remote requesters configure their systems to treat the data sharing group as a single LU. This name can be up to eight characters long.

**Parallel Sysplex domain name**

This name lets you take advantage of workload balancing for TCP/IP connections.

**Group IPv4 address**

GRPIPV4 identifies a constant IPv4 address to be associated with the data sharing group for which this DDF is a member.

**Group IPv6 address**

GRPIPV6 identifies a constant IPv6 address to be associated with the data sharing group for which this DDF is a member.

**Related concepts**

[Group attachment names and subgroup attachment names](#)

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

[Communicating with data sharing groups \(Db2 Data Sharing Planning and Administration\)](#)

[Group TCP/IP access \(Db2 Data Sharing Planning and Administration\)](#)

[Specifying the DRDA port number \(Db2 Data Sharing Planning and Administration\)](#)

## Group attachment names and subgroup attachment names

Group and subgroup attachments are used by TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

A group attachment name acts as a generic name for all the members of a data sharing group. Subgroup attachment names can be used to specify a subset of members within a group attachment and provide more organization and control over connection requests. To specify subgroup attachment names, you must use Db2 12 early code.

Specify the group attachment name and subgroup attachment name for a subsystem in member IEFSSNxx. You can let the Db2 installation process do this for you by specifying the names on installation panel DSNTIPK, or you can update the member yourself. If you use the DSNTIPK panel, the installation CLIST places the specified names in the IEFSSNxx member and in the DSNHDECP load module for the group. Specify the group attachment name and subgroup attachment name at a convenient time (during a planned IPL, for example).

The following rules apply to group attachment and subgroup attachment names:

- A subgroup attachment cannot have the same name as a group attachment.
- Neither the group attachment nor the subgroup attachment should have the same name as a Db2 member.
- If you specify a subgroup attachment name, you must also specify a group attachment name. A subgroup attachment must belong to one, and only one group attachment.
- A member can belong to one subgroup attachment at most and does not need to belong to a subgroup attachment.

The group attachment name and subgroup attachment name are included in the output for the command DISPLAY GROUP.

Even if you have not yet enabled data sharing, the group attachment name and subgroup attachment name is active after you IPL the system. An active group attachment name and subgroup attachment name in a non-data sharing environment is not a problem. Until you are ready to move to data sharing, continue to specify the Db2 subsystem name in your TSO and batch jobs. When you are ready to move to data sharing, you can change those jobs to specify a group attachment name and subgroup attachment name without the need for an IPL.

## How Db2 chooses a subsystem name

When you submit a job on a z/OS system, Db2 treats the name that you specified on the Db2 connection request as a subsystem name, a group attachment name, or a subgroup attachment name. Db2 first assumes that the name is a subsystem name and attaches to that subsystem if either of the following is true:

- The subsystem is started.
- The subsystem is not started, and NOGROUP was specified in the Db2 connection request. NOGROUP indicates that group attachment or subgroup attachment processing is not to be considered. If RETRY was specified in the command, Db2 tries to attach the subsystem again in 30 seconds. The value of RETRY determines the number of times that Db2 re-attempts to attach.

Db2 assumes that the name on the Db2 connection request is a group attachment name or subgroup attachment name if no qualifying subsystem is found and either of the following is true:

- No subsystem with the name in the command is defined.
- A subsystem with that name is not started, the group attachment name or subgroup attachment name is the same as its subsystem name, and NOGROUP was not specified in the Db2 connection request.

When Db2 assumes that the name is a group attachment name or subgroup attachment name, it performs the following actions:

- Constructs a list of Db2 subsystems that are defined to this z/OS.

To create the list, Db2 adds each subsystem during subsystem initialization. At IPL time, subsystems are initialized in the order in which they appear in member IEFSSNxx if the MVS Subsystem Interface (SSI) is running on a single processor. If the MVS SSI is running on multiple processors in parallel, the subsystems are placed in the group attachment name list in the order that they complete initialization. In this case, the order of the list is unpredictable. If you add a subsystem with the z/OS SETSSI command, that subsystem is added to the list at that time.

- Tries to attach to the subsystems in the list in random order until it finds one that is started on this z/OS. However, if RANDOMATT=NO has been specified for a Db2 subsystem, that subsystem is excluded from the random search.
- Searches for any available Db2 subsystem within the group or subgroup, including those that specify RANDOMATT=NO, if the random search finds no available Db2 subsystems or if RANDOMATT=NO is specified for all subsystems. Search order is defined according to the order in which z/OS subsystem initialization completes for each Db2 subsystem. If you want to direct work to certain Db2 subsystems, set the RANDOMATT subsystem parameter to YES on those subsystems. If you want to direct work away from certain Db2 subsystems, set the RANDOMATT subsystem parameter to NO on those subsystems.

If the name on the Db2 connection request is not a group attachment name or subgroup attachment name, a "not started" message is returned.

If you need to prevent a batch workload from running on a Db2 subsystem that is intended for high-performance online transactions, specify RANDOMATT=NO for the online subsystems and RANDOMATT=YES for the batch workload subsystems. In that case, the batch jobs use the group attachment name or subgroup attachment name, and the online subsystem does not.

Alternatively, to achieve non-randomized group attachments or subgroup attachments, as in Version 8 of Db2, specify RANDOMATT=NO for all members of the group.

## When a subsystem and a group attachment name or subgroup attachment name are the same

When you begin moving to data sharing, ensure that your IEFSSNxx definitions are correct and Db2 connection requests are coded to get the results that you intend. You should especially ensure that the definitions are correct when the group attachment name or subgroup attachment name is the same as a subsystem name. Incorrect IEFSSNxx definitions might be troublesome if you have inactive subsystems that are still defined but not used.

Assume you have the following subsystem definitions on a z/OS system:

```
DB2A,DSN3INI,'DSN3EPX,-DB2A,S' ←Inactive subsystem
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB2A' ←Active subsystem
```

The jobs that are submitted on this z/OS system try to connect to the name DB2A. Db2 tries to connect to subsystem DB2A before considering group attachment processing. However, because DB2A is not started and it lacks a group attachment name, Db2 does not invoke group attachment processing and find DB1A as you might have intended. To avoid this situation, include the group attachment name in the definition of DB2A, or remove entry IEFSSNxx for subsystem DB2A if it is obsolete. With DB2A defined as the group attachment name for subsystem DB2A, Db2 tries to attach to DB1A after it discovers that DB2A is not started.

Alternatively, you might want a job to connect to a specific subsystem, but it connects to another subsystem in the group instead.

Assume that you have the following subsystem definitions on a z/OS system:

```
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB1A'. ←Inactive subsystem
DB2A,DSN3INI,'DSN3EPX,-DB2A,S,DB1A'. ←Inactive subsystem
DB3A,DSN3INI,'DSN3EPX,-DB3A,S,DB1A'. ←Active subsystem
```

Notice that DB1A is specified as a subsystem and also as the group attachment name for all three subsystems.



The jobs are submitted on this system with a Db2 connection request that specifies the name DB1A and omits the NOGROUP keyword. Db2 tries to connect to subsystem DB1A, but does not. Instead, Db2 invokes group attachment processing and eventually connects to DB3A, the first active subsystem with the group attachment name. You might have intended that the job connect only to DB1A. To ensure that Db2 connects to subsystem DB1A and no other subsystem, specify NOGROUP in the Db2 connection request to disable group attachment processing. Specify the RETRY keyword in the request to indicate the number of times, at 30-second intervals, that Db2 will try to connect to DB1A again.

### **Related tasks**

Registering the command prefixes, member group attachment name, and subgroup attachment name  
Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

## **Member names**

Member names include the individual Db2 member (subsystem) name and its associated z/OS subsystem name, procedure names, and BSDS and log names. Member names must be unique within the data sharing group or, in certain cases, the z/OS Parallel Sysplex.

The following names are considered member names:

### **Member name**

The name of an individual member of a data sharing group. A member name can be up to eight characters long, and it can consist of the characters A-Z, 0-9, \$, #, and @. Db2 uses this name to form its z/OS cross-system coupling facility (XCF) member name. This name must be unique within the data sharing group. If the member name is also used as the high level qualifier for the member's data sets (BSDS, logs, and so on), member names must be unique within the z/OS Parallel Sysplex. This is because the z/OS Parallel Sysplex can have a shared master catalog. An example of a member name is DB1A.

### **Db2 subsystem name**

The name of a Db2 subsystem that is a member of a data sharing group. This name is used by all the attachment interfaces. A Db2 subsystem name can be up to four characters long, and it must be unique within the Parallel Sysplex. The member name and the Db2 subsystem name should be the same. An example of a Db2 subsystem name is DB1A.

### **Location alias name**

This name can represent one, several, or all members of a data sharing group. A location alias name enables you to define subsets of data sharing group members. Subsetting gives you the ability to limit the members to which DRDA requesters can connect.

### **Member LU name**

The network name of an individual member of a data sharing group. A logical unit (LU) name must be unique both within the group and within the network. This name can be up to eight characters long.

### **Member domain name**

This name lets Db2 handle indoubt thread resolution for TCP/IP connections.

### **Network Address**

The member DVIPA and port number. It can be either an IPv4 address, an IPv6 address, or both. The TCP/IP port number that is used by the distributed data facility (DDF) to accept incoming DRDA two-phase commit resynchronization requests, if the data sharing group uses TCP/IP. Each member of a data sharing group listens on a unique resynchronization port.

### **Member IPv4 Address**

A constant IPv4 address to be associated with the data sharing member.

### **Member IPv6 Address**

A constant IPv6 address to be associated with the data sharing member.

### **Command prefix**

The prefix that directs commands entered at a z/OS console to a particular member of a data sharing group. The command prefix can be up to eight characters long and the first character must be a special character. The default prefix is the concatenation of the hyphen character (-) with the Db2 subsystem name.

This string is specified as a parameter on the IEFSSNxx subsystem definition. An example of a command prefix is -DB1A. You can have blanks between the command prefix and the command.

Do not assign a command prefix that is used by another Db2 subsystem or that can be interpreted as belonging to more than one Db2 subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix starting from the first character. For example, it is invalid to assign a hyphen (-) to one Db2 subsystem and '-DB2A' to another Db2 subsystem. Similarly, it is invalid to assign '?Db2' to one Db2 subsystem and '?DB2A' to another Db2 subsystem. It is valid, for example, to assign '-DB2A' and '-DB3A' to different Db2 subsystems.

### Work file database

The name of the work file database that is associated with a member of the data sharing group. Each member has its own work file database. In a non-data sharing environment, a Db2 subsystem's work file database is called DSNDB07. In a data sharing environment, although one member of the group can have a work file database with the name DSNDB07, you might want to create one with a more meaningful name, such as WRKDB1A, for member DB1A. This name can be up to eight characters long.

Work file data sets have names of the format *catalias.DSNDBC.mworkdb.DSNkknn.y0001.A001*, where y can be either I or J.

**Restriction:** You cannot specify a work file database name that begins with DSNDB unless the name is DSNDB07.

### Load module for subsystem parameters

The name of the load module that contains a member's subsystem parameters. Each member has its own subsystem parameters. The load module resides in SDSNEXIT. The name is specified as a parameter on *mssnMSTR* procedure.

The load module name can be up to eight characters long. An example name is DSNZP01A, a naming convention that you can use to associate member DB1A with DSNZP01A.

**Choosing names for member data sets:** When choosing names for member data sets, remember that data set names beginning with *membrname* must have a master catalog alias to point to the catalog where the data sets are cataloged. The Db2 installation process does not create this catalog alias. One way to handle this is to begin member data set names with *catalias* and a member-related qualifier. For example, member data set names could take the form *catalias.membrname.xxxxx*. This format eliminates the need to have a master catalog alias for *membrname*.

### Member BSDS names

The names of bootstrap data sets (BSDS) belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These names can be up to 33 characters long. Example BSDS names are DSNDB0A.DB1A.BSDS01 and DSNDB0A.DB1A.BSDS02.

### Active log data set prefixes

The prefixes of active log data sets belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These prefixes can be up to 30 characters long. Example active log data set prefixes are DSNDB0A.DB1A.LOGCOPY1 and DSNDB0A.DB1A.LOGCOPY2.

### Archive log data set prefixes

The prefixes of archive log data sets belonging to a member of a data sharing group. The catalog alias can be added as the first qualifier. These prefixes can be up to 35 characters long unless you want the data sets timestamped. If they are timestamped, these prefixes can be up to only 19 characters long. Use the **TIMESTAMP ARCHIVES** parameter of installation panel DSNTIPH to specify whether you want the date and time qualifiers to be added to the archive log data set prefix.

Example archive log data set prefixes are DSNDB0A.DB1A.ARC1 and DSNDB0A.DB1A.ARC2.

### SCA and group buffer pool connection names

The connection name is generated by Db2. You see it only in certain commands (z/OS D XCF,STRUCTURE and the Db2 connection list display of DISPLAY GROUPBUFFERPOOL). The connection name can be up to 16 characters long. An example connection name is *DB2\_membrname*.

## Procedure names

The procedure names are generated from the member subsystem name at installation. The names can be up to eight characters long. Example procedure names are *mssnMSTR*, *mssnDBM1*, *mssnDIST*, and *mssnSPAS*.

## XCF member name

This is the same as the member name for Db2; thus, a maximum of eight characters is used.

## Related concepts

[Group TCP/IP access \(Db2 Data Sharing Planning and Administration\)](#)

## Related tasks

[Choosing names for the local subsystem](#)

You define the names for the local subsystem and its VTAM password to Db2 by using the installation panels, or by using the change log inventory utility.

[Registering the command prefixes, member group attachment name, and subgroup attachment name](#)

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

## Related reference

[COMMAND PREFIX field](#)

The value of the COMMAND PREFIX field specifies the Db2 subsystem command prefix. When the prefix appears at the beginning of a command that is entered at a z/OS operator's console, z/OS passes the command to Db2 for processing. The command prefix is used in the Db2 entry of member IEFSSNxx of SYS1.PARMLIB.

## IRLM names

Each member of a data sharing group has its own IRLM. The IRLM group name, subsystem name, and member ID are parameters on the IRLM startup procedure.

This means that every IRLM in the group must have a separate IRLM procedure. The following figure shows the relationship between Db2 group names and IRLM group names.

Db2 group: DSNDB0A

IRLM group: DXRDB0A

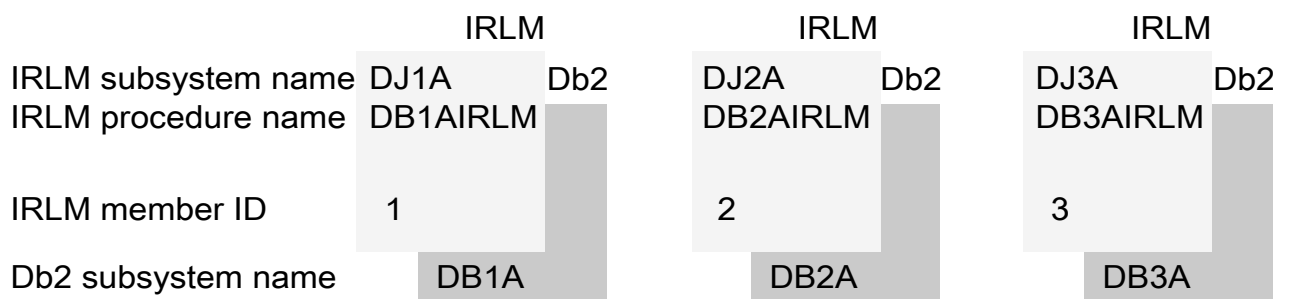


Figure 82. Relationship between Db2 and IRLM group names

You must choose the following IRLM names before installing Db2:

## IRLM group name

The name that encompasses the entire IRLM group. This name can be up to eight characters long and can consist of the characters A-Z, 0-9, \$, #, and @. The group name must begin with an alphabetic character. The name must be unique across the Parallel Sysplex.

**Restriction:** To avoid names that IBM uses for its XCF groups, do not begin with the letters A-I unless the first three characters are DXR. Do not use the string SYS as the first three characters, and do not use the string UNDESIG as your group name.

The IRLM group name is a parameter (IRLMGRP=) on each member's IRLM procedure. An example IRLM group name is DXRDB0A, a naming convention that you can use to associate member DB0A with DXRDB0A.

### IRLM subsystem name

Each IRLM must have a subsystem name that must be unique within the data sharing group and can be up to four characters long and. This name is a parameter on the IRLM procedure.

A sample subsystem name is DJ1A. The "1A" characters indicate that this IRLM is paired with the member DB1A.

### IRLM procedure name

Each member of a data sharing group knows its IRLM by the procedure and subsystem names saved in that member's installation parameter load module. The IRLM procedure name can be up to eight characters long.

**Recommendation:** Use the member subsystem name followed by "IRLM." An example IRLM procedure name is DB1AIRLM.

### IRLM member ID

This ID uniquely names an IRLM within a group. It is a parameter on the IRLM procedure and must be unique within the data sharing group. It is a number in the range 1–255 (inclusive).

The following names also apply to IRLMs:

### IRLM XCF member name

This name can be up to 16 characters long. An example IRLM XCF member name is `xxxxxxx$issnNNN`, where `xxxxxxx` is the IRLM group name, `issn` is the IRLM subsystem ID, and `NNN` is the IRLM member ID. Dollar signs (\$) are used as padding. This name is generated at startup time.

### Lock structure connection name

The connection name is the same as the IRLM XCF member name. It is generated by IRLM. You see it only as the output of certain commands (such as `z/OS D XCF,STRUCTURE`). In some cases, the connection name can be of the format `xxxxxxx#issnNNN`.

### Related reference

[START irlmproc command z/OS IRLM\) \(Db2 Commands\)](#)

## Coupling facility structure names

Names for coupling facility structures must conform to a strict naming convention that is based on the Db2 group name.

Sample names are shown in the following table:

*Table 52. Sample names of coupling facility structures*

Structure type	Example name
Cache structure (group buffer pools)	DSNDB0A_GBP0
Lock structure	DSNDB0A_LOCK1
List structure (shared communications area)	DSNDB0A_SCA

### Group buffer pool names

Use a name of the following format on the CFRM policy to define the group buffer pool to the coupling facility. The name can be up to 16 characters long.

```
groupname_GBPxxxx
```

Where `GBPxxxx` is the name of the group buffer pool; the following restrictions apply:

- 4 KB group buffer pools are named `GBP0`, `GBP1`, ..., `GBP49`
- 8 KB group buffer pools are named `GBP8K0`, `GBP8K1`, ..., `GBP8K9`
- 16 KB group buffer pools are named `GBP16K0`, `GBP16K1`, ..., `GBP16K9`
- 32 KB group buffer pools are named `GBP32K`, `GBP32K1`, ..., `GBP32K9`

**Requirement:** You must define GBP0, GBP8K0, GBP16K0, and GBP32K. You must also define any other group buffer pools that you need for your particular data sharing setup.

When Db2 duplexes a group buffer pool structure, the same structure name is used for both the primary and secondary structures. A duplexed structure requires a single CFRM policy structure definition, with one structure name.

### Lock structure name

Use a name of the following format on the CFRM policy to define the lock structure to the coupling facility. The name can be up to 16 characters long.

```
groupname_LOCK1
```

### Shared communications area

Use a name of the following format on the CFRM policy to define the SCA to the coupling facility. The name can be up to 16 characters long.

```
groupname_SCA
```

## Renaming data sharing members

Strictly speaking, the renaming of existing data sharing members is not supported. However, you can change the names of your data sharing group members by replacing the members that you want to rename.

### Before you begin

Changing member names in your data sharing group Db2 data sharing members is an activity that requires careful planning. For more information, see [“Naming in Db2 data sharing”](#) on page 608.

### Procedure

To change the names of existing members of a data sharing group:

1. Define the correct profile names for the DSNR class. Make sure that RACF definitions are in place to handle the new subsystem names. Add the correct names to the following tables:
  - The RACF router table. For more information, see [The RACF router table \(z/OS Security Server RACF System Programmer's Guide\)](#).
  - The started procedures table (ICHRIN03), if used. For more information, see [Defining RACF user IDs for Db2-started tasks \(Managing Security\)](#) and [The started procedures table \(ICHRIN03\) \(z/OS Security Server RACF System Programmer's Guide\)](#).
2. Replicate existing PERMIT commands to allow users and groups to access the new profiles.
3. Quiesce the member that you want to rename, as described in [Quiescing a data sharing member \(Db2 Data Sharing Planning and Administration\)](#).
4. Add a member with the new name, as described in [“Adding a new data sharing member”](#) on page 675.

### Related concepts

[Planning for Db2 data sharing](#)

Db2 data sharing introduces special requirements for your Db2 and z/OS environments.

### Related tasks

[Renaming the originating Db2 subsystem for a new data sharing group](#)

When you enable Db2 data sharing, you can rename the Db2 subsystem that becomes the originating member and reuse the original subsystem name as the group attach name. The result is that existing

jobs and other workloads can continue to connect to the group instead of the subsystem, without modifications to the jobs or applications.

## Renaming the originating Db2 subsystem for a new data sharing group

When you enable Db2 data sharing, you can rename the Db2 subsystem that becomes the originating member and reuse the original subsystem name as the group attach name. The result is that existing jobs and other workloads can continue to connect to the group instead of the subsystem, without modifications to the jobs or applications.

### Before you begin

Renaming a Db2 subsystem and renaming members in a data sharing group require careful planning. Also, because every installation has a different configuration, this procedure might not be complete for your environment.

**Tip:** Rename the originating subsystem during the process for enabling Db2 data sharing because Db2 must be stopped when you complete this process.

### About this task

The following procedure describes an approach to changing the name of the Db2 subsystem that becomes the originating member of a new data sharing group. It is a variation of the process for enabling data sharing, as described in [“Enabling Db2 data sharing”](#) on page 662.

The examples change the name of member DB2P to DB1A, which conforms to the naming convention used in other examples in the Db2 data sharing information

### Procedure

To rename the originating member when enabling data sharing, complete the following steps:

1. Define the correct profile names for the DSNR class. Make sure that RACF definitions are in place to handle the new subsystem names. Add the correct names to the following tables:
  - The RACF router table. For more information, see [The RACF router table \(z/OS Security Server RACF System Programmer's Guide\)](#).
  - The started procedures table (ICHRIN03), if used. For more information, see [Defining RACF user IDs for Db2-started tasks \(Managing Security\)](#) and [The started procedures table \(ICHRIN03\) \(z/OS Security Server RACF System Programmer's Guide\)](#).
2. Replicate existing PERMIT commands to allow users and groups to access the new profiles.
3. Run the installation CLIST, as described in [“Running the CLIST for enabling data sharing”](#) on page 663, and update the following values (you cannot change the subsystem name on the installation panels):
  - a) On installation panel DSNTIPH, modify the archive prefix names to include the member name; for example: DB2PCAT.DB1A.ARCLG1
  - b) Specify the old subsystem name (for example: DB2P) as the group attachment name.
4. Modify the IEFSSNxx member for this subsystem to include the group attachment name.

**Tip:** To avoid having to modify JCL for all your jobs, use the existing subsystem name as the group attachment name.

This step is necessary to ensure that there are no problems when the call attachment and TSO attachment facilities try to use the group attachment name.

For example, if the existing IEFSSNxx member looks like this:

```
DB2P,DSN3INI,'DSN3EPX,?'
```

Change it to look like this:

```
DB2P,DSN3INI, ' DSN3EPX, ?, S, DB2P '
```

5. Add new IEFSSNxx definitions for the new name and prefix by taking one of the following actions:

- Modify the names to the IEFSSNxx member and IPL z/OS. For example:

```
DB1A,DSN3INI, ' DSN3EPX, -DB1A, S, DB2P '
```

The command prefix -DB1A is not a subset or a superset of the DB2P command prefix. For example, ?DB1A is not valid in this context.

- Use the z/OS command SETSSI to set the definitions without an IPL. For example:

```
SETSSI ADD, SUBNAME=DB1A, INITRTN=DSN3INI, INITPARM=' DSN3EPX, -DB1A, S, DB2P '
```

If you use this alternative, you must also add the new name and prefix to the IEFSSNxx member before the next IPL.

You can leave the old IEFSSNxx definitions in place until you complete the process of enabling data sharing. However, it is best to remove them after you finish enabling data sharing. The change does not take effect until the next IPL of z/OS. However, you can use an SETSSI command to delete the obsolete definition until the next IPL, for example:

```
SETSSI DELETE, SUBNAME=DB2P, FORCE
```

6. Stop Db2 and ensure that all work is stopped:

- a) Issue a STOP DB2 command with the MODE(QUIESCE) option.
- b) Restart Db2 in ACCESS(MAINT) mode.
- c) Issue a -DISPLAY THREAD(\*) TYPE(\*) command to identify indoubt threads. Then use the -RECOVER INDOUBT command for any indoubt threads.
- d) Issue a -DISPLAY UTILITY(\*) command to identify unterminated utilities. Then use the -DSN1 TERM UTILITY(\*) command to terminate all utilities.
- e) Stop Db2 with the MODE(QUIESCE) option.

7. Rename the BSDS and active log data sets with the new prefix, like DB2PCAT.DB1A.BSDS01.

8. Modify and run job DSNTIJIN to alter the active log data sets to specify SHAREOPTIONS(2 3). Before running the job, verify that the AMS ALTER statements there specify the new name for the active log data sets.

9. Update the BSDS with the renamed log data sets. Include the same RBA ranges as the original active log data sets:

- a) Run the utility print log map (DSNJU004) to obtain the start and end RBAs.
- b) Run the utility change log inventory (DSNJU003) to delete the active logs with the old names.
- c) Run the utility change log inventory (DSNJU003) to add the renamed active logs with the correct ranges. You do not need to add the archive log data sets. The archive log data sets that you specified on panel DSNTIPH replace them.

10. If necessary, increase the size of the BSDS.

11. Run the following jobs to define system settings.

- a) Run job DSNTIJUZ to assemble and link-edit the new subsystem parameter (DSNZPxxx) module. First, verify these settings:
  - DSN6GRP.MEMBNAME: The member name; for example: DB1A
  - DSN6ARVP.ARCPF1 and DSN6ARVP.ARCPF2; for example: The archive log data set name prefixes; for example: DB2PCAT.DB1A.ARCHLOG1
  - DSN6SPRM.ADMTPROC: The name of the Db2 Administrative Scheduler address space procedure; for example: DB1AADMT

- b) Run job DSNTIJUA to assemble and link-edit the new application programming default (DSNHDECP) module. First, verify the setting of the DSNHDECM.SSID parameter for the group attach name; for example: DB2P
- c) Run job DSNTIJUL to modify the BSDS and establish the subsystem as the first member of the group. Before running the job, verify the following settings:
  - The names of the BSDS; for example: DB2PCAT.DB1A.BSDS01
  - The GROUPMEM parameter; for example: GROUPMEM=DB1A
12. If necessary, increase the size of the SYSLGRNX table space.
13. Rename the startup procedures. For example, change DB2PMSTR to DB1AMSTR. Do not forget to change the BSDS names to the new names in the *ssnmMSTR* startup procedure.
14. Modify the IRLM startup procedure for the member.
  - a) Change the SCOPE parameter setting from LOCAL to GLOBAL.
  - b) Set the IRLMGRP parameter to the name that is to be used for the IRLM group. This name must be different from the Db2 group name.
15. Verify that CICS can connect to the new Db2 subsystem. There are several ways of doing this, depending on which level of CICS you are running.

For example, you might use one of the following techniques:

  - Change the CICS DB2CONN to use the new Db2 subsystem name, reassemble, and link-edit.
  - Modify the JCL for CICS to include the new subsystem name on the INITPARM.
16. Verify that IMS can connect to the new Db2 subsystem.
17. Start Db2 by issuing a START DB2 command.

## What to do next

Complete the process for enabling data sharing, by continuing with the step described in [“Creating the default storage group and defining temporary work files: DSNTIJTM”](#) on page 673.

After data sharing is enabled, remove old definitions from the IEFSSNxx member, as described at the end of step 5.

## Planning for availability in a data sharing environment

When planning your data sharing configuration for the high availability, the primary concerns are the physical protection of the coupling facility, the structures in the coupling facility, and network connectivity. The SCA and lock structure are both necessary for the data sharing group to function.

### About this task

To plan for high availability of your data sharing group, take the following actions:

### Procedure

1. Duplexing the group buffer pool and store the SCA and lock structures in failure-isolated coupling facilities as described in [“Planning for coupling facility availability for data sharing”](#) on page 624.
2. Define a dynamic virtual IP address (DVIPA) for the Db2 group and a DVIPA for each Db2 member in the group.

DVIPA addressing gives you the ability to assign a specific virtual IP address to a data sharing group and to each member of the group. This address is independent of any specific TCP/IP stack within the Parallel Sysplex. Even if a member is moved to another z/OS system, as in the case of a failure or maintenance, the member remains accessible and retains the same virtual IP address.

- To achieve the highest level of application availability at the database level, route connections using the Db2 Universal JDBC Driver or Db2 Connect Server with connection concentrator and Sysplex Workload Balancing support enabled. To route all connections through a Db2 Connect Server with



Sysplex support enabled, you must first configure the Db2 group and each Db2 member to use DVIPA. The Db2 Connect Server then manages the connections to the group using the DVIPAs.

- To support JTA and JTS distributed transactions, the Db2 Universal JDBC Driver and the WebSphere® Application Server can be used to coordinate commits against a data sharing group. If using the Db2 Universal JDBC Driver, group and member DVIPA need to be configured in order to recover indoubt threads after a system failure.

## **Automatic restart of z/OS**

The purpose of automatic restart is to reduce the amount of time that a particular system is down.

When Db2 or IRLM stops abnormally, the surviving z/OS systems analyze the situation to determine whether z/OS failed too, and where Db2 or IRLM should be restarted. If z/OS did not fail, then Db2 or IRLM is restarted on the same z/OS image. If z/OS failed, then Db2 or IRLM is restarted on another z/OS image.

Automatic Restart Manager (ARM) is the component of z/OS that manages automatic restarts.

### ***Advantage of automatic restart***

When Db2 and IRLM restart automatically, locks that are held by failed members are released quickly.

Applications that are running on other members can then access data for which the failed member is holding incompatible locks. Consider using automatic restart in conjunction with the RETAINED LOCK TIMEOUT option of installation panel DSNTIPI.

You must install Db2 with a command prefix scope of "started" to take advantage of automatic restart.

### **Related concepts**

The scope and uniqueness of Db2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

### **Related tasks**

Registering the command prefixes, member group attachment name, and subgroup attachment name

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

### ***Automatic restart policies***

You control how automatic restart works by using z/OS automatic restart policies.

When the automatic restart function is active, the default action (for both sharing and non-sharing Db2 subsystems and IRLMs) is to restart the subsystems when they fail. If this default action is not what you want, you must create a policy that defines the action that you want to be taken.

### ***Creating an automatic restart policy***

If the default action of restarting Db2 and IRLM is the action that you want, you do not need to create an automatic restart policy.

## **Before you begin**

If you do want to change the default restart behavior of Db2 or IRLM, you need to know the automatic restart element name.

In a data sharing group, the Db2 element name is the Db2 group name concatenated with the member name (such as DSNDB0ADB1A).

For IRLM, the element name is the IRLM group name concatenated with the IRLM subsystem name and three-character member ID (such as DXRDB0ADJ1A001).

You can also specify a pattern-matching character (such as `DSNDB0A*`) if you want to use a single policy statement for all members in the group.

## About this task

Db2 startup can be a little faster when z/OS Automatic Recovery Manager (ARM) restarts IRLM because this activity is done in parallel. Db2 does not have to start IRLM and wait. However, if you do not want IRLM to automatically restart after a failure, you can modify the IRLM element.

You can also tailor the restart policy to use restart light. Restart light enables Db2 to restart with a minimal storage footprint to quickly release retained locks and then terminate normally. It is not recommended for a restart in place, but it is recommended for a cross-system restart in the event of a failed z/OS system. It is primarily intended to restart Db2 temporarily on another z/OS system that does not have the capacity to sustain a Db2 and IRLM pair.

## Procedure

Create an ARM policy with one or both of the following specifications as needed for your system.

- To specify that Db2 or IRLM is not to be restarted after a failure:

Include `RESTART_ATTEMPTS(0)` in the policy for that Db2 or IRLM element. For IRLM, you can also use the `MODIFY irlmproc,ABEND` command, as shown below, to stop IRLM and unregister it from ARM when it comes down. Unregistering prevents IRLM from automatically restarting after you bring it down.

```
MODIFY irlmproc,ABEND,NODUMP
```

However, if a member's `AUTO START` option of installation panel `DSNTIPI` has a value of `YES`, and if z/OS restarts Db2 automatically, Db2 restarts IRLM, too.

- To have Db2 restarted in a light mode (restart light):

Modify the ARM policy for the Db2 group to specify `LIGHT(YES)` or `LIGHT(NOINDOUBTS)` within the `RESTART_METHOD(SYSTEM)` keyword for the Db2 element name. For example:

```
RESTART_METHOD(SYSTEM,STC,'cmdprfx STA DB2,LIGHT(YES)')
```

## Planning for coupling facility availability for data sharing

If properly configured, Db2 and IRLM can recover very quickly and with very little disruption from any kind of coupling facility failure. If coupling facilities are not properly configured, coupling facility failures can cause serious outages for users.

## About this task

When planning your data sharing configuration for high availability, the primary concerns are physical protection of the coupling facility, protection of the structures in the coupling facility, and the network connectivity. The SCA and lock structure are both necessary for the group to function.

Multiple coupling facilities are always required for high availability because a single coupling facility is single point of failure for the data sharing group. With multiple coupling facilities, you can specify that structures be allocated in the secondary coupling facility, if the primary coupling facility is damaged. You can also consider duplexing SCA, lock, and group buffer pool structures. With duplexing, a secondary structure is always on standby in another coupling facility. This secondary structure is ready to take over if the primary structure fails or if a connectivity failure occurs. If you have three or more coupling facilities, you can even maintain duplexing while performing maintenance on one of the coupling facilities.

For more information about the different types of coupling facility failures, and how to recover from them, see [How Db2 recovers from coupling facility failures \(Db2 Data Sharing Planning and Administration\)](#).

## Procedure

To ensure the highest availability for Db2 data sharing and reduce the time and effort for recovering from failures, use the following practices, which are listed in priority order, to configure the coupling facilities:

1. Duplex the group buffer pool so that Db2 can switch to the secondary structure if the primary structure fails.

The performance cost of duplexed group buffer pools is negligible in most cases, and the availability benefits are very high. Although the loss of a group buffer pool does not require a group restart, availability for users and important applications requires that data in a group buffer pool be available as quickly as possible after a failure. Duplexing group buffer pool structures assures minimal impact from failures. Duplexing can also help you to avoid hours of recovery time, which are often required to recover simplexed group buffer pool structures.

Duplexing the SCA and lock structure is not as important for high availability because these structures can be rebuilt dynamically on an alternate coupling facility, if the coupling facility that contains the SCA and lock structure fails. However, if the SCA and lock structure are not duplexed, the coupling facility that contains these structures should be failure isolated as described below. If failure isolation is not possible for the SCA and lock structures, use the following approaches to duplex the structures:

- Use system-managed duplexing for the SCA structure. It has a performance cost, but the usage pattern of this structure might make it tolerable.
- Use asynchronous duplexing for the lock structure. It has a performance cost, but it is less than the cost of system-managed duplexing.

For more information about duplexing, see [“Duplexed structures” on page 629](#).

2. Isolate failures by configuring multiple coupling facilities, and physically separate each coupling facility on a separate central processor complex (CPC) from all z/OS sysplex members, including any Db2 data sharing members that use the coupling facility.

A *failure-isolated* coupling facility resides in a central processor complex (CPC) that does not also contain any data sharing member that is connected to structures in that coupling facility.

By separating the SCA and lock structures from the systems that use them, you can minimize the chances of performing a lengthy group restart after a lengthy outage because Db2 uses information in the lock structure and SCA for *damage assessment* to determine which databases must be recovered for quick recovery of group buffer pools. If you lose the lock structure or SCA at the same time as one or more group buffer pools, Db2 waits until the lock structure and SCA are rebuilt before doing damage assessment.

If the SCA and lock structure reside in a *non-failure-isolated* coupling facility (a coupling facility that contains the SCA and lock structure and resides in a CPC that also contains a member of that data sharing group), the CPC becomes a single point of failure. If the CPC fails, the entire data sharing group comes down. Duplexing the SCA and lock structure, or keeping the SCA and lock structure in a failure-isolated coupling facility, avoids this single point of failure.

Also, consider putting the lock structure and SCA in a coupling facility that does not contain important cache structures (such as group buffer pool 0). You are less likely to lose the SCA, lock structure, and the group buffer pool at the same time if you carefully separate these structures by placing them in different coupling facilities.

3. Use non-volatile coupling facilities that use uninterruptible power supply equipment.

If a coupling facility is configured to be non-volatile (using the proper power backup, such as a battery backup), volatility is generally a transient state that might occur, if for example you remove the battery. If you lose power to a non-volatile coupling facility, the coupling facility enters power save mode and saves the data that is contained in the structures. When power is returned, you do not need to do a group restart nor recover the data from the structures.

When a coupling facility is in a volatile state, data in the coupling facility is not saved in the event of a power failure. The following messages indicate that a coupling facility is in a vulnerable state.

- DSNB302I or DSNB301I for group buffer pools.

- DXR141I for the LOCK1 structure.
  - DSN7507I or DSN7509I for the SCA structure.
4. Take the following actions for simplex structures:
    - Specify system weights in an active system failure management (SFM) policy. Unless you do this, it is not possible to automatically rebuild simplex coupling facility structures. If the SCA and lock structure cannot be rebuilt, Db2 abnormally terminates the members affected by the loss of those structures, or the loss of connectivity to those structures. If the group buffer pool cannot be rebuilt, which is only attempted when a subset of members lose connectivity, those members disconnect from the group buffer pool.
    - Specify a REBUILDPERCENT value specified in the CFRM policy for all Db2-related structures. In general, specify a low REBUILDPERCENT value to allow for automatic rebuild when a member loses connectivity. For more information, see [“Specifying when structure rebuilds occur after connectivity is lost”](#) on page 628.
    - Configure adequate storage in an alternate coupling facility to rebuild or reallocate structures as needed. For rebuild, z/OS uses the current size structure of the CFRM policy on the alternate coupling facility to allocate storage. If z/OS cannot allocate enough storage to rebuild the SCA or lock structure, the rebuild fails. If it cannot allocate enough storage for the group buffer pool, Db2 must write the changed pages to disk instead of rebuilding them into the alternate group buffer pool.
  5. Enable automatic recovery for the group buffer pool. For more information, see [“Automatic recovery requirements for group buffer pools”](#) on page 629.
  6. To prepare for channel failures, consider using dual channels between each CPC and a coupling facility. Without dual channels (sometimes called *links*), a channel failure is more likely to occur than a failure in the coupling facility. Losing connectivity to the SCA or lock structure can bring that particular member down, unless you specify duplexing or an alternative coupling facility in the CFRM policy preference list.

## Results

The following table summarizes how Db2 recovers from structure and connectivity failures for different structures and configurations.

Failure type	Recovery if duplexed	Recovery if simplex
Group buffer pool structure	The failing structure is deallocated, and processing continues with the running structure. This recovery is usually fast and unnoticeable.	Recovery from the log can occur manually, as the result of a START DATABASE command, or if the group buffer pool is defined with the AUTOREC(YES) option, it can occur automatically.
SCA and lock structure	The failing structure is deallocated, and processing continues on the running structure.	<p>Db2 uses information that is contained in its virtual storage to quickly rebuild the structures.</p> <p>Recovery of a simplex SCA is usually fast and has a minimal impact on performance. Recovery of a simplex lock structure is also fast in normal cases, but the performance impact depends on the number of held locks at the time of the failure.</p> <p>Db2 can rebuild a simplex SCA and lock structure in the same coupling facility or in an alternate coupling facility, assuming that the following conditions are true:</p>

Failure type	Recovery if duplexed	Recovery if simplexed
		<ul style="list-style-type: none"> <li>• You specified the alternate coupling facility in the CFRM policy preference list.</li> <li>• You allocated enough storage in the alternate coupling facility to rebuild the structures there.</li> </ul> <p>If Db2 fails to rebuild the SCA and lock structure from virtual storage, all active members in the group terminate abnormally, and you must perform a group restart to recover the necessary information from the logs.</p>
Connectivity	Db2 switches to the structure with good connectivity	<p>Db2 rebuilds simplexed structures on the alternate coupling facility that is specified in the CFRM policy. Recovery of a simplexed SCA is fast and has little or no impact on performance. The performance of the recovery of a lock structure depends on the number of modify locks in the lock structure at failure time, but it is also fast in most cases.</p> <p>However, recovery of simplexed group buffer pool structures is very disruptive to the system.</p> <p>In rebuilding these structures, Db2 attempts to allocate storage on the alternate coupling facility. Db2 uses the current size of the structure for the initial size of the structure on the alternate coupling facility. If Db2 cannot allocate the storage for the SCA or lock structure, the rebuild fails. If z/OS cannot allocate the storage for the group buffer pools, the changed pages are written to disk.</p>

For more information about recovering from coupling facility failures, see [How Db2 recovers from coupling facility failures \(Db2 Data Sharing Planning and Administration\)](#).

**Related concepts**

Duplexed structures

Running some or all of the SCA, lock, and group buffer pool structures in duplex mode is one way to achieve high availability for these structures across many types of failures, including lost connections and damaged structures.

[Allocating a Structure in a Coupling Facility \(z/OS MVS Programming: Sysplex Services Reference\)](#)

**Related reference**

[Managing coupling facility resources \(z/OS MVS Setting Up a Sysplex\)](#)

## ***Specifying when structure rebuilds occur after connectivity is lost***

The *rebuild threshold* is a percentage that you specify for the REBUILDPERCENT parameter in the CFRM policy. z/OS uses the REBUILDPERCENT value to determine whether to initiate a structure rebuild in the case of a loss of connectivity to the coupling facility that contains the structure.

### **About this task**

The percentage is based on the sysplex failure management (SFM) weights of all the systems that have active connections to a structure at the time. (A connection is considered active even if connectivity is lost.) You also specify weights on the SFM policy.

Db2 calculates the total weight of:

- All systems that have active connections but that lost connectivity to the structure (A)
- All systems that have active connections to the structure (B)

z/OS then divides A by B and compares the result to the REBUILDPERCENT value. (In the case of multiple connections to a structure from a single z/OSsystem, that system is counted only once. Multiple connections from a single z/OS system exist, for example, when two members reside on the same z/OSsystem.)

### **Procedure**

Specify REBUILDPERCENT values in your CFRM policy.

**Recommendation:** If you have high availability requirements, specify a small REBUILDPERCENT value, and allow the system to rebuild the structure. Specify a larger REBUILDPERCENT value only if you prefer to have a member lose the use of a structure rather than temporarily disrupt all of the members that were using the structure so that the structure can be rebuilt.

### **Example**

All z/OS systems in an eight-member Parallel Sysplex are of equal weight (10), and six of the systems have active connections to the group buffer pool. *A* equals the total weight of all systems that lose connectivity to the group buffer pool. *B* equals the total weight of all systems that have active connections to the group buffer pool. If two of the six systems lose connectivity, the value of *A* is 20, and the value of *B* is 60.

z/OS determines whether to initiate a rebuild as follows:

- If  $(A/B) \times 100$  is greater than or equal to the REBUILDPERCENT value, Db2 rebuilds the structure.
- Otherwise, Db2 does not rebuild the structure. Instead, the affected members disconnect from the group buffer pool.

In this example,  $(20/60) \times 100$  is equal to 33. If the value of REBUILDPERCENT is 35, z/OS does not initiate a rebuild.

### **What to do next**

You can monitor a performance class 20 trace (IFCIDs 0267 and 0268) to determine how long a rebuild of a structure takes and the reason for the rebuild.

You can also examine the messages that are returned to the console to monitor a rebuild. The reasons for a rebuild can include:

- Lost connectivity
- Operator command
- Duplexing is being established

### **Related reference**

[Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

## ***Automatic recovery requirements for group buffer pools***

Automatic recovery is faster than manual recovery because Db2 can optimize internal processing of the recovery.

For automatic recovery to be initiated for a group buffer pool, all of the following conditions must be true:

- AUTOREC (YES) is specified for the group buffer pool.
- At least one member is actively connected at the time that the group buffer pool failed. This member must have successfully completed damage assessment.

Db2 never initiates automatic recovery during restart.

For a duplexed group buffer pool, Db2 can use automatic recovery if both instances of the group buffer pool are damaged. Automatic recovery is not needed for group buffer pools that are defined as GBPCACHE (NO).

You can enable automatic recovery with the AUTOREC option of the ALTER GROUPBUFFERPOOL command.

### **Related reference**

[-ALTER GROUPBUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

## **Duplexed structures**

Running some or all of the SCA, lock, and group buffer pool structures in duplex mode is one way to achieve high availability for these structures across many types of failures, including lost connections and damaged structures.

**Important:** Choosing the default duplexing option of synchronous for the lock structure or SCA can have a significant impact on performance. You can improve the performance for duplex mode by choosing the asynchronous duplexing option for the lock structure.

**Important:** If you decide to duplex the SCA and lock structure, you must duplex both structures to achieve the availability benefits. Duplexing only the SCA or only the lock structure does not provide any benefit.

### ***How group buffer pool duplexing works***

With a duplexed group buffer pool structure, two allocations of the same structure use one connection from each member.

Each structure allocation must be in a different coupling facility. z/OS prefers to place the structures in coupling facilities that are failure-isolated from one another.

**Recommendation:** Ensure that at least one of the group buffer pool structures is in a non-volatile coupling facility. If power is lost to both coupling facilities and both coupling facilities are volatile, you must recover the group buffer pool from the logs.

#### *Characteristics of primary and secondary structures*

z/OS commands let you stop and start duplexing, and let you choose which of the duplexed structures is the primary and which is the secondary.

The *primary structure* is the one from which changed data is cast out to disk. Db2 also uses the primary structure to read data, keep track of page-registration, and perform cross-invalidation of pages in the buffer pools of individual members. When changed data is written to the primary structure, it is also written to the *secondary structure*. Db2 uses the secondary structure as a backup. After data is cast out to disk from the primary structure, the data is deleted from the secondary structure.

From a z/OS perspective, duplexing is really an extended rebuild, so z/OS documentation and commands sometimes call the primary structure the *old* structure, and refer to the secondary structure as the *new* structure.

### *Coupling facility storage considerations for duplexing*

When planning for storage, make the primary and secondary group buffer pool structures the same size.

If your system is properly configured for high availability using a simplex group buffer pool, you usually do not need extra coupling facility storage for duplexing. For simplex structures, you must reserve enough spare capacity in the coupling facilities to be able to absorb the structures of any failed coupling facility. With duplexed structures, instead of reserving storage in case of a coupling facility failure, that storage is used by the secondary group buffer pool.

For example, assume that you have 2 coupling facilities, each with 1 GB of memory, for a total of 2 GB of memory. Ensure that the total size of the structures across the 2 coupling facilities does not exceed 1 GB (50% of the total coupling facility storage).

If you configure three or more coupling facilities, you might need an additional coupling facility for duplexing.

### **Duplexing requirements**

To achieve high availability for SCA, lock, and group buffer pool structures across many types of failures, three conditions must be met.

For duplexing to work, the following conditions must be true:

- The CFRM policy preference list for the group buffer pool structure that you want to duplex must contain at least two coupling facilities with a CFLEVEL of 5 or higher. All members of the data sharing group must have physical connectivity to both coupling facilities in which the primary and secondary structures reside.

If you are going to do automatic reduplexing, you need three coupling facilities that are physically connected to members of the data sharing group.

- At least one member must be actively connected to the group buffer pool structure.
- The group buffer pool must be defined with GBPCACHE(YES), the default.

For asynchronous duplexing of the lock structure, the CFRM couple data set needs to support asynchronous duplexing. To provide that support, add the following item to the CFRM couple data set parameters in the job that runs the format utility:

```
ITEM NAME(ASYNCDUPLEX) NUMBER(1)
```

**Important:** Include this item only when the coupling facility level is CFLEVEL 21 or higher, and the z/OS system level is Version 2.2 with the PTF for APAR OA47796, or later versions.

### **Related reference**

[Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

### **Options for duplexing**

Options for the CFRM policy allow, enable, or disable duplexing.

The following options are available in the CFRM policy for duplexing of the group buffer pool, SCA, and lock.

*Table 53. Duplexing options in the CFRM policy*

<b>Option</b>	<b>Valid for</b>	<b>Description</b>
DUPLEX(ENABLED)	SCA, group buffer pool, lock	Automatically starts duplexing. For the CF structure, duplexing is started in synchronous mode.
DUPLEX(ENABLED,duplex-mode)	Lock only	Automatically starts duplexing, with the specified duplex mode. Possible duplex modes are defined below.



Table 53. Duplexing options in the CFRM policy (continued)

Option	Valid for	Description
DUPLEX(ALLOWED)	SCA, group buffer pool, lock	Allows duplexing. You must use a command to start duplexing.
DUPLEX(ALLOWED, <i>duplex-mode</i> )	Lock only	Allows duplexing, with the specified duplex mode. You must use a command to start duplexing. Possible duplex modes are defined below.
DUPLEX(DISABLED)	SCA, group buffer pool, lock	Disables duplexing

Possible values of *duplex-mode* are:

#### **SYNCONLY**

The CF structure uses only synchronous duplexing. Either user-managed duplexing or system-managed synchronous duplexing is used. This is the default.

#### **ASYNCONLY**

The CF structure uses only asynchronous duplexing. System-managed asynchronous duplexing is used.

When this keyword is used, system-managed duplexing rebuild allocation for the structure requires that the coupling facility level is CFLEVEL 21 or higher.

#### **ASYNC**

The structure uses asynchronous duplexing, if possible. If asynchronous duplexing is not possible, the structure uses synchronous duplexing. Some reasons that asynchronous duplexing is not possible are:

- The coupling facility level is less than CFLEVEL 21.
- There is no connector or application support for asynchronous duplexing.

#### **Related tasks**

[Starting duplexing for a structure \(Db2 Data Sharing Planning and Administration\)](#)

[Stopping duplexing for a structure \(Db2 Data Sharing Planning and Administration\)](#)

#### **Related reference**

[Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

### ***Performance implications of duplexing***

The process of establishing duplexing can be somewhat disruptive because access to the group buffer pool structure is quiesced while the secondary structure is allocated. Also, changed pages are copied from the primary structure to the secondary structure (or cast out to disk).

Transactions that need access to the group buffer pool structure during this process are suspended until the process is complete. Because of this disruption, you need to establish duplexing at a time of low activity on the system. How long the process takes depends on how many pages are copied to the secondary group buffer pool structure.

In general, more processor and elapsed time is needed to do duplexed group buffer pool structure writes and castout processing than to do simplexed group buffer pool structure writes and castout processing. Workloads that are more update-intensive will probably experience a slight increase in host CPU usage when duplexing is activated. In most cases, the majority of the CPU increase occurs in the Db2 address space. Duplexing can cause a slight increase in the transaction elapsed time. Read performance is unaffected by duplexing.

The statistics and accounting trace classes contain information about structure duplexing.

### *Estimating the effect of duplexing on CPU usage*

When you enable duplexing, you will see an increase in the CPU usage in the coupling facility that contains the secondary structure. Duplexing should have little or no impact on the CPU usage in the coupling facility that contains the primary structure.

## **Procedure**

To estimate approximately how much the coupling facility CPU usage will increase when you establish duplexing:

1. Determine the amount of coupling facility CPU usage that the simplex primary structure consumes.
2. Divide the result in half to determine how much coupling facility CPU usage the duplexed secondary structure will consume.

### ***Duplexing rebuild status***

When a group buffer pool structure is duplexed, it is considered to be in an extended rebuild status called a duplexing rebuild.

This activity is reported in IFCIDs 0267 and 0268, along with other reasons for rebuilding.

## **Db2 for z/OS support for asynchronous CF duplexing**

When the coupling facility (CF) is set up in duplex mode, Db2 for z/OS data sharing performance can improve if asynchronous CF duplexing is in effect.

With asynchronous CF duplexing, multi-site data sharing groups that implement duplexing all Db2 CF structures can have continuous availability without significant performance impact after site failures.

Asynchronous CF duplexing for the lock structure has the following prerequisites:

- z/OS 2.2, with the PTF for APAR OA47796
- Firmware support for Coupling Facility Control Code (CFCC) with service level 02.16
- CF-to-CF connectivity through coupling links

If those prerequisites are met, you can enable asynchronous CF duplexing by setting the DUPLEX option in the coupling facility resource management (CFRM) policy to one of the following values:

- DUPLEX(ENABLED,ASYNCONLY)
- DUPLEX(ENABLED,ASYNC)
- DUPLEX(ALLOWED,ASYNCONLY)
- DUPLEX(ALLOWED,ASYNC)

See [“Options for duplexing”](#) on page 630 for details.

## **Asynchronous duplexing and coexistence with Db2 11**

When a data sharing group is in coexistence mode with Db2 11 members, asynchronous duplexing of the lock structure cannot be established. When a Db2 11 member joins a data sharing group, the connection to the lock structure is switched to either simplex mode or to synchronous duplexing mode, depending on the DUPLEX option in the CFRM policy for the lock structure. When asynchronous duplexing is no longer active, z/OS issues message IXC522I. The structure can switch back to asynchronous duplexing when there are no active Db2 11 members left in the group.

## **Switching from asynchronous CF duplexing**

You can switch from asynchronous CF duplexing to a simplex lock structure or to synchronous duplexing of the lock structure at any time by changing the CFRM policy for the lock structure, and rebuilding the lock structure to activate the new policy.

## Db2 resource availability considerations

Several options for the catalog and directory, for data in group buffer pools, and for Db2 restart can be used for data that requires high-availability.

Db2 resource availability considerations for a data sharing group are basically the same as for a single Db2 subsystem.

### Critical Db2 data

Critical Db2 data should be placed behind high-availability storage controllers, such as the IBM Enterprise Storage Server®. Consider placing the catalog and directory behind a 3990 control unit with dual-write capability for hardware duplexing. Another possibility is to use storage controllers with high-availability characteristics (such as controllers that use RAID technology) for critical Db2 data.

### Group buffer pool data

Assign data that require high availability to group buffer pools that reside on non-volatile coupling facilities. Use group buffer pool duplexing, which has minimal impact on performance and can avoid hours of recovery time.

### Data availability at restart

For faster restarts, take more frequent checkpoints. Checkpoint frequency is the most important factor in Db2 restart time.

If your installation sometimes has problems with units of recovery (URs) that take a long time to back out after a failure, make plans to reroute work to other members of the group. Another solution is to postpone backout processing for those long-running URs until Db2 is up and receiving new work.

### Related concepts

[Postponed backout in a data sharing environment \(Db2 Data Sharing Planning and Administration\)](#)

## XA support for a sysplex by the IBM Data Server Driver for JDBC and SQLJ

WebSphere Application Server and the IBM Data Server Driver for JDBC and SQLJ can be used to coordinate distributed transactions using XA protocols supported by DRDA.

This type of XA support is only available for transaction managers that use a single-transport processing model. In a single-transport model, a transaction, over a single transport (physical connection), is tied to a member from xa\_start to xa\_end. The transaction end is followed immediately by xa\_prepare(readonly), xa\_prepare plus xa\_commit or xa\_rollback, or xa\_rollback. All of this must occur within a single application process. An example of a transaction manager that uses this model is IBM WebSphere Application Server.

Support for the single-transport processing model also includes indoubt transaction recovery where member information for each recoverable transaction is retrieved through xa\_recover, which allows xa\_commit or xa\_rollback to be directed at the specified member.

**Important:** When a global transaction runs, locks are shared among branches of the global transaction only if those branches run on the same data sharing member. When sysplex workload balancing is enabled, there is no guarantee that all branches run on the same data sharing member. As a result, an application that uses global transactions and sysplex workload balancing might experience deadlocks or timeouts.

To use XA support with client applications, you need to set up dynamic virtual IP addresses. A dynamic IP address needs to be configured for the Db2 group, and one address must be set up for each Db2 member in the group. For XA recovery to be processed on any member after failure, information on indoubt XIDs must be obtained from the SCA. The SCA contains the list of indoubt XIDs for the entire group, as well as each member's DVIPA and the resync port of the member that owns the indoubt thread. XA recovery returns the list of all prepared or heuristically committed threads for the entire group back to the XA Transaction Manager (TM). The IBM Data Server Driver for JDBC and SQLJ uses the information to send

the commit decision to the owning member, when the XA TM recovers, and then commits or rolls back indoubt XIDs.

For the recovery process to function properly, you must set up the group DVIPA. the following figure illustrates how the XA recovery process, that is described above, works. After a system failure, XA recover requires the list of indoubt transactions identified by XA XIDs, to be returned to the group. In this example, if member DB1G fails, DB1G will leave an indoubt thread. The state of the thread, as well as related XIDs, is contained in the log of the DB1G member. The DB1G indoubt thread XID is also contained in the group's XA indoubt list, in the SCA. When WebSphere tries to recover from the system failure, the IBM Data Server Driver for JDBC and SQLJ sends the XA Recover command to any member of the group. The member then returns the group's list of indoubt XIDs from reading the XA indoubt list in the SCA. When WebSphere commits or rollbacks the indoubt thread, the IBM Data Server Driver for JDBC and SQLJ sends the decision to member DB1G, which resolves the indoubt thread.

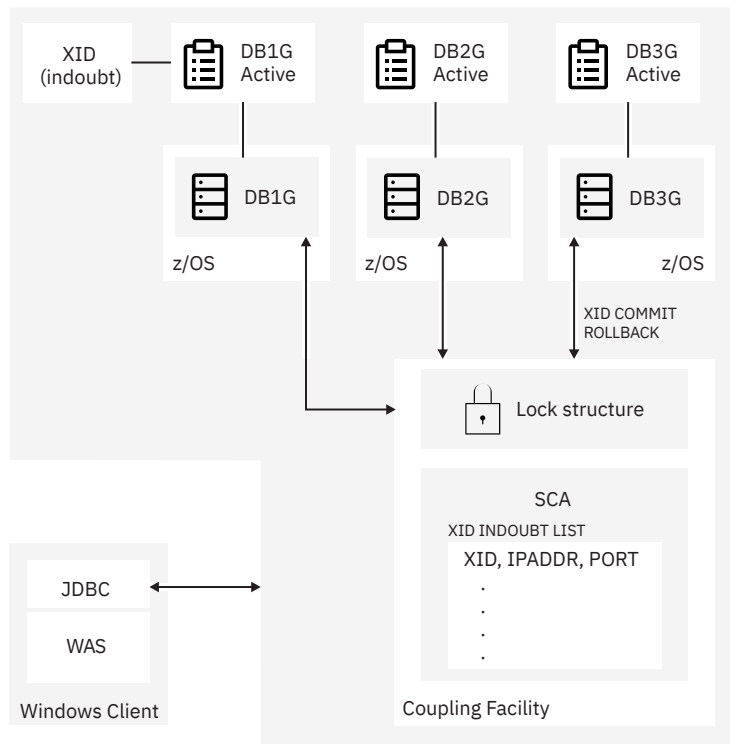


Figure 83. The XA recovery process

### Related concepts

[Communicating with data sharing groups \(Db2 Data Sharing Planning and Administration\)](#)

## Storage estimates for data sharing environments

As part of planning for a data sharing environment, you should estimate the storage requirements for coupling facility structures and for Db2 resources.

Precise estimates for the sizes of coupling facility structures are hard to provide. Every environment is different, and storage allocation is affected by the processor model and the level of coupling facility control code. Use the information in this section to estimate initial size (INITSIZE) values. Depending on how much your workload varies, consider specifying a larger value for SIZE.

For duplexed structures, the SIZE and INITSIZE parameter values apply to both instances of the structure.

The information in this section assumes that all page sets in a particular group buffer pool are defined with the same GBPCACHE attribute. You can put page sets with different GBPCACHE attributes in the same group buffer pool, but you must adjust the formulas accordingly.

## Coupling facility structure size

When a new coupling facility structure is allocated for a data sharing group, its size is usually taken from the value of the INITSIZE parameter in the CFRM policy.

After the structure is allocated, you can dynamically change its size with the following z/OS command:

```
SETXCF START,ALTER,SIZE=newsize,STRNAME=strname
```

The new SIZE value cannot be greater than the SIZE value in the CFRM policy, but it can be smaller than the INITSIZE value. If the coupling facility has enough space, z/OS increases (or decreases) the size of the structure to the new size; the INITSIZE value of the policy remains unchanged.

In most cases, Db2 uses the new SIZE value for any subsequent allocations of the structure instead of the INITSIZE value in the CFRM policy. Any of the following subsequent allocations can use the new SIZE value:

- A group buffer pool or SCA is deallocated and then reallocated
- A secondary structure is allocated for a duplexed group buffer pool, SCA, or lock structure, if duplexing is started after the size of the primary structure was dynamically changed
- Any structure is rebuilt with the following z/OS command:

```
SETXCF START,REBUILD,STRNAME=strname
```

The new size is recorded across a restart of Db2 and is used for all subsequent allocations until one of the following events occurs:

- A CFRM policy is started, and the policy has a different INITSIZE value than the size of the structure that was dynamically changed with the SETXCF START,ALTER command
- Another SETXCF START,ALTER command is issued to dynamically change the size of the structure

**Exception:** If a lock structure is deallocated and all the members are down, the INITSIZE value is used. This is a consideration for disaster recovery or for situations where data sharing groups are cloned. During normal operation of a data sharing group, you are unlikely to encounter this situation.

## Recommendations for coupling facility sizes

Coupling facility structures contain some static control structures. When a structure is initially allocated, these static structures are allocated to accommodate the potential size of the coupling facility structure. In other words, the size of the static structures is proportional to the maximum size (the value of the SIZE parameter) of the coupling facility structure. If the SIZE value is much larger than the INITSIZE value, a large percentage of the initial structure's size might be used for these static structures, leaving you with little usable storage space in the structure.

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ” on page 636](#).

In general, specify a SIZE value that is larger than the INITSIZE value, but limit the SIZE value in the following ways:

- Not more than two to three times the INITSIZE value for the SCA and lock structure.
- 1.2–1.5 times the INITSIZE value for group buffer pools, but not be more than two times the INITSIZE value. For example, if the INITSIZE value for a group buffer pool is 100 MB, specify a SIZE value of 200 MB or less.

### Related concepts

[Coupling facility structures](#)

Db2 relies on areas of storage in the coupling facility called *structures*.

#### Group buffer pool sizes

The two parts of a group buffer pool are data pages and directory entries. You can specify the ratio of data pages to directory entities in a group buffer pool, or you can use the Db2 default ratio.

#### Lock structure size

The coupling facility lock structure contains two parts: a lock entry table and a list of update locks.

#### SCA list structure size

The *shared communications area (SCA)* is a list structure in the coupling facility. Your storage estimate for your data sharing group should include an estimate of SCA size.

## The CFSizer tool

The *coupling facility structure sizer (CFSizer)* tool simplifies the task of estimating coupling facility structure storage sizes based on information about your existing or planned Db2 data sharing configuration. It uses your inputs to calculate the SIZE and INITSIZE values for the CFRM policy.

To prepare to use the CFSizer tool, collect the following information about your existing or planned Db2 data sharing environment:

Structure	Information to collect
IRLM LOCK structure	<ul style="list-style-type: none"><li>• Lock rate in maximum locks per second</li><li>• Number of systems expected to be active in the sysplex at the same time</li><li>• Number of table spaces for all databases managed by the data sharing group</li><li>• Maximum number of users</li><li>• Maximum number of connectors</li><li>• Whether asynchronous duplexing is used</li></ul>
SCA LIST structure	<ul style="list-style-type: none"><li>• Total number of databases</li><li>• Total number of tables</li></ul>
Group buffer pool	<ul style="list-style-type: none"><li>• Page size</li><li>• Number of buffers</li><li>• GBPCACHE type</li></ul>

To access the CFSizer tool for Db2 data sharing, go to <https://www.ibm.com/support/pages/cfsizer> and select the DB2 option.

After you decide what your structure sizes are, you can include those values in the CFRM policy definition. For more information about creating the CFRM policies, see [“Defining coupling facility structures”](#) on page 604.

### Related concepts

#### Coupling facility structure size

When a new coupling facility structure is allocated for a data sharing group, its size is usually taken from the value of the INITSIZE parameter in the CFRM policy.

#### Group buffer pool sizes

The two parts of a group buffer pool are data pages and directory entries. You can specify the ratio of data pages to directory entities in a group buffer pool, or you can use the Db2 default ratio.

#### Lock structure size

The coupling facility lock structure contains two parts: a lock entry table and a list of update locks.

#### SCA list structure size

The *shared communications area (SCA)* is a list structure in the coupling facility. Your storage estimate for your data sharing group should include an estimate of SCA size.

### **Related tasks**

[Allowing a structure to be altered automatically \(z/OS MVS Setting Up a Sysplex\)](#)

### **Related reference**

[Adding MVS systems to a sysplex](#)

[Managing coupling facility resources \(z/OS MVS Setting Up a Sysplex\)](#)

## **Group buffer pool sizes**

The two parts of a group buffer pool are data pages and directory entries. You can specify the ratio of data pages to directory entities in a group buffer pool, or you can use the Db2 default ratio.

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ” on page 636.](#)

## **Data pages**

Data pages (sometimes called *data entries*) reside in the group buffer pool. The size of a data page is the same as the page size supported by the corresponding Db2 buffer pools (4 KB, 8 KB, 16 KB, or 32 KB).

If you are caching changed data only, you need enough space to cache changed data plus extra space for pages that are frequently referenced. By caching those frequently referenced pages in the group buffer pool, you can decrease the amount of time it takes for any member to refresh that page in its member buffer pool because you avoid the disk I/O.

If you choose GBPCACHE NONE or GBPCACHE SYSTEM, no user data pages are actually stored in the group buffer pool. However, with GBPCACHE SYSTEM, space map pages for LOBs are cached in the coupling facility.

## **Directory entries**

A directory entry specifies the location and status of a page image somewhere in the data sharing group, whether the image is in the group buffer pool or in one of the member buffer pools. Only one directory entry exists for any given page, no matter how many places that page is cached.

The size of a directory entry is approximately 400 bytes, but it varies somewhat based on the size of the data pages and the CFLEVEL you are using.

## **Specifying a ratio**

The amount of space that is allocated for a group buffer pool is determined by the ratio of directory entries to data pages. When you originally define a structure in the CFRM policy for a group buffer pool, you specify its total size. For Db2, the ratio defaults to five directory entries per data page. Later, you can change the ratio with the ALTER GROUPBUFFERPOOL command. The new value that you define takes effect when the group buffer pool is rebuilt or reallocated.

For group buffer pools that are defined with GBPCACHE(NO), ratios are ignored because no data is actually stored in the group buffer pool.

When possible, both a formula and a general guideline are provided to help you estimate the initial sizes and ratios of your group buffer pools. (The exception is for GBPCACHE ALL group buffer pools, for which only a general guideline is provided.)

The formula is not too complex and is likely to be more accurate, assuming that you are fairly confident of the values for the variables in the formulas. Otherwise, use the general guidelines and then adjust your values from there.

### **Related concepts**

[Determining the correct size and ratio of group buffer pools \(Db2 Data Sharing Planning and Administration\)](#)

## Related reference

[zSeries Processor Resource/Systems Manager Planning Guide](#)

### **Storage estimate for group buffer pools that cache changed data**

The size of a group buffer pool is related to the amount of sharing and the amount of updating. You can use a formula to estimate the storage size of group buffer pools that cache changed data.

An estimate must be based on the total amount of member buffer pool storage multiplied by a percentage based on the amount of update activity. As data sharing and updating increases, more pages must be cached in the group buffer pool, and more directory entries are needed to track inter-Db2 interest.

## Formula

The following is a formula for estimating storage for group buffer pools that cache changed data:

```
Data_entries = U * D * R
Data(MB)     = Data_entries * P / 1024
Dir_entries  = Data_entries + (U * VP)
Dir(MB)     = 1.1 * Dir_entries * 0.2 / 1024
GBP(MB)     = Data(MB) + Dir(MB)
RATIO      = Dir_entries / Data_entries
```

Where:

### **U**

The estimated degree of data sharing:

**1**

A high amount of sharing with a lot of update activity

**0.7**

A moderate amount of sharing with a moderate amount of update activity

**0.5**

A low amount of sharing with a low amount of update activity

### **D**

The number of data pages written to disk per second for all members during peak activity. Do not use the number of pages written to the group buffer pool; D must be a count of distinct pages. To determine this value, use the field QBSTPCO from IFCID 0002 (the PAGES CASTOUT field of the buffer pool section of the IBM OMEGAMON for Db2 Performance Expert on z/OS Statistics report.)

### **R**

The average page residency time in the group buffer pool, in seconds. This value is application-dependent, but you can assume that the typical range is 30 to 180 seconds. If you have no information about residency time, use 120.

**Tip:** Make *R* large enough so that other members can refresh an invalidated local copy of a changed page. When a changed page is written to the group buffer pool, it invalidates local copies of the page in other members. The changed page needs to remain resident in the group buffer pool long enough for other members to refresh the page.

### **P**

The page size (4 KB, 8 KB, 16 KB, or 32 KB).

### **VP**

The number of data pages defined for the virtual pool (the sum across all of the members).

**0.2**

The approximate size of a directory entry, in KB.

**1.1**

The additional storage needed for coupling facility control structures.



## Example

Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is very high (U=1).
- 500 disk writes per second occur across both members (D=500).
- No information exists about the page residency time (R=120).
- The page size is 4 KB (P=4).
- Member 1 is configured with a virtual pool of 80000 buffers.
- Member 2 is configured with a virtual pool of 40000 buffers (VP=120000).

The following calculation is used:

```
Data_entries = 1 * 500 * 120 = 60000
Data(MB)     = 60000 * 4 / 1024 = 234 MB
Dir_entries  = 60000 + (1 * 120000) = 180000
Dir(MB)     = 1.1 * 180000 * 0.2 / 1024 = 38 MB
GBP(MB)     = 234 MB + 38 MB = 272 MB
RATIO      = 180000 / 60000 = 3.0
```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 272 MB. Use the ALTER GROUPBUFFERPOOL command to change RATIO to 3.

## General guideline

For installation planning purposes, you should use the following general guideline as an initial estimate for the size of a Db2 group buffer pool for table spaces, indexes, or partitions that cache only changed data (GBPCACHE(CHANGED)):

Add the local buffer pool storage for this buffer pool number across all the members of the group. Then, multiply this amount by one of these workload factors:

Factor	Condition
10%	For light sharing with a low amount of updating activity
20%	For medium sharing with a moderate amount of update activity
40%	For a high amount of sharing with a lot of update activity

You can run a trace for IFCID 0002 to obtain an estimate of the amount of data sharing in your system. Calculate the "degree of data sharing" by dividing QBGLGG, the number of get pages for group buffer pool-dependent objects, by QBSTGET, the number of get pages. A value that is less than 25% is considered to be light data sharing, a value between 25% and 75% is medium data sharing, and a value greater than 75% is high data sharing.

Remember that the type of workload you run can influence the amount of storage you use. For example, if you have "hot spots" in which updates to a single page are frequent rather than spread throughout the table space, you might need less storage for caching.

## Example

Assume that the total buffer pool storage for all the members of the group is 400 MB, and you expect a medium amount of read/write sharing in the environment. The following calculation is an estimate for the size of a group buffer pool when GBPCACHE(CHANGED):

```
400 MB x 20% = 80 MB
```

### **Storage estimate for caching all data**

For installation planning purposes, you can use an initial size estimate of a group buffer pool that caches read-only pages with changed pages (GBPCACHE(ALL)).

Calculate the sum of the local buffer pool storage for this buffer pool number (virtual only) across all members in the group. Then, multiply this amount by one of these workload factors:

<b>Factor</b>	<b>Condition</b>
50%	Less than half of the table spaces, indexes, or partitions specify GBPCACHE ALL
75%	Half of the table spaces, indexes, or partitions specify GBPCACHE ALL
100%	75% of more of the table spaces, indexes, or partitions specify GBPCACHE ALL for a high sharing environment

### **Example**

Assume that the local buffer pool storage on all members of the group adds up to 200 MB. Half of the page sets that come into the pool are defined as GBPCACHE(ALL). The following calculation is an estimate for the size of a group buffer pool when GBPCACHE(ALL):

$$200 \text{ MB} \times 75\% = 150 \text{ MB}$$

### **Storage estimate for caching no data**

For planning purposes, you can use a formula to estimate the size of group buffer pools that cache no data.

The following is a formula for estimating storage for group buffer pools that cache no data (GBPCACHE(NO)):

```
Dir_entries = U * VP
Dir(MB)     = 1.1 * Dir_entries*0.2/1024
GBP(MB)     = Dir(MB)
RATIO      = n/a
```

If the group buffer pool itself is defined with GBPCACHE(NO), the ratio is ignored.

In summary, the variables are:

#### **U**

The estimated degree of data sharing.

#### **P**

The page size (4 KB, 8 KB, 16 KB, or 32 KB).

#### **VP**

The number of data pages defined for the virtual pool (the sum across all the members).

### **Example**

Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is very high (U=1).
- Member 1 is configured with a virtual pool of 80000 buffers.
- Member 2 is configured with a virtual pool of 40000 buffers (VP=120000).

The following calculation is used:

```
Dir_entries = 1 * 120000 = 120000
Dir(MB)     = 1.1 * 120000 * 0.2/1024 = 25 MB
GBP(MB)     = 25 MB
```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 25 MB. Use the command ALTER GROUPBUFFERPOOL to change the GBPCACHE attribute to NO. If you put GBPCACHE NONE page sets in a GBPCACHE(YES) group buffer pool, the calculation becomes more complicated. You do this because the RATIO is observed and you are probably going to waste a lot of space on unneeded data entries.

### Related concepts

Storage estimate for group buffer pools that cache changed data

The size of a group buffer pool is related to the amount of sharing and the amount of updating. You can use a formula to estimate the storage size of group buffer pools that cache changed data.

### Storage estimate for caching LOB space maps (GBPCACHE SYSTEM)

For planning purposes, you can use a formula to estimate storage for group buffer pools that cache LOB space map data.

The following is a formula for estimating storage for group buffer pools that cache LOB space map data:

```
Data_entries = (U * D / 10) * R
Data(MB)     = Data_entries * P / 1024
Dir_entries  = Data_entries + (U * VP)
Dir(MB)      = 1.1 * Dir_entries * 0.2 / 1024
GBP(MB)      = Data(MB) + Dir(MB)
RATIO        = MIN(Dir_entries / Data_entries, 255)
```

In summary, the variables are:

#### U

The estimated degree of data sharing.

#### D

The number of data pages that are written to disk per second for all members during peak activity. Do not use the number of pages that are written to the group buffer pool; D must be a count of distinct pages. To determine this value, use the field QBSTPWS from IFCID 0002 (the PAGES WRITTEN field of the buffer pool section of the IBM OMEGAMON for Db2 Performance Expert on z/OS Statistics report).

#### 10

An estimate of the LOB system pages that are written for every LOB data page.

#### P

The page size (4 KB, 8 KB, 16 KB, or 32 KB).

#### R

The average page residency time in the group buffer pool in seconds.

#### VP

The number of data pages that are defined for the virtual pool (the sum across all the members).

### Example

Assume that you have a two-member data sharing group for which you have determined the following information:

- The degree of data sharing is moderate (U=.7).
- 10 disk writes per second occur across both members during peak activity (D=10).
- The space map page is resident in the group buffer pool page for 120 seconds (R=120).
- The page size is 32 KB (P=32).
- Member 1 is configured with a virtual pool of 20000 buffers.
- Member 2 is configured with a virtual pool of 10000 buffers (VP=30000).

The following calculation is used:

```
Data_entries = ((.7 * 10) / 10) * 120 = 84
Data(MB)     = 84 * 32 / 1024 = 2.6 MB
Dir_entries  = 84 + (.7 * 30000) = 21084
Dir(MB)      = 1.1 * 21084 * 0.2 / 1024 = 4.5 MB
```

```

GBP(MB)      = 2.6 MB + 4.5 MB = 7.1 MB
RATIO        = MIN (21084 / 84, 255) = 251

```

The preceding calculation indicates that the group buffer pool should be defined with an INITSIZE of 7.1 MB. The ratio is less than the maximum value, so use the command ALTER GROUPBUFFERPOOL to change the ratio to 251.

### Related concepts

Storage estimate for group buffer pools that cache changed data

The size of a group buffer pool is related to the amount of sharing and the amount of updating. You can use a formula to estimate the storage size of group buffer pools that cache changed data.

### Related reference

[-ALTER GROUPBUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

### **PR/SM formulas for calculating sizes of group buffer pools**

You can use Processor Resource/System Manager (PR/SM) formulas to calculate the sizes of group buffer pools.

You can also calculate group buffer pool sizes by using the coupling facility allocation formulas for cache structures found in 32,13: [zSeries Processor Resource/Systems Manager Planning Guide](#). The following table contains information that is used in those formulas. The size of cache structures in Db2 can vary greatly based on the amount of data for which inter-Db2 read/write interest exists at any given time. You probably need to monitor the use of the group buffer pools and adjust their sizes accordingly.

*Table 54. Information for calculating cache structure sizes*

Parameter	Db2 Value	Explanation
MSC	<b>1</b>	Maximum storage class
MCC	<b>1024</b>	Maximum castout class
MDAS	Dependent on page size being cached: <b>1</b> for 4 KB pages <b>2</b> for 8 KB pages <b>4</b> for 16 KB pages <b>8</b> for 32 KB pages	Maximum data area size
DAEX	<b>4</b>	Data area element characteristic
AAI	<b>0</b>	Adjunct assignment indicator
R_de	Set on ALTER GROUPBUFFERPOOL. Default is <b>5</b> . See the table below for more information on determining this value.	The directory portion of the directory-to-data ratio
R_data	Set on ALTER GROUPBUFFERPOOL command. See the table below for more information on determining this value.	The data object portion of the target directory-to-data ratio

The following table contains information about the formulas used to determine R\_data and R\_de. *N* is the RATIO entered on the ALTER GROUPBUFFERPOOL command. If *N* has a decimal point, all digits after the first decimal place are ignored. For example, 5.67 is treated as 5.6.

*Table 55. Formulas for determining R\_data and R\_de.*

Page Size	N has no decimal point	N has decimal point
4 KB R_de	N	N×10
4 KB R_data	1	10

Table 55. Formulas for determining R\_data and R\_de. (continued)

Page Size	N has no decimal point	N has decimal point
8 KB R_de	N	N×10
8 KB R_data	2	20
16 KB R_de	N	N×10
8 KB R_data	4	40
32 KB R_de	N	N×10
32 KB R_data	8	80

### Related reference

[-ALTER BUFFERPOOL command \(Db2\) \(Db2 Commands\)](#)

## Lock structure size

The coupling facility lock structure contains two parts: a lock entry table and a list of update locks.

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ”](#) on page 636.

The *lock entry table* is used to determine if inter-Db2 read/write interest exists on a particular hash class. *Hash classes* are resources that hash to a particular place in the lock table. The second part is a list of the update locks that are currently held (sometimes called a *modify lock list* or *record list table*). You can control the division of the lock structure storage between these two components by using the IRLMPROC or by using an IRLM MODIFY command. If you do not specify how the structure is to be split, IRLM attempts to divide it with a 1:1 ratio between lock table entry (LTE) and record list entry (RLE) storage.

The total size of the lock structure must be large enough to limit hash contention, which prevents performance problems. The lock structure must also be large enough to prevent failures that result from a lack of record table storage to write a MODIFY entry (RLE). Proper specification for the number of LTEs can help avoid hash contention.

IRLM reserves 10% of the record table entries for "must complete" functions (such as rollback or commit processing), so that a shortage of storage does not cause a member to fail. However, if storage runs short in the record table, there can be an impact on availability (transactions are terminated), response time, and throughput.

The z/OS system can automatically alter the size of a lock structure in the coupling facility if it needs storage space. The ALLOWAUTOALT option in the CFRM policy specifies whether system-initiated automatic alters are to be allowed for a structure.

If no competing resource is using the coupling facility, consider specifying ALLOWAUTOALT(YES) to enable the lock structure to change as the workload grows. However, if you use this setting, other resources can force the IRLM lock structure size to decrease. This situation can cause an IRLM out-of-storage condition in the lock table and an abend.

If you need the lock structure to be stable, specify ALLOWAUTOALT(NO). If you do not specify ALLOWAUTOALT, the default value of NO is used.

### Related concepts

[Avoiding false contention \(Db2 Data Sharing Planning and Administration\)](#)

[Auto Alter capabilities \(Db2 Data Sharing Planning and Administration\)](#)

[Changing the size of the lock structure \(Db2 Data Sharing Planning and Administration\)](#)

[Ways to monitor Db2 locking activity \(Db2 Data Sharing Planning and Administration\)](#)

## Lock entry size parameter

The LOCK ENTRY SIZE parameter on installation panel DSNTIPJ determines the amount of space required for lock contention control information (that is, individual entries in the lock table).

The lock entry size and the number of lock table entries of the first IRLM to join the group determines the whole group's storage size for the lock table and the lock table entry width. The default is 2 bytes, which is probably the size you want, unless you immediately create a data sharing group of eight or more members. By restricting each lock entry to 2 bytes, you maximize the amount of RLE space available from the define structure size.

### Related reference

#### LOCK ENTRY SIZE field

The value of the LOCK ENTRY SIZE field specifies the initial size, in bytes, of individual lock entries in the lock table portion of the lock structure.

### Storage estimate for the lock structure

For installation planning purposes, the initial size of the lock structure is based on how much updating you do.

**Recommendation:** If you do not specify a value for the LTE parameter in the IRLMPROC procedure, choose a value for INITSIZE that is a power of 2. This enables IRLM to allocate the coupling facility storage so that half is used for lock table entries and the remainder is used for record table entries. If a 1:1 split occurs and total size is not a power of 2, you might experience a severe shortage of space for the record table entries, resulting in Db2 or IRLM failures. Those failures occur because the number of lock table entries requested during connection to the group must be a power of 2. The record table is susceptible to storage shortages if the structure is too small or if the allocation of the lock table leaves too little storage for the record table.

When you specify a value for the LTE parameter in the IRLMPROC procedure, or when you issue the MODIFY *irlmproc* SET,LTE=*nnnn* command, you should monitor XES contention rates to determine the optimum value for your normal operating environment. If the contention rates appear to be too high, increase the LTE parameter value to the next power of 2. Remember, any increase in the size of the lock table causes a corresponding decrease in the record table, unless the structure size is also increased.

If you have little contention and want more storage available for record table entries, decrease the LTE parameter value by a power of two. Anytime the number of lock table entries is decreased, you should monitor contention rates for a period of time.

Because structure allocation is done during connection, any change that is made to the LTE parameter value does not take effect unless the lock structure is reallocated. You can reallocate the lock structure in one of the following ways:

- Rebuild the lock structure. This is the simpler method.
- Terminate the group, force deallocation of the lock structure, and restart the group.

The LTE parameter value of the first IRLM to connect to the newly allocated structure dictates the coupling facility structure sizes that are used by the group.

The following table shows initial size value recommendations.

INITSIZE	SIZE	Condition
32 MB	64 MB	For light sharing with a low amount of updating, or for a single-member data sharing group
64 MB	128 MB	For medium sharing with a moderate amount of update activity
128 MB	256 MB	For a high amount of sharing with a lot of update activity

## SCA list structure size

The *shared communications area (SCA)* is a list structure in the coupling facility. Your storage estimate for your data sharing group should include an estimate of SCA size.

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ” on page 636.](#)

The SCA contains the following information:

- Member names
- BSDS names
- Database exception status conditions about object in the database
- Recovery information, such as log data set names and the list of indoubt XA transactions

The following table shows how to estimate the size of the SCA. The SCA size can be specified in 1 KB increments.

Table 57. Estimating storage for the SCA

Site size	Databases	Tables	INITSIZE	SIZE
Small	50	1000	16 MB	32 MB
Medium	200	4000	32 MB	64 MB
Large	400	10,000	64 MB	128 MB
Extra Large	600	50,000	128 MB	256 MB

Running out of space in the SCA can cause Db2 to fail. Because much of the space in the SCA is taken up with exception information, you can reclaim space by correcting database exception conditions. Each indoubt XID entry takes approximately 250 bytes. The additional SCA storage required to be reserved is dependent on the total number of database access threads (DBATs) that can be active for the data sharing group. If the data sharing group supports XA transactions, be sure to reserve additional space in the SCA for the indoubt transaction ID (XID) list. (DRDA XA protocol support enables Db2 servers to participate in WebSphere coordinated two-phase commit transactions that have multiple connections to more than one data source.) After a failure, indoubt XA transactions are resolved by WebSphere, or you can reclaim space by resolving indoubt XA transactions manually.

### Related concepts

[Coupling facility structures](#)

Db2 relies on areas of storage in the coupling facility called *structures*.

### Related tasks

[Recovering indoubt threads \(Db2 Administration Guide\)](#)

## How to change structure sizes

You can change the size of individual structures by changing the CFRM policy.

Then you should rebuild the structures by using the z/OS command SETXCF START, REBUILD, STRNAME=*strname*. Be aware that:

- The coupling facility size does not increase unless at least one Db2 subsystem is active when this command is issued.
- This command does not work on structures that are actively being duplexed.

z/OS attempts to reallocate a new instance of the structure in the same coupling facility if that coupling facility has enough storage space. If there is not enough space, z/OS looks at the preference list and uses the specified alternate coupling facility. After the space is allocated, Db2 rebuilds the information into the new structure. Any transactions that need the structure must wait until the rebuild is complete. It is best to plan a rebuild when other activity in the system is low.

## Dynamic changes to structure sizes

If the affected structure is allocated in a coupling facility with CFLEVEL greater than 0, you can dynamically increase the structure sizes up to a maximum limit specified on the CFRM policy by using the z/OS command SETXCF START,ALTER.

The advantages to this method are:

- Db2 can access the structures while a change is taking place.
- Less coupling facility storage is required because Db2 does not need to allocate enough space for a whole new structure. It dynamically adds or deletes storage from the existing structure.
- The command works on duplexed structures.

### Related concepts

[Storage estimates for data sharing environments](#)

As part of planning for a data sharing environment, you should estimate the storage requirements for coupling facility structures and for Db2 resources.

[Changing the size of the group buffer pool \(Db2 Data Sharing Planning and Administration\)](#)

[Problem: storage shortage in the SCA \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Changing the lock structure size dynamically \(Db2 Data Sharing Planning and Administration\)](#)

### Related reference

[Updating a CFRM Policy \(z/OS MVS Setting Up a Sysplex\)](#)

## Automatic changes to structure sizes

z/OS can automatically alter a coupling facility structure when the structure reaches an installation-defined or default percent-full threshold, as determined by structure full monitoring.

The alter process can change the size of the structure, reapportion the objects within the structure, or both. This function works the same in data sharing environments as it does in non-data sharing environments. See [Adding MVS systems to a sysplex](#) for complete information about allowing structures to be altered automatically.

## IRLM storage size

For data sharing, plan for additional IRLM storage to accommodate data sharing-specific locks called *P-locks*.

**Tip:** You can use the coupling facility structure sizer (CFSizer) tool to help you calculate CF structure storage sizes for Db2 data sharing. For more information, see [“The CFSizer tool ” on page 636](#).

P-locks are held on open page sets and on database descriptors (DBDs), skeleton cursor tables (SKCTs), and skeleton package tables (SKPTs). Unlike transaction locks, storage for P-locks is held even when no transaction activity exists; therefore they consume storage even with no transaction activity.

Plan also for the extra storage that IRLM needs to build retained locks in case other members fail. The following table shows the variables that you need to take into account.

Table 58. Variables that are used to estimate additional IRLM storage

Variable	Description	Calculation
X	P-locks <sup>1</sup>	$N = (\text{MAX\_OPEN\_DATA\_SETS} \times 500)$ $X = (N + (N \times .40))$
Y	Ability to hold update-retained locks for a failed member	Depends on the update intensity of the workload. Start with the following: $Y = .25(X)(X)$



---

Table 58. Variables that are used to estimate additional IRLM storage (continued)

---

Variable	Description	Calculation
----------	-------------	-------------

---

**Note:**

1. The formula is based on the assumption that more than one P-lock might be held on a page set occasionally (such as for castout activity), and an estimate of about 40% for P-locks on the EDM pool objects and for short-lived page P-locks. If you know that the EDM pool has relatively few objects in it, you can use a lower percentage for that value. Estimate the maximum number of open data sets or use the value that is specified for the subsystem parameter DSMAX.

---

**Related concepts**

[Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

[How Db2 determines the initial value of DSMAX \(Db2 Performance\)](#)

[Physical locks in data sharing \(Db2 Data Sharing Planning and Administration\)](#)

**Related reference**

[DSMAX field \(DSMAX subsystem parameter\)](#)

The DSMAX subsystem parameter specifies the maximum number data sets that can be open at one time.

***IRLM priority setting***

If IRLM priority is too low, storage might not be freed as quickly, and IRLM might run out of storage.

The IRLM address space priority, though it should remain high, should be lower than XCFAS.

**Related tasks**

[Determining z/OS Workload Manager velocity goals \(Db2 Performance\)](#)

***IRLM storage use***

Use the z/OS command `MODIFY irlmproc,STATUS,STOR` to see how much storage IRLM is using.

**Related reference**

[MODIFY irlmproc,STATUS command \(z/OS IRLM\) \(Db2 Commands\)](#)

**Storage estimate for the EDM pool in a data sharing environment**

If you are planning to use data sharing, you should consider additional storage requirements for the EDM pool.

**General guideline**

You can use the storage estimates for your capacity planning.

For data sharing, you might need to increase your storage estimate by about 10% because of the way Db2 cross-invalidates database descriptors (DBDs). This percentage is just an estimate; the actual amount of the increase depends on how often you create, drop, and alter objects in the data sharing group.

**Cross-invalidating items in the EDM pool**

Db2 does not have a backup EDM pool in the coupling facility for invalidating objects in the EDM pool (DBDs, cursor tables, and more) because these objects are modified less frequently than database data. So, there is one EDM pool for each member. When a DBD changes, Db2 uses XCF messages to notify other members which are also using that DBD that new transactions should use the new DBD, which is read into the EDM pool. Thus, it is possible that one transaction is using the new DBD while other, currently running transactions are still using the old DBD. In other words, more than one copy of a DBD can exist in the EDM pool.

## Reducing the storage impact

For CREATE, ALTER, or DROP statements, the DBD is not modified until a COMMIT is issued. You can significantly reduce the number of EDM versions by issuing CREATE, ALTER, or DROP statements within a single COMMIT scope. However, the exclusive lock on the DBD is held until the COMMIT.

### Related concepts

[Default database storage requirements](#)

The size of the default database depends on column lengths, page sizes, and index column lengths.

The estimated size of your data, multiplied by 2, usually provides an adequate planning estimate for the default database size.

### Related tasks

[Calculating EDM pool sizes](#)

The environmental descriptor manager (EDM) controls areas of virtual storage that hold cached objects.

These areas are called pools, and thus the term *EDM pool* is frequently used to describe these areas of virtual storage.

## Before you enable Db2 data sharing

You must take certain actions to prepare your environment for Db2 data sharing.

### Related concepts

[Disabling and re-enabling Db2 data sharing](#)

Disabling Db2 data sharing is a complex procedure and is very disruptive. Do not attempt to disable Db2 data sharing without a thorough understanding of the process.

[Deadlock detection and resource timeouts in data sharing environments \(Db2 Data Sharing Planning and Administration\)](#)

### Related tasks

[Enabling Db2 data sharing](#)

The enabling process allows an existing Db2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

[Migrating an existing data sharing group to Db2 12](#)

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

## Connecting CICS to Db2 (optional)

Before you enable data sharing, connect CICS to each member. The CICS attachment facility command, DSNCRSTR, lets you override the subsystem name on startup.

### About this task

To connect Db2 to CICS, you must regenerate several CICS tables with additional entries. Coordinate this connection with your CICS support group.

### Related information

[Command types and environments in Db2 \(Db2 Commands\)](#)

## Connecting Db2 to IMS (optional)

Before you enable data sharing, attach IMS to every member that runs IMS applications. IMS must include a separate member SSM for every member Db2.

### About this task

Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

## Procedure

To connect the IMS attachment facility:

1. [Make Db2 load modules available to IMS.](#)
2. [Define Db2 to IMS.](#)
3. [Define new programs and transactions to IMS.](#)
4. [Prepare IMS applications for Db2.](#)
5. Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications.](#)
  - [Generate a user language interface.](#)

## Registering the command prefixes, member group attachment name, and subgroup attachment name

Before you enable data sharing, register the command prefix for a member, the group attachment name, and the subgroup attachment name for the group.

## Procedure

Use parameter library member IEFSSNxx. For example:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
  INITPARM( ' DSN3EPX,cmd-prefix<,<scope>,<group-attach>,<subgroup-attach>>>' )
```

By default, the subsystem definition does not include the subgroup attachment name. If you specify a value for SUBGRP NAME on installation panel DSNTIPK, the installation CLIST appends the name to the subsystem definition.

**Recommendation:** When you register the 1- to 8-character command prefix in parameter library member IEFSSNxx and specify the scope of the prefix, choose a scope of started (S). This specification lets all z/OS systems in a single PARMLIB member IEFSSNxx use all z/OS systems in the Parallel Sysplex. It also simplifies the task of moving a member from one system to another; you can stop Db2 on one z/OS system and start it on another. You do not need to re-IPL the system.

## Results

The following sample definitions are examples of what might appear in the shared parameter library SYS1.PARMLIB:

```
DB1A,DSN3INI,'DSN3EPX,-DB1A,S,DB0A'
DB2A,DSN3INI,'DSN3EPX,-DB2A,S,DB0A,SBG1'
DB3A,DSN3INI,'DSN3EPX,-DB3A,S,DB0A,SBG1'
DB4A,DSN3INI,'DSN3EPX,-DB4A,S,DB0A,SBG2'
```

## What to do next

If you need to change the command prefix parameters, you must change entry IEFSSNxx and re-IPL the host system. For example, if you want to change the command prefix scope from system-wide to Parallel Sysplex-wide, and you want to register the prefix at Db2 startup, change the M in the entry to S before you re-IPL.

If you want to use multiple-character command prefixes, make sure that your automation programs can handle multiple-character prefixes in messages before you change the prefixes.

## Related concepts

[Group attachment names and subgroup attachment names](#)

Group and subgroup attachments are used by TSO, CAF, RRSAP, JDBC, ODBC, and Db2 utilities connections to find active Db2 subsystems.

### **Related tasks**

Migration step 13: Define Db2 12 to IRLM and MVS: DSNTIJMV

For migration to Db2 12, job DSNTIJMV updates SYS1.PARMLIB members to update the definition of Db2 12 to IRLM and MVS.

## **Increasing the size of the BSDS**

Data sharing causes additional records to be written to the BSDS for member information.

### **About this task**

**Recommendations:** To prevent the BSDS from expanding into secondary extents, change the size of the primary space allocation to 1500 records. This change is necessary only for members that have followed the recommended migration path from a previous Db2 version without altering that record size. New installations and member installations already do this for you.

### **Procedure**

To increase the space allocation for the BSDS:

1. Rename existing BSDSs.
2. Define larger BSDSs with the original names.
3. Copy the renamed BSDSs into the new BSDSs.

### **Results**

You can do this using access method services. To see the definition that is used for the BSDSs, see the installation job DSNTIJIN.

## **Increasing the size of the SYSLGRNX table space**

The SYSLGRNX directory table space contains the relative byte address (RBA) ranges showing when data sets are open for updating.

### **About this task**

Because more members open and close data sets in a data sharing configuration, this table space is likely to grow with the addition of each new member to the data sharing group. And if you choose to copy indexes, this table space can grow even more.

Consider increasing the frequency with which you remove rows from this table space, or increasing the size. To see the definition used for SYSLGRNX, see installation job DSNTIJIN.

### **Procedure**

To increase the space allocation for SYSLGRNX, use access method services:

1. Stop the table space.
2. Rename the existing SYSLGRNX data set.
3. Define a larger SYSLGRNX data set with the original name.
4. Using only DSN1COPY, copy the contents of the renamed data set into the new SYSLGRNX data set.
5. Restart the table space.

## Database design recommendation

You should partition table spaces as much as possible and use as much separation of I/O as possible.

**Define table spaces and indexes with GBPCACHE CHANGED:** It is unlikely that members that are processing a large query will repeatedly read the same pages, so those pages do not need to be cached in the group buffer pool. Define the relevant table spaces and indexes with GBPCACHE CHANGED (the default).

### Related tasks

[Partitioning for optimal parallel performance \(Db2 Performance\)](#)

## Application design planning for data sharing

Particular considerations apply to applications for use in Db2 data sharing environments.

### CACHE option of CREATE SEQUENCE statement

The CACHE option of the CREATE SEQUENCE statement is a performance and tuning option that directs Db2 to preallocate a specified number of sequential values in memory.

**GUIP** Sequence objects provide unique, sequential, and numeric values to Db2 applications. Applications can use sequence numbers for a variety of purposes, including the avoidance of concurrency and performance problems that can result when applications generate their own sequence numbers. Unlike application-generated sequences, Db2 sequence objects allow multiple transactions to concurrently increment the sequence number, and Db2 guarantees that each sequential value is unique. Db2 does not wait for a transaction that has incremented a sequence to commit before allowing the sequence to be incremented by another transaction. No retained locks are held to prevent access to the sequence.

Every time a cache is allocated, the SYSIBM.SYSSEQUENCES table is updated and a forced log record is written for the update. Using ORDER or NO CACHE will result in a SYSIBM.SYSSEQUENCES table update and the associated forced log write every time a new value is generated by Db2. Specifying CACHE provides faster access to the sequence since values are assigned from the cache. It also reduces the number of SYSIBM.SYSSEQUENCES updates and the associated forced log records. The SYSIBM.SYSSEQ table space is defined with the MAXROWS(1) attribute in order to minimize page P-lock contention in a data sharing environment as the SYSIBM.SYSSEQUENCES table gets updated.

Db2 always generates sequence numbers in order of request. However, when a sequence is shared across multiple members of a data sharing group, each Db2 member allocates its own cache of unique consecutive numbers for the sequence. Therefore, in situations where transactions from different members are requesting the next sequence number from the same sequence, values assigned for the sequence across multiple Db2 members may not be in strict numeric order.

For example, assume that members DB2A and DB2B share a sequence named SEQ1 that starts with 1, increments by 1, and has cache = 20.

If the transaction that is associated with DB2A makes the first request for a sequence number, DB2A allocates a cache of 20 values (from 1 to 20) and the value of 1 is provided to the application. If the transaction that is associated with DB2B makes the next request for a sequence number, DB2B allocates its own cache of 20 values (from 21 to 40) and the value of 21 is provided to the application.

Assuming that sequence number requests continue to arrive from the transactions that are associated with members DB2A and DB2B in this manner (one from DB2A and then one from DB2B), the values assigned for that sequence are 1, 21, 2, 22, 3, 23, and so on. Although the numbers are in sequence within each Db2, the numbers assigned across multiple Db2 members are not in strict numeric sequence.

In a data sharing environment, using the ORDER or NO CACHE option ensures that the values assigned to a sequence which is shared by applications across multiple Db2 members are in strict numeric order. In a data sharing environment, if ORDER is specified, then NO CACHE is implicit even if CACHE n is specified.

In a non-data sharing environment, the numbers are always assigned in strict numerical order, even if NO ORDER is specified; so specifying ORDER or NO CACHE is not necessary.

**Important:** Specifying ORDER or NO CACHE in a data sharing environment, or NO CACHE in a non-data sharing environment, is not recommended because it will result in a SYSIBM.SYSSEQUENCES table update and the associated forced log record for each value generated by Db2. This can lead to an excessive amount of log write I/Os, which can drastically reduce the log write bandwidth.

#### GUI

#### **Related reference**

[CREATE SEQUENCE statement \(Db2 SQL\)](#)

## **Applications using CICSplex System Manager**

CICSplex® System Manager (CICSplex SM) is a system-management tool that lets you manage several Customer Information Control System (CICS) systems as if they were one.

The dynamic transaction routing program that is supplied with CICSplex SM balances the enterprise workload dynamically across the available application owning regions. CICSplex SM lets you manage a variable workload without operator intervention and maintains consistent response times. It can do this because it routes transactions away from busy regions and from those that are failing or likely to fail, which improves throughput and conceals problems from users.

### ***Storm-drain effect***

In some situations, your Db2 applications must be sensitive to a resource-unavailable condition.

For example, assume that a database is stopped for planned maintenance, and that the application receives SQLCODE -904 from the system and ends normally. If your application ignores the SQLCODE -904 message, CICSplex SM might continue to route work to the stopped system because it appears to complete its work rapidly. This is sometimes called the *storm-drain* effect.

When both of the following conditions are true, the storm drain effect can occur:


- The CICS attachment facility is down.
- You are using INQUIRE EXITPROGRAM to avoid AEY9 abends.

Again, because there has not been an abend, it appears as if work completes rapidly at that subsystem.

### ***How a CICS exit routine can avoid the storm-drain effect***

You can write a resource manager interface program exit routine, XRMIOUT, to avoid the storm drain effect caused by SQLCODE -904 (resource unavailable). This exit routine does not avoid the storm-drain problem caused by using INQUIRE EXITPROGRAM to avoid AEY9 abends.

## **About this task**

 Using XRMIOUT, you can intercept the return from the resource manager. The exit routine can determine whether:

- The resource manager is Db2.
- SQLCODE -904 is in the SQL communication area (SQLCA).

If these conditions exist, abend the transaction instead of ending the transaction normally.

To determine if Db2 is the resource manager, compare 'DSNCSQL' with the value stored at the address that is included with the UEPTRUEN parameter that is passed to XRMIOUT, as shown in the following figure.

XRMIOU's  
DFHUEPAR  
Parameter list

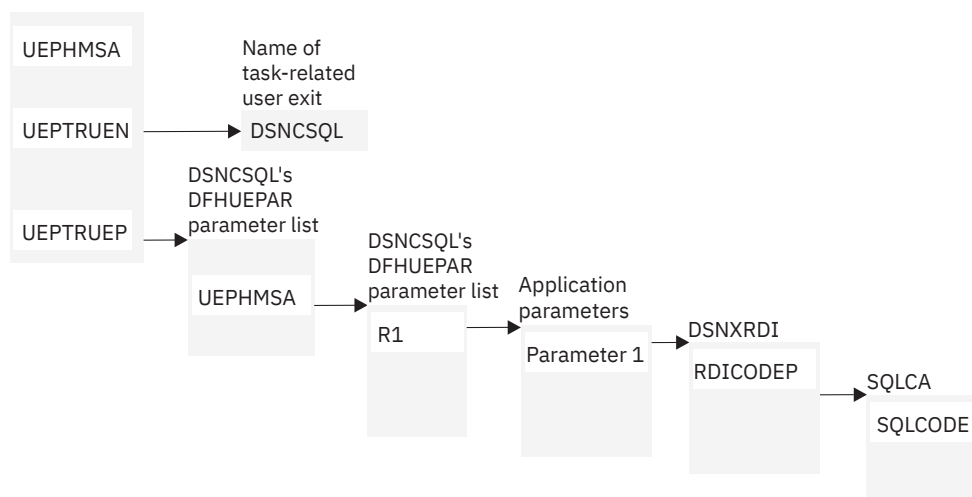


Figure 84. Pointers to resource manager name and SQLCODE

## Procedure

To find the SQLCODE:

1. Find UEPTRUEP in the DFHUEPAR parameter list that is passed to XRMIOU. UEPTRUEP contains the address of the DFHUEPAR parameter list that is passed to DSNCSQL.
2. Find UEPHMSA in DSNCSQL's DFHUEPAR parameter list. UEPHMSA points to the register save area that contains the application's registers.
3. Find register 1 in the register save area. Register 1 contains the address of the application parameters.

The DSNXRDI macro maps the application parameters that are passed by the precompiler to Db2. The mapping macro is contained in the data set library prefix.SDSNMACS.

4. Find RDICODEP in the DSNXRDI structure. RDICODEP contains the address of the SQL communication area (SQLCA).
5. Find the SQLCODE.



## Related concepts

[SQL control statements for external SQL procedures \(Db2 SQL\)](#)

## Related reference

[Exit XRMIOU \(CICS Transaction Server for z/OS\)](#)

## A CICS enhancement that avoids the storm-drain effect

The CICS Transaction Server for z/OS helps you avoid the storm-drain effect. With the CICS Transaction Server for z/OS, you do not need to use XRMIOU to check for resource unavailable conditions.

CICS Transaction Server for z/OS also lets you benefit from the INQUIRE EXITPROGRAM command without causing the storm-drain effect.

## Related information

[INQUIRE EXITPROGRAM \(CICS Transaction Server for z/OS\)](#)

## Order-dependent transactions

In limited cases, one transaction, called an originating transaction, updates Db2 data with INSERT, UPDATE, or DELETE. Before completing phase 1 of the commit process, the originating transaction

spawns a second transaction that is dependent on the updates of the first transaction. These types of transactions are referred to as *order-dependent transactions*.

## Description of the problem

In some situations, a dependent transaction can encounter a "row not found" condition that does not occur in non-data sharing environments. Even in non-data sharing environments, dependent transactions need to tolerate the "row not found" condition in cases where the originating transactions roll back.

## When the problem might occur

The "row not found" condition can occur if all of the following conditions are true:

- The originating transaction spawns a dependent transaction before it completes phase 1 of the commit process.
- The dependent transaction runs on a different member than the member on which the originating transaction runs.

Because each member has its own local buffer pools, the uncommitted buffered pages that are updated by the originating transaction are not immediately visible to the dependent transaction.

- The dependent transaction attempts to access a row that was updated by the originating transaction.
- The dependent transaction is not bound with an isolation level of repeatable read.

## Preventing the problem

To prevent these periodic "row not found" situations, consider using the IMMEDIATEWRITE(YES) option of the BIND and REBIND commands for plans or packages that spawn dependent transactions that might run on other members. You can also use the IMMEDIATEWRITE subsystem parameter. IMMEDIATEWRITE(YES) means that Db2 writes the page as soon as the buffer update completes. Db2 writes the data to one of the following structures or devices:

- The group buffer pool
- Disk storage for GBPCACHE NO group buffer pools
- Disk storage for GBPCACHE NONE page sets
- Disk storage for GBPCACHE SYSTEM page sets

The IMMEDIATEWRITE parameter (IMMEDIATE WRITE field on installation panel DSNTIP8) can override the value of the IMMEDIATEWRITE bind option on a data sharing member. The following table illustrates the implied hierarchy when using the IMMEDIATEWRITE subsystem parameter and the IMMEDIATEWRITE option of the BIND and REBIND commands.

Table 59. The implied hierarchy of the immediate write option

IMMEDIATEWRITE bind option	IMMEDIATEWRITE subsystem parameter	Value at run time
NO	NO	NO
NO	YES	YES
YES	NO	YES
YES	YES	YES

**Note:** YES always has precedence whether it is defined by the subsystem parameter or the bind option. Updated pages that are group buffer pool-dependent are written at, or before, phase 1 of the commit process.

The following alternatives can help solve the order-dependent transaction problem:



- Ensure that the originating transaction does not schedule the dependent transaction until the originating transaction has completed phase 1 of commit.
- Run the dependent transaction with an isolation level of repeatable read.
- If the dependent transaction is currently running with an isolation level of cursor stability AND CURRENTDATA(NO), changing it to use CURRENTDATA(YES) can sometimes solve the problem.
- Add statement retry logic to handle the return of a "row not found" condition.
- Run the dependent transaction on the same member as the originating transaction.

### Related concepts

#### The scope and uniqueness of Db2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

## Strategy for creating a Db2 data sharing group

---

When you create a data sharing group, add one member at a time. You can install a new Db2 for the first member (the *originating member*), or you can enable an existing Db2 subsystem as the originating member.

### Before you begin

Familiarize yourself with the information in [“Planning for Db2 data sharing” on page 601](#).

### About this task

Enabling Db2 data sharing is a big step. Carefully plan your strategy because data sharing is difficult to disable after it is enabled. Disabling should only be considered if your long-term plans are to disable data sharing. During migration, test other major new capabilities in the new release on a single system before enabling data sharing, and then build and try a test data sharing group. When you are ready to begin a move to production, you must avoid having to fall back to the previous release.

**Tip:** Db2 target library and distribution library data sets can be shared among all members of a data sharing group. Sharing these libraries reduces the effort of installing and maintaining the different members of the data sharing group. Sharing libraries can also help ensure that members are using the same exit routines. Also, sharing libraries simplifies the tasks of defining a new member to a data sharing group. The member installation process supports sharing of the libraries.

### Procedure

Follow this general strategy for creating a data sharing group:

1. Build and try a test data sharing group. Here is one approach to testing your data sharing group:
  - a) Install Db2 12 as a single system, and test it with dummy data, or copies of production data, in order to test some of the new capabilities. Run old applications and begin new application development work. In the meantime, prepare the hardware and define the coupling facility structures to enable data sharing.
  - b) Enable data sharing on the test system.
 

You have a single-system data sharing group at this point, and this can help you find any initial configuration problems. Make sure that old applications work in this environment.
  - c) Install additional members in the test group. Run applications from different members in the group to fully exercise the group buffer pools and cross-system locking.
2. Move to production.

When you are ready to move to production complete the following steps:

- a) If your originating member is not already migrated to Db2 12, migrate it from Db2 11 to Db2 12.

**Recommendation:** Wait until your system is stable before enabling data sharing . You can enable data sharing on your existing release and then migrate to Db2 12, but it is not recommended, particularly if you plan to migrate soon. If you are in the process of migrating, wait until after the activation of function level 500 or higher before you move to the data sharing mode.

- b) Verify that function level 500 or higher is activated and that your Db2 system is stabilized. Once the system is stabilized, you can begin using new capabilities.
- c) Tune applications to contain the level of locking and lock contention rates.  
To reduce the effects of locking contention in a data sharing environment, first control locking costs in a non-data sharing environment. This gives you a baseline from which to perform further tuning after the move to data sharing.
- d) Enable data sharing on the originating member, and run applications on this one-member data sharing group.
- e) Install additional members as needed.

#### Related concepts

[Introduction to Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

[Database administration for data sharing \(Db2 Data Sharing Planning and Administration\)](#)

[Concurrency and locks in data sharing environments \(Db2 Data Sharing Planning and Administration\)](#)

#### Related tasks

[Controlling resource usage \(Db2 Performance\)](#)

## Subsystem parameters and application defaults in a data sharing environment

---

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

### Specifying the subsystem parameter load module for a member

Every member of a data sharing group must have its own unique load module for subsystem parameters (sometimes called DSNZPARM in a non-data sharing environment).

#### About this task

The load module for subsystem parameters is built by job DSNTIJUZ and stored in the *prefix*.SDSNEXIT target library. Every member must use a different name for its parameter load module because the *prefix*.SDSNEXIT target library can be shared among all members of the data sharing group. The installation process requires that you provide the name of the load module for a member.

**Recommendation:** Name each member's load module using the convention DSNZPxxx, where xxx includes the number in the member name and the group identifier. For example, DB1A's subsystem parameter load module could be named DSNZP01A.

The subsystem parameter load module name for a member is an optional parameter on the EXEC statement in the JCL procedure that is used to start the system services address space (*ssnmMSTR*). This optional parameter provides support for an operator (or automated operations) not specifying the subsystem parameter load module name when starting a member.

#### Procedure

Specify the load module name in the EXEC statement of the *ssnmMSTR* JCL procedure in SYS1.PROCLIB as follows:

```
//IEFPROC EXEC PGM=DSNYASCP,PARM='ZPARM(DSNZPxxx)',...
```

## Related tasks

Generating tailored Db2 12 installation, migration, or function level activation jobs

You can generate tailored JCL jobs and input files for installing Db2, migrating to Db2 12, or Db2 activating Db2 12 function levels by using the Db2 installation CLIST. The Db2 installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## The scope and uniqueness of Db2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

The values of most parameters do not need to be unique. Recommendations are offered for some of these parameters. In the following tables, the parameter is indicated by the name of the corresponding installation panel field. However, some of the parameters do not reside in the DSNZPxxx load module.

### Parameter values that must be different on each member

The list below shows the values of the installation panel fields that must be different for every member of a data sharing group. You specify values for these fields when a member is installed, migrated, or updated.

- Active Logs: COPY 1 PREFIX
- Active Logs: COPY 2 PREFIX
- Archive Logs: COPY 1 PREFIX (ARCPFX1 parameter)
- Archive Logs: COPY 2 PREFIX (ARCPFX2 parameter)
- Bootstrap Data Sets : COPY 1 NAME
- Bootstrap Data Sets : COPY 2 NAME
- COMMAND PREFIX
- Db2 VTAM LUNAMEDb2 NETWORK LUNAME
- MEMBER IDENTIFIER
- MEMBER NAME
- PARAMETER MODULE
- PROC NAME
- RESYNC PORT
- SUBSYSTEM NAME
- SUBSYSTEM SEQUENCE
- SUBSYSTEM NAME (IRLM)
- WORK FILE DB

### Parameter values that must be the same on every member

The list below shows the installation panel fields that must have the same values for every member of the data sharing group.

- APPL COMPAT LEVEL
- AUTH EXIT CACHE REFR
- AUTH EXIT CHECK
- CATALOG ALIAS
- DEL CF STRUCTS

- DBADM CREATE AUTH
- Db2 LOCATION NAME
- DESCRIBE FOR STATIC
- DIRECTORY AND CATALOG DATA
- DIRECTORY AND CATALOG INDEXES
- TCPIP PORT
- EVALUATE UNCOMMITTED
- EXTENDED SECURITY
- GROUP ATTACH
- GROUP NAME
- INDEX SPACE ALLOCATION
- IRLM XCF GROUP NAME
- INSTALL DD CONTROL SUPT
- LIKE\_BLANK\_INSIGNIFICANT in macro DSN6SPRM
- MAX UTILS PARALLELISM
- MINIMUM DIVIDE SCALE
- PAD INDEXES BY DEFAULT
- PERCENT FREE FOR UPDATE
- REAL TIME STATS
- REVOKE DEP PRIV
- SECURE PORT
- SITE TYPE
- SKIP UNCOMM INSERTS
- STATISTICS FEEDBACK
- STATISTICS HISTORY
- STATISTICS ROLLUP
- SYSTEM ADMIN 1
- SYSTEM ADMIN 2
- SYSTEM OPERATOR 1
- SYSTEM OPERATOR 2
- SECURITY ADMIN 1
- SEC ADMIN 1 TYPE
- SECURITY ADMIN 2
- SEC ADMIN 2 TYPE
- SEPARATE SECURITY
- TABLE SPACE ALLOCATION
- TEMPLATE TIME
- TCP/IP ALREADY VERIFIED
- TRACKER SITE
- UNICODE IFCIDS
- VARY DS CONTROL INTERVAL

## Other recommendations

The table below shows the installation panel fields that can have the same or different values for members of a data sharing group.

Table 60. Recommended values for installation panel fields

Installation panel field (parameter) name	Recommendation
<a href="#">DEALLOC PERIOD</a>	Do not archive to tape. If you must, however, you should specify 0 for this parameter unless you intend to run all RECOVER jobs from the same member. Specifying a deallocation delay means that the tape is not available to any other member until the deallocation time expires.
<a href="#">DEFAULT 4-KB BUFFER POOL FOR USER DATA</a> <a href="#">DEFAULT 8-KB BUFFER POOL FOR USER DATA</a> <a href="#">DEFAULT 16-KB BUFFER POOL FOR USER DATA</a> <a href="#">DEFAULT 32-KB BUFFER POOL FOR USER DATA</a> <a href="#">DEFAULT BUFFER POOL FOR USER LOB DATA</a>  <a href="#">DEFAULT BUFFER POOL FOR USER XML DATA</a>	For consistent results when creating objects on different members, make this default the same on all members.
<a href="#">DEFAULT BUFFER POOL FOR USER INDEXES</a>	For consistent results when creating objects on different members, make this default the same on all members.
<a href="#">“DEVICE TYPE 1 field (UNIT subsystem parameter)” on page 294</a> <a href="#">DEVICE TYPE 2</a>	Archive the first copy of the log to disk.
<a href="#">DISABLE EDM RTS</a>	For consistent results, make the value of this subsystem parameter the same on all members.
<a href="#">IMMEDIATE WRITE (IMMEDWRI parameter)</a>	
<a href="#">READ COPY2 ARCHIVE</a>	This option should have the same value (either YES or NO) for all members of the group. Otherwise, the parameter, as it is set on the member that owns the archive log data set, determines which copy is used.
<a href="#">READ TAPE UNITS</a>	Do not archive to tape. If you must, however, it is vital that you have enough tape units allocated to the member doing the recovery to merge the archive logs from <b>all</b> members in the group that have updated the object being recovered. Thus, if there are eight members in the group, make sure you specify at least eight on this panel for each member.
<a href="#">RECORDING MAX</a>	All members should use the maximum value of 10000, making it easier to transfer a workload from one member to another.
<a href="#">RETAINED LOCK TIMEOUT</a>	If you have automatic restart, or some other restart automation that quickly restarts failed members, choose a non-zero value for this parameter.
<a href="#">START IRLM CTRACE</a>	Diagnostic traces should be activated for all members of the group. The negligible performance overhead is outweighed by the benefit of easier problem resolution. Only those systems that have reached the limits of processor capacity should consider not automatically activating these traces.

### Related concepts

#### [Order-dependent transactions](#)

In limited cases, one transaction, called an originating transaction, updates Db2 data with INSERT, UPDATE, or DELETE. Before completing phase 1 of the commit process, the originating transaction spawns a second transaction that is dependent on the updates of the first transaction. These types of transactions are referred to as *order-dependent transactions*.

[The impact of archiving logs in a data sharing group \(Db2 Data Sharing Planning and Administration\)](#)

### Related reference

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Subsystem parameters that are not on installation panels](#)

Some subsystem parameters are defined by job DSNTIJUZ and are not associated with fields on any installation panels.

[BIND and REBIND options for packages, plans, and services \(Db2 Commands\)](#)

## Updating subsystem parameters for a member

No group-wide subsystem parameters can be updated; however, you can update the subsystem parameters for an individual member.

### Procedure

Specify the following installation option on the DSNTIPA1 installation panel:

```
INSTALL TYPE ===> UPDATE
```

This option updates parameters for the member.

### Related concepts

[The scope and uniqueness of Db2 subsystem parameters in data sharing](#)

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

### Related reference

[DSNTIPA1 or DSNTILA1: Main panel](#)

The entries on the Main panel control input to and output from the installation CLIST.

## Application defaults parameters

An application defaults load module, *dsnhdecpl*, is generated as part of installing or migrating Db2. In a data sharing environment, this module is generated only for the first member that is installed or migrated.

If you provide a separate *dsnhdecpl* module for each member, use the same *dsnhdecpl* settings (except for the SSID parameter) for all members of the data sharing group. If you provide a separate *dsnhdecpl* module for each member, after you activate a new function level, identify the jobs that you use to maintain those *dsnhdecpl* modules. You must modify those jobs to specify `SQLLEVEL=V12R1M500` or higher, and then run those jobs.

### Related concepts

[The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## Installing a new data sharing group

Although you can install and immediately enable Db2 data sharing on a new Db2 12 member, you should do so only in low-risk situations. The recommended approach is to migrate to, or install, a Db2 12 member, use it for a while, and then enable data sharing.

### Before you begin

Familiarize yourself with the following information:

- [“Planning for Db2 data sharing” on page 601](#)
- [“Strategy for creating a Db2 data sharing group” on page 655](#)

### About this task

If you decide to install and immediately enable data sharing on a new Db2 12 member, that member becomes the *originating member* of the data sharing group. This member's Db2 catalog is used as the Db2 catalog for the entire data sharing group.

### Procedure

To install a new data sharing group:

1. Run the installation CLIST as described in [Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43](#). Then on installation panel DSNTIPA1, specify the following values.

```
INSTALL TYPE ===> INSTALL
DATA SHARING ===> YES
```

2. On installation panel DSNTIP0A, specify option 1 to indicate the group data sharing function.

```
DSNTIP0A
DATA SHARING FUNCTION:
Select one.
  1 1. Group
  2 2. Member
  3 3. Enable
```

3. On installation panel DSNTIPK, specify:

```
GROUP NAME   ===> group name
MEMBER NAME  ===> originating member name
```

Verify that the *originating member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnmMSTR* startup procedure with the group name and member name you specify here.

4. Complete the installation panels and specify all of the parameters.
5. Complete the installation of Db2 by following the installation steps in [Chapter 5, “Installing Db2 12,” on page 427](#).
6. Run the [installation verification procedures \(IVP\)](#).

### Related concepts

[Subsystem parameters and application defaults in a data sharing environment](#)

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

#### The scope and uniqueness of Db2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

#### **Related tasks**

##### Naming in Db2 data sharing

By maintaining a consistent naming convention, you can simplify the process of naming the many items in a Db2 data sharing environment. You also simplify the management of name changes, as you add new members or move existing members to different systems in the future.

##### Enabling Db2 data sharing

The enabling process allows an existing Db2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

#### **Related reference**

##### DSNTIPA1 or DSNTILA1: Main panel

The entries on the Main panel control input to and output from the installation CLIST.

##### DATA SHARING field (DSHARE subsystem parameter)

The DSHARE subsystem parameter controls whether the data sharing function is to be used.

## Enabling Db2 data sharing

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The enabling process allows an existing Db2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

### Before you begin

Familiarize yourself with the following information:

- [“Planning for Db2 data sharing” on page 601](#)
- [“Strategy for creating a Db2 data sharing group” on page 655](#)
- [Security for Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#)

### About this task

**Important:** If you use a product that uses IFCID 306 to read log data, consult the documentation for that product for information about disabling and re-enabling data sharing.

**Tip:** You can use a variation of this process to rename data sharing members. For more information, see [“Renaming data sharing members” on page 619](#).

**Important:** If the RBA for a non data sharing Db2 subsystem reaches or exceeds the hard or soft limit, you must either convert all table spaces and indexes to the 10-byte format or use the RBA reset procedure. Enabling data sharing is not sufficient to resolve the problem.

### Procedure

To enable Db2 data sharing, complete the following tasks:

#### **Related concepts**

##### The scope and uniqueness of Db2 subsystem parameters in data sharing

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other



parameter values must be different on each member. For example, each member specifies a different BSDS name.

[Db2 data sharing considers for RACF access control \(RACF Access Control Module Guide\)](#)

### Related tasks

#### Installing Db2 12

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

#### Migration step 9: Stop Db2 11 activity

Before making Db2 12 operational, ensure that all work is stopped on the Db2 11 subsystem.

## Running the CLIST for enabling data sharing

The process of enabling data sharing involves running some of the installation jobs. Before you run the installation jobs, tailor them to your environment by running the installation CLIST.

### About this task

The enabling CLIST tailors the following jobs:

Jobs	Jobs	Jobs	Jobs
DSNTEJ0	DSNTEJ3M	DSNTEJ6W	DSNTEJ78
DSNTEJ1	DSNTEJ3P	DSNTEJ6Z	DSNTEJA
DSNTEJ1L	DSNTEJ4C	DSNTEJ61	DSNTEJSC
DSNTEJ1P	DSNTEJ4P	DSNTEJ62	DSNTEJSD
DSNTEJ1S	DSNTEJ5A	DSNTEJ63	DSNTEJSE
DSNTEJ1T	DSNTEJ5C	DSNTEJ64	DSNTEJSH
DSNTEJ1U	DSNTEJ5P	DSNTEJ65	DSNTEJIDE
DSNTEJ2A	DSNTEJ6	DSNTEJ66	DSNTEJIFT
DSNTEJ2C	DSNTEJ6D	DSNTEJ67	DSNTEJIGF
DSNTEJ2D	DSNTEJ6O	DSNTEJ7	DSNTEJIN
DSNTEJ2E	DSNTEJ6P	DSNTEJ71	DSNTEJIMV
DSNTEJ2F	DSNTEJ6R	DSNTEJ73	DSNTEJITM
DSNTEJ2H	DSNTEJ6S	DSNTEJ75	DSNTEJUJZ
DSNTEJ2P	DSNTEJ6T	DSNTEJ76	DSNTEJVC
DSNTEJ2U	DSNTEJ6U	DSNTEJ77	DSN8ES1
DSNTEJ3C	DSNTEJ6V		DSN8ES2

The enabling CLIST also edits the DB2I CLISTs.

### Procedure

To tailor the installation jobs for enabling data sharing:

1. Invoke the installation CLIST as described in Chapter 4, “[Generating tailored Db2 12 installation, migration, or function level activation jobs,](#)” on page 43.
2. On installation panel DSNTIPA1 specify the following field values.

```
INSTALL TYPE      ==> INSTALL
DATA SHARING     ==> YES

INPUT MEMBER NAME ==> input member for originating member
OUTPUT MEMBER NAME ==> new output member
```

3. On installation panel DSNTIP0A, specify option 3 to enable data sharing.

```

DSNTIP0A
DATA SHARING FUNCTION:
Select one.
  3 1. Group
    2. Member
    3. Enable

```

4. On installation panel DSNTIPK, specify:

```

GROUP NAME ==> group name
MEMBER NAME ==> originating member name

```

Verify that the *originating member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnmMSTR* startup procedure with the group name and member name that you specify here.

5. Complete the remaining installation panels, specifying parameters according to the Db2 subsystem parameters guidelines.

### Related concepts

[Subsystem parameters and application defaults in a data sharing environment](#)

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

[The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## Stopping Db2 activity

Before running any installation jobs to enable data sharing, ensure that all work is stopped on the subsystem that you chose to be the originating member.

### Procedure

To stop work on Db2:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for Db2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

**GUI**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUI**

The QUIESCE keyword allows Db2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access Db2:

**GUI**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUI**

If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct

jobs were run for DSNTIJUZ. Ensure that you started Db2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all Db2 11 work is stopped:

- Make sure no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use -DSN1 RECOVER INDOUBT for any indoubt threads.

- Ensure that all utilities are completed or terminated. To ensure that no utility work remains, issue the following command:

**GUIP**

```
-DSN1 DISPLAY UTILITY(*)
```

**GUIP**

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the Db2 directory (DSNDB01) or the Db2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

**GUIP**

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

**GUIP**

You must have system administrator or system operator authority (specified on installation panel DSNTIPP1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop Db2 by issuing the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**

A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

### Related reference

- [-STOP DB2 command \(Db2\) \(Db2 Commands\)](#)
- [-DISPLAY THREAD command \(Db2\) \(Db2 Commands\)](#)
- [-DISPLAY UTILITY command \(Db2\) \(Db2 Commands\)](#)
- [-TERM UTILITY command \(Db2\) \(Db2 Commands\)](#)
- [-DISPLAY DATABASE command \(Db2\) \(Db2 Commands\)](#)

## Modify the Db2 definition to IRLM and MVS for data sharing: DSNTIJMV

You must modify the definition of Db2 for data sharing in the system parameter libraries of the target z/OS system.

### About this task

Job DSNTIJMV demonstrates how to update the SYS1.PARMLIB members to identify Db2 to IRLM and MVS. Although you might edit and run this job, the more common approach is to examine the changes that DSNTIJMV makes and use an editor, such as ISPF/PDF, to make the required updates directly to the SYS1.PARMLIB members.

Because DSNTIJMV cannot anticipate all the necessary updates to identify Db2 to MVS and IRLM in your z/OS environment, additional updates might be required for your site. You can complete these updates either by making the updates directly in SYS1.PARMLIB members, or by editing and running the DSNTIJMV job.

Do not overwrite the entries for Db2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see [Program properties table \(PPT\) \(MVS Initialization and Tuning Reference\)](#).

### Procedure

To modify the definition of Db2 for data sharing in the system parameter libraries of the target z/OS system:

1. Examine the DSNTIJMV job and study the updates that it makes.
2. Update the IEFSSNxx member of SYS1.PARMLIB by editing it directly, or by tailoring and running job DSNTIJMV.

The IEFSSNxx member contains an entry for every z/OS subsystem. Db2 adds one entry for Db2 and two entries for IRLM in the list. The second IRLM entry, whose subsystem name is JRLM, simplifies adding a second IRLM to your system if the first is damaged. You must provide your own procedure to add JRLM. Unique names must be used for each entry.

z/OS provides subsystem entries for Db2 and IRLM in IEFSSN00. Examine these entries to determine whether they are appropriate for your needs. Make sure that a subsystem name appears only once in the subsystem name list.

Place the SMS line as the first line in an IEFSSNxx member. Place the primary system's record (JES2 or JES3) record next. Other products might affect the position of the entries during system initialization. The Db2 line should come after SMS, the JES subsystem, and other vendor products.

The Db2 entry has the following format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
  INITPARM('DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>>')
```

#### **ssname**

The Db2 subsystem name.

#### **DSN3INI**

The name of the Db2 load module that z/OS invokes during z/OS master scheduler initialization. This module must be located in a link list data set (or in SYS1.LINKLIB).

#### **DSN3EPX**

The name of the Db2 load module that responds to Db2 requests that are received from the z/OS subsystem interface. (Db2 can be active or inactive when the requests are received.) This module must be located in a link list data set (or in SYS1.LINKLIB).

#### **cmd-prefix**

The one- to eight-character command prefix.

The first character of the command prefix must be one of the following characters: @ # . / ' ) \* + - = < > | & ! ; % \_ ? : ". The remaining characters of the command prefix must be one of the above characters, A-Z, or 0-9. Do not use the JES2 backspace character or command prefix character. The default is the hyphen (-).

Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign ' - ' to one subsystem and '-Db2A ' to another. Similarly, you also cannot assign '?DB2 ' to one subsystem and '?DB2A ' to another. You can assign '-DB2A ' and '-DB2B ' to different Db2 subsystems.

#### **scope**

The one-character scope for the command prefix. Db2 registers its command prefix with the operating system. When this is done, the scope of the command prefix is controlled by the value you choose:

#### **S**

Started; and the prefix is registered with sysplex scope at Db2 startup instead of during z/OS IPL. This is the default.

**Recommendation:** Choose S, which allows you to have a single IEFSSNxx PARMLIB member that all z/OS systems in the sysplex can use. Choosing S also simplifies the task of moving a Db2 from one system to another; you can stop Db2 on one z/OS and start it up on another without having to re-IPL the system.

#### **M**

z/OS system scope; the prefix is registered during z/OS IPL.

#### **X**

Sysplex scope; the prefix is registered during z/OS IPL. As a result, this Db2 cannot be restarted on another z/OS without changing the definitions and re-IPLing both z/OS systems.

#### **group-attach**

The group attachment name, which is used for data sharing. You can specify this on installation panel DSNTIPK.

#### **subgroup-attach**

is the name of the subgroup attachment, which is used in data sharing environments to provide more control over how TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections find active Db2 subsystems. You can specify this value by entering a subgroup name in the SUBGRP ATTACH field on installation panel DSNTIPK.

## **Update address space startup procedures for Db2 data sharing: DSNTIJMA**

When you enable Db2 data sharing, you must modify the address space startup procedures for the system services address space (*ssnmMSTR*) and IRLM address space (*irlmproc*) in the system procedure library for the target z/OS system.

### **Before you begin**

The authorization ID that runs the jobs must have authority to update the target system PROCLIB. You can enter that library name on installation panel DSNTIPW in the SYSTEM PROCEDURES field. You might want to use a procedure library other than SYS1.PROCLIB for the procedures.

Examine the updates from the jobs in this step carefully before you run them. Also, you might have additional procedures of your own to rename.

### **About this task**

Because different sites have different requirements, the jobs in the following steps cannot anticipate all the necessary updates to the target system procedure library in your z/OS environment. You can complete

these updates either by making the updates directly in the target system procedure library , or by editing the job in the following steps.

## Procedure

Tailor and run job DSNTIJMA.

Job DSNTIJMA defines the startup procedures in the target system procedure library for the following Db2 address spaces, where *ssnm* is the subsystem name:

- The system services address space (*ssnm*MSTR)
- The IRLM address space (*irlm*proc)

## Altering the current active log data sets: DSNTIJIN

When job DSNTIJIN is tailored for enabling a Db2 subsystem to become the originating member of a new data sharing group, it does not define any data sets. It only alters the member's active log data sets to use SHAREOPTIONS (2 3).

## Procedure

Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0. Check any VSAM messages carefully.

## Related concepts

[Allocating and extending data sets \(Db2 Performance\)](#)

## Defining Db2 initialization parameters for enabling data sharing

For Db2 12 installation, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdec*p), define the offline message generator CCSID (DSNHMCID), and update DDF related information in the BSDS. For migration to Db2 12, you must define initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdec*p), and define the offline message generator CCSID (DSNHMCID).

## About this task

The subsystem parameter module (DSNZPxxx) and application defaults module (*dsnhdec*p) names are specified in the following DSNITPO3 installation panel fields:

- [“PARAMETER MODULE field” on page 187](#)
- [“APPL DEFAULTS field” on page 187](#)

## Procedure

To define the Db2 12 initialization parameters, complete the following steps:

1. Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module”](#) on page 403.

2. Run job DSNTIJUA.

Job DSNTIJUA defines the Db2 data-only application defaults module.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix.SDSNEXIT* and *prefix.SDSNLOAD*, you can move the SYSLMOD output to that library.

For more information, see [“Job DSNTIJUA: define data-only application defaults module”](#) on page 404.

3. Run job DSNTIJUM.

Job DSNTIJUM defines the Db2 data-only offline message generator CCSID (DSNHMCID) module which is needed for message conversion by Db2 applications and utilities. For more information, see [“Job DSNTIJUM: define Db2 data-only offline message generator CCSID \(DSNHMCID\) module”](#) on page 405.

4. Run job DSNTIJUL.

Job DSNTIJUL runs the Db2 change log inventory (DSNJU003) to update DDF-related information in the BSDS. For more information, see [“Job DSNTIJUL: update DDF related BSDS information”](#) on page 405.

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## Recording Db2 data to SMF (optional)

When you enable Db2 data sharing, you can specify whether Db2 statistical, accounting, and audit trace data is to be collected.

### Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
<b>To have Db2 collect statistical information</b>	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
<b>To have Db2 collect accounting information</b>	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
<b>To have Db2 collect auditing information</b>	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, Db2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

Db2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. Db2 can also record other performance data. After you complete the installation process, you can use commands to have Db2 record performance data for subsystem events.

2. If, during installation, you requested that Db2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

## What to do next

During Db2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other Db2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:

```
SYS(TYPE(100:102))
```

For Db2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if Db2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for Db2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks

[Controlling traces \(Db2 Administration Guide\)](#)

### Related reference

[-START TRACE command \(Db2\) \(Db2 Commands\)](#)

[z/OS MVS Initialization and Tuning Guide](#)

### Related information

[z/OS MVS Initialization and Tuning Reference](#)

## Connecting Db2 to TSO

If you are enabling data sharing, connect Db2 to TSO after you define the initialization parameters. This step is necessary only if you specified a group attachment name.

### About this task

Access to TSO is required to support the interactive component of Db2 (DB2I). Access to TSO also allows batch applications to access Db2 when those batch programs are executed under the TSO terminal monitor program (TMP).

### Procedure

To attach Db2 to TSO:

1. Make Db2 load modules available to TSO and batch users.
2. Make Db2 CLISTs available to TSO and batch users.
3. Make PL/I options available (if applicable).
4. Make panels, messages, and load modules available to ISPF and TSO.
5. Connect the DB2I panels to the ISPF Main Panel.



## Related tasks

[Make Db2 load modules available to TSO and batch users](#)

As part of installation, you must make Db2 load modules available to TSO and batch users. If *prefix*.SDSNEXIT and *prefix*.SDSNLOAD are included in your LNKLSTxx, you can skip this step.

[Make Db2 CLISTs available to TSO and batch users \(DSNTIJVC\)](#)

To connect Db2 to TSO, you must make Db2 CLISTs available to TSO and batch users by running the DSNTIJVC job.

[Ensure that PL/I options are available](#)

If you are using PL/I, ensure that the options that your Db2 programmers use are included in the compiler.

[Make DB2I panels, messages, and load modules available to ISPF and TSO](#)

During installation, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

[Connect DB2I panels to the ISPF main panel](#)

You can connect the DB2I panels to the standard ISPF panels that are already installed on your system.

## Defining Db2 to z/OS for enabling data sharing

After you run job DSNTIJMV, you might need to define Db2 in SYS1.PARMLIB. This step is only necessary if you are changing the command prefix, or adding or changing the group attachment name.

### Before you begin

Run job DSNTIJMV, as described in [“Modify the Db2 definition to IRLM and MVS for data sharing: DSNTIJMV”](#) on page 666.

### About this task

Job DSNTIJMV creates new subsystem definitions in the IEFSSNxx member.

### Procedure

Do an initial program load (IPL) of z/OS.

You must do this action to apply any Db2 or IRLM subsystem parameter changes in the IEFSSNxx member.

After the IPL for z/OS completes, message DSN3100I is displayed on the z/OS console, stating that Db2 is ready for the START command.

Alternatively, to apply any Db2 or IRLM subsystem parameter changes until the next IPL, you can use SETSSI commands to delete the subsystem, and add a subsystem with the modified parameters.

For example, the first command below deletes subsystem DSN1. The second command adds a new subsystem named DSN1 that has these characteristics:

- Command prefix -DSN
- Command prefix scope S (started)
- Group attachment name DB0A

```
SETSSI DELETE, SUB=DSN1, FORCE
SETSSI ADD, SUB=DSN1, INITRTN=DSN3INI, INITPARM='DSN3EPX, -DSN, S, DB0A'
```

### What to do next

Start Db2, as described in [“Starting the Db2 subsystem”](#) on page 672.

### Related reference

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

## Related information

[DSN3100I \(Db2 Messages\)](#)

# Starting the Db2 subsystem

During the process of enabling data sharing, start the Db2 subsystem after you define Db2 to z/OS.

## Procedure

To start Db2:

1. Start Db2 from the z/OS console.

The simplest form of the following command is:

```
-DSN1 START DB2
```

where *-DSN1* is the subsystem command prefix that you defined for Db2.

When you issue the START DB2 command with this command format, Db2 uses the subsystem parameter module that is specified in the *ssnmMSTR* start-up JCL procedure in SYS1.PROCLIB.

If you need to change the name of the subsystem parameter module, you can edit the *ssnmMSTR* JCL member in SYS1.PROCLIB. Alternatively, you can override the default subsystem parameter module name by using the PARM option, as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If Db2 starts successfully, some or all of the following address spaces start, where *ssnm* is the Db2 subsystem name.

- The system services address space (*ssnmMSTR*)
- The database services address space (*ssnmDBM1*)
- The IRLM address space (*irlmproc*), where *irlmproc* is the IRLM procedure name
- Possibly, the DDF address space (*ssnmDIST*)
- Possibly, the administrative task scheduler stored procedure address space (*ssnmADMT*)

If Db2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I   RESTART COMPLETED  
DSN9022I   DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

When you start Db2 12 for the first time, Db2 issues message DSNT501I with reason code 00C900A6. This message is expected. When you run job DSNTIJTC, which is required to complete the tailoring of the Db2 catalog, the cause of this message is corrected. Job DSNTIJTC is described in a later installation step.

After you start Db2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If Db2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIE, DSNTIJIF, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started Db2 is the one that is built by job DSNTIJUZ. Check the JCL for the Db2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

## 2. Optional: Start TSO.

After Db2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

## Creating the default storage group and defining temporary work files: DSNTIJTM

After you start Db2 as part of the process for enabling data sharing, you must create the default storage group for user-defined Db2 tables that are not specifically assigned to a storage group. You must also define the database for temporary work files.

### Procedure

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

Table 61. DSNTIJTM return codes

Step	PROCSTEP	Return code
DSNTIAS	IKJEFT01	0000
DSNTICR	IKJEFT01	0000
DSNTIST	IKJEFT01	0000

### Results

The SYSDEFLT storage group is the default storage group, and it is used for your database, table space, and table definitions that are not related to a specific storage group. By default, it is also used for the work file database and for work file table spaces that are created during Db2 installation and migration. When DSNTIJTM creates the SYSDEFLT storage group, it completes the following grants:

- Grants use of the default buffer pool and storage group to PUBLIC or the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG.
- Grants use of the SYSDEFLT storage group to PUBLIC or to the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG. This access is necessary to give users the ability to implicitly create table spaces in the default database.
- Grants authority to create tables and table spaces in the default database to PUBLIC or to the authorization IDs that you specified in the INSTALL GRANTEE(S) field of panel DSNTIPG.

### What to do next

For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve Db2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table spaces after you run job DSNTIJTM, use the

DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

## Creating an image copy of the Db2 directory and catalog: DSNTIJIC (optional)

If you decide to image copy the Db2 directory and catalog, use the DSNTIJIC job that was generated during the installation or migration of the originating member. You do not need to make an image copy of the Db2 catalog or user data sets for recovery because Db2 uses image copies that were made before you enabled data sharing.

### Procedure

To create an image copy of the directory and catalog:

1. Examine job DSNTIJIC for the following information:

- The device type or unit name.  
The default value is SYSDA. If this is incorrect for your site, correct it.
- Expiration date or retention period. You can add a retention period or an expiration date to the job.
- The user on the JOB statement. Ensure that the user is authorized. If Db2 is started under ACCESS(MAINT), this must be the same user that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1.

2. Run job DSNTIJIC.

The DSNTIJIC job contains a list of all the Db2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the Db2 image copy utility to copy these table spaces to disk or tape, depending on the value that you select for “[IC DATA SET UNIT NAME field](#)” on page 102. Having copies of table spaces enables you to recover the Db2 catalog and Db2 directory in case of a failure.

3. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape or disk setup for image copy. If you find no problems with the setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

### What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

During the ISPF tailoring session, you named one or two IDs to have installation SYSADM authority. One of these users can now grant various levels of authority to other users. You can use SPUFI or a job similar to DSNTIJSG to perform the authorization. To grant SYSOPR authority to all primary and secondary user IDs that issue Db2 commands from the z/OS console or TSO SDSF, issue the following statement in SPUFI:

```
GRANT SYSOPR TO userid
```

## Verifying that enabling data sharing was successful (optional)

If you ran the complete set of installation verification procedure (IVP) sample jobs after you migrated to Db2 12, you should not need to run these jobs again.

### About this task

When you start the originating member, Db2 checks your coupling facility, group, and member definitions and verifies that data sharing is enabled. You can also verify that the group has been correctly established by issuing the Db2 command DISPLAY GROUP after the originating member has completed startup.

## Procedure

Run the verification jobs that are described in Chapter 9, “Verifying successful Db2 12 installation or migration with sample applications,” on page 727.

## Adding a new data sharing member

---

After you install a new data sharing group or enable an existing Db2 subsystem for data sharing, you can add new data sharing members. Always add a member as a new installation. After being added to the group, the new member uses the Db2 catalog of the originating member.

### About this task

When adding a new member to a group, you might need to make changes during installation to allow more XCF groups, or more XCF members per group. Or, you might need to "widen" the locks in the IRLM lock structure (for example, if the structure was initially allocated with a maximum of seven members, and the eighth member is joining the group).

Db2 does not have an automatic way to "merge" catalogs and resolve naming conflicts. If you have applications that currently run on several existing Db2 subsystems, your migration plan might include procedures for moving the relevant data and applications from those Db2 subsystems onto one or more of the group members. Your migration plan should also include procedures for resolving any catalog naming conflicts that result.

### Related concepts

[Merging existing Db2 data into the group](#)

Although Db2 cannot automatically merge catalogs, you can merge existing Db2 subsystems into a data sharing group. Consider carefully a decision to merge existing Db2 subsystems.

### Related tasks

[Installing Db2 12](#)

Installing Db2 involves running the installation jobs, connecting the facilities that allow TSO, batch, IMS, and CICS to access Db2 resources, and preparing Db2 for use. After you complete the installation steps, function level 500 or higher is activated and available for use.

### Related information

[IEFSSNxx \(subsystem definitions\) - keyword parameter form \(MVS Initialization and Tuning Reference\)](#)

## Running the CLIST for adding a new member

The process of adding a new data sharing member involves running some of the installation jobs. Before you run the installation jobs, tailor them to your environment by running the installation CLIST.

### About this task

The add-member CLIST tailors the following jobs:

- DSNTIJIN
- DSNTIJTM
- DSNTIJMV
- DSNTIJMA
- DSNTIJUZ
- DSNTIJUL
- DSNTIJID
- DSNTIJFT
- DSNTIJDE
- DSNTIJGF

## Procedure

To tailor the installation jobs for adding a new member:

1. Invoke the installation CLIST as described in Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43.
2. On installation panel DSNTIPA1, specify the following values:

```
INSTALL TYPE ===> INSTALL
DATA SHARING ===> YES
.
.
INPUT MEMBER NAME ===> originating member's output PDS member
OUTPUT MEMBER NAME ===> new member's output PDS member
```

In the INPUT MEMBER NAME field, specify the same PDS member name that you specified in the OUTPUT MEMBER NAME field when you ran the CLIST to define the first (originating) member of the data sharing group.

3. On installation panel DSNTIP0A, specify option 2 for adding a member.

```
DSNTIP0A
DATA SHARING FUNCTION:
Select one.
  2 1. Group
    2. Member
    3. Enable
```

4. On installation panel DSNTIPK, specify a new member name:

```
MEMBER NAME ===> new member name
```

Verify that the *new member name* is unique within the z/OS Parallel Sysplex. Installation job DSNTIJMV edits the *ssnmMSTR* startup procedure with the member name that you specify on panel DSNTIPK.

5. Complete the installation panels, specifying parameters according to the Db2 subsystem parameters guidelines.

**Recommendation:** Rename the tailored SDSNSAMP data set for each member. This data set contains tailored JCL for each member, including jobs that are used for disabling and re-enabling data sharing, if that should ever become necessary. If you do not rename the SDSNSAMP data set, it is overwritten when you install a new member. Rename the data set by choosing a new name for the *prefix.NEW.SDSNSAMP* data set on installation panel DSNTIPT. For example, use *prefix.member\_name.SDSNSAMP*.

### Related concepts

#### [Subsystem parameters and application defaults in a data sharing environment](#)

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

#### [The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## Define the new Db2 data sharing member to IRLM and MVS: DSNTIJMV

You must define the new Db2 data sharing member in the system parameter library of the target z/OS system.

### Before you begin

The z/OS operating system must be installed at the prerequisite level.

### About this task

Job DSNTIJMV demonstrates how to update the SYS1.PARMLIB members to identify Db2 to IRLM and MVS. Although you might edit and run this job, the more common approach is to examine the changes that DSNTIJMV makes and use an editor, such as ISPF/PDF, to make the required updates directly to the SYS1.PARMLIB members.

Because DSNTIJMV cannot anticipate all the necessary updates to identify Db2 to MVS and IRLM in your z/OS environment, additional updates might be required for your site. You can complete these updates either by making the updates directly in SYS1.PARMLIB members, or by editing the DSNTIJMV job.

Do not overwrite the entries for Db2 and IRLM in the program properties table (PPT). Note that PPT entries should no longer be defined in SYS1.PARMLIB(SCHEDxx). Default entries are supplied in the SYS1.LINKLIB(IEFSDPPT) load module, which is provided by z/OS. For details of the PPT entries, see [Program properties table \(PPT\) \(MVS Initialization and Tuning Reference\)](#).

### Procedure

To identify the new Db2 data sharing member to IRLM and MVS:

1. Examine the DSNTIJMV job and study the updates that it makes.
2. Update the IEFSSNxx member of SYS1.PARMLIB by editing it directly, or by tailoring and running job DSNTIJMV.

The IEFSSNxx member contains an entry for every z/OS subsystem. Db2 adds one entry for Db2 and two entries for IRLM in the list. The second IRLM entry, whose subsystem name is JRLM, simplifies adding a second IRLM to your system if the first is damaged. You must provide your own procedure to add JRLM. Unique names must be used for each entry.

z/OS provides subsystem entries for Db2 and IRLM in IEFSSN00. Examine these entries to determine whether they are appropriate for your needs. Make sure that a subsystem name appears only once in the subsystem name list.

Place the SMS line as the first line in an IEFSSNxx member. Place the primary system's record (JES2 or JES3) record next. Other products might affect the position of the entries during system initialization. The Db2 line should come after SMS, the JES subsystem, and other vendor products.

The Db2 entry has the following format:

```
SUBSYS SUBNAME(ssname) INITRTN(DSN3INI)
      INITPARM('DSN3EPX,cmd-prefix<,scope<,group-attach<<,subgroup-attach>>>')
```

#### **ssname**

The Db2 subsystem name.

#### **DSN3INI**

The name of the Db2 load module that z/OS invokes during z/OS master scheduler. This module must be located in a link list data set (or in SYS1.LINKLIB).

## **DSN3EPX**

The name of the Db2 load module that responds to Db2 requests that are received from the z/OS subsystem interface. (Db2 can be active or inactive when the requests are received.) This module must be located in a link list data set (or in SYS1.LINKLIB).

### ***cmd-prefix***

The one- to eight-character command prefix.

The first character of the command prefix must be one of the following characters: @ # . / ' ) \* + - = < & ! ; % \_ ? : ". The remaining characters of the command prefix must be one of the above characters, A-Z, or 0-9. Do not use the JES2 backspace character or command prefix character. The default is the hyphen (-).

Do not assign a command prefix that is used by another subsystem or that can be interpreted as belonging to more than one subsystem or z/OS application. Specifically, do not specify a multiple-character command prefix that is a subset or a superset of another command prefix beginning from the first character. For example, you cannot assign ' - ' to one subsystem and '-Db2A' to another. Similarly, you also cannot assign '?DB2' to one subsystem and '?DB2A' to another. You can assign '-DB2A' and '-DB2B' to different Db2 subsystems.

### ***scope***

The one-character scope for the command prefix. Db2 registers its command prefix with the operating system. When this is done, the scope of the command prefix is controlled by the value you choose:

#### **S**

Started; and the prefix is registered with sysplex scope at Db2 startup instead of during z/OS IPL. This is the default.

**Recommendation:** Choose S, which allows you to have a single IEFSSNxx PARMLIB member that all z/OS systems in the sysplex can use. Choosing S also simplifies the task of moving a Db2 from one system to another; you can stop Db2 on one z/OS and start it up on another without having to re-IPL the system.

#### **M**

z/OS system scope; the prefix is registered during z/OS IPL.

#### **X**

Sysplex scope; the prefix is registered during z/OS IPL. As a result, this Db2 cannot be restarted on another z/OS without changing the definitions and re-IPLing both z/OS systems.

### ***group-attach***

The group attachment name, which is used for data sharing. You can specify this on installation panel DSNTIPK.

### ***subgroup-attach***

is the name of the subgroup attachment, which is used in data sharing environments to provide more control over how TSO, CAF, RRSAF, JDBC, ODBC, and Db2 utilities connections find active Db2 subsystems. You can specify this value by entering a subgroup name in the SUBGRP ATTACH field on installation panel DSNTIPK.

## **Define address space startup procedures for the new Db2 data sharing member: DSNTIJMA**

You must define the address space startup procedures for the new Db2 data sharing member.

### **Before you begin**

The authorization ID that runs the job must have authority to update the target system PROCLIB. You can enter that library name on installation panel DSNTIPW in the SYSTEM PROCEDURES field. You might want to use a procedure library other than SYS1.PROCLIB for the procedures.

Examine the updates from job DSNTIJMA carefully before you run it.



## About this task

Because different sites have different requirements, the jobs in the following steps cannot anticipate all the necessary updates to the target system procedure library in your z/OS environment. You can complete these updates either by making the updates directly in the target system procedure library, or by editing and running job DSNTIJMA.

## Procedure

Tailor and run job DSNTIJMA.

Job DSNTIJMA defines the startup procedures in the target system procedure library for the following Db2 address spaces, where *ssnm* is the subsystem name:

- system services address space (*ssnmMSTR*)
- database services address space (*ssnmDBM1*)
- DDF address space (*ssnmDIST*)
- administrative task scheduler stored procedure address space (*ssnmADMT*)
- IRLM address space (*irlmproc*)

Examine the size of the private area on the Db2 startup procedures. If necessary, modify the procedures to satisfy the requirements for environmental descriptor manager (EDM) pool size, buffers, number of data sets open, and amount of available private address space. For more information, see [“Calculating working storage requirements”](#) on page 26.

The STEPLIB concatenation of the database services address space (*ssnmDBM1*) procedure includes a commented-out DD for the IBM Language Environment data sets SCEERUN and SCEERUN2. If your system does not include SCEERUN and SCEERUN2 in the system link list, you must uncomment this DD.

## Defining system data sets: DSNTIJIN

When job DSNTIJIN is tailored for adding a new member, it defines the new BSDS and active log data sets for that member to use SHAREOPTIONS (2 3). It does not define catalog and directory data sets.

## Procedure

To define system data sets:

1. Check the DEFINE CLUSTER statements in job DSNTIJIN to ensure that they allocate adequate disk space for your system.

**Recommendation:** For recovery purposes, place system data sets such as the Db2 recovery log and the VSAM catalog on different disk volumes. Because these data sets are used frequently, do not migrate them by using DFSMSHsm.

2. Run job DSNTIJIN.

If DSNTIJIN runs successfully, it produces return codes of 0 for all DEFINE statements and steps. Check any VSAM messages carefully.

3. If job DSNTIJIN fails or abends, run the DSNTIJDE job for the member to delete its BSDS and active log data sets. Then rerun the DSNTIJIN job for the member to re-create those data sets.

## Related concepts

[Allocating and extending data sets \(Db2 Performance\)](#)

## Defining Db2 initialization parameters for new data sharing members

For new data sharing members, you must define Db2 12 initialization parameters in the subsystem parameter module (DSNZPxxx) and application defaults load module (*dsnhdec*).

### About this task

The subsystem parameter module (DSNZPxxx) and application defaults module (*dsnhdec*) names are specified in the following DSNITPO3 installation panel fields:

- [“PARAMETER MODULE field” on page 187](#)
- [“APPL DEFAULTS field” on page 187](#)

### Procedure

To define Db2 initialization parameters for new data sharing members, complete the following steps:

1. Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module” on page 403](#).

2. Run job DSNTIJUL.

Job DSNTIJUL runs the Db2 change log inventory (DSNJU003) to update DDF-related information in the BSDS. For more information, see [“Job DSNTIJUL: update DDF related BSDS information” on page 405](#).

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## Initializing system data sets: DSNTIJID

If you are adding a new data sharing member, you must initialize its BSDS and active log data sets after you define them and the member's Db2 initialization parameters.

### Procedure

Run job DSNTIJID.

- If the job runs successfully, it produces a return code of 0. Otherwise, check for and resolve error conditions that might be reported by VSAM messages.
- If the job fails or abends, rerun jobs DSNTIJDE, DSNTIJIN, DSNTIJUZ, and DSNTIJID for that member.

## Results

Job DSNTIJID records the active log data set names to the BSDS, formats the active log data sets, and initializes the Db2 directory table spaces and indexes.

## Defining user authorization exit routines: DSNTIJEX (optional)

When you add a new data sharing member, you should not have to make changes to the Db2 exit routines. However, if the new member is using its own separate load module or exit library, you must define the exit routines in the new library.

### Procedure

To define user authorization exit routines:

1. Modify job DSNTIJEX to reference the correct library.
2. Run job DSNTIJEX.

If job DSNTIJEX runs successfully, it produces return codes of 4.

### Related concepts

[Connection routines and sign-on routines \(Managing Security\)](#)

## Recording Db2 data to SMF (optional)

When you add a Db2 data sharing member, you can specify whether Db2 statistical, accounting, and audit trace data is to be collected.

### Procedure

To specify the data that is to be collected:

1. Choose from the following options:

Option	Description
<b>To have Db2 collect statistical information</b>	Accept the default (YES class 1) for the SMF STATISTICS option on installation panel DSNTIPN. To collect statistical information for deadlock or timeout, specify class 3. To collect information about DDF error conditions, specify class 4.
<b>To have Db2 collect accounting information</b>	Accept the default (1) or specify * (all classes) for the SMF ACCOUNTING option on installation panel DSNTIPN.
<b>To have Db2 collect auditing information</b>	Specify * (all classes) for the AUDIT TRACE option on installation panel DSNTIPN.

In all cases, Db2 invokes a trace, passing the data it collects to the System Management Facility (SMF) of z/OS.

Db2 also passes performance data to SMF whenever an accounting, statistics, or audit trace is successfully started or stopped. Db2 can also record other performance data. After you complete the installation process, you can use commands to have Db2 record performance data for subsystem events.

2. If, during installation, you requested that Db2 pass accounting and statistics data to SMF, update the SMFPRMxx member of SYS1.PARMLIB as follows:
  - Specify the ACTIVE parameter.
  - Specify STC,NODETAIL for the SUBSYS parameter.
  - Specify the proper TYPE subparameter of the SYS and SUBSYS parameters.

## What to do next

During Db2 execution, you can use the SMF SET or SS command to alter the SMF parameters. For example, you can record the statistics trace class 1 IFCIDs 0001, 0002, and 0202 (SMF record type 100); accounting trace class 1 IFCIDs 0003 and 0239 (SMF record type 101); and all other Db2 trace records (SMF record type 102) to SMF. To record this information, issue the following command:

```
SYS(TYPE(100:102))
```

For Db2 to pass data to SMF, you must allocate an adequate supply of SMF buffers. The default buffer settings are probably insufficient.

You can specify SMF buffering on the VSAM BUFSP parameter of the Access Method Services DEFINE CLUSTER statement. Do not use the default settings if Db2 data is sent to SMF. Specify CISZ(4096) and BUFSP(81920) on the DEFINE CLUSTER statement for each SMF VSAM data set. These values for CISZ and BUFSP are the minimum requirement for Db2. You might need higher values for CISZ and BUFSP, depending on the requirements of all your z/OS subsystems.

You can also code an IEFU84 SMF exit routine to process the records that are produced.

### Related tasks

[Controlling traces \(Db2 Administration Guide\)](#)

### Related reference

[-START TRACE command \(Db2\) \(Db2 Commands\)](#)

[z/OS MVS Initialization and Tuning Guide](#)

### Related information

[z/OS MVS Initialization and Tuning Reference](#)

## Establishing subsystem security: DSNTIJRA (optional)

Db2 can control access to data within a Db2 subsystem. Db2 also works with outside security systems, such as RACF, that control access to the Db2 subsystem.

### About this task

Most of the tasks to establish subsystem security for a data sharing group need to be completed only after the originating member is installed. For other members, you must set up only the security of the administrative task scheduler of those members.

### Procedure

Customize and run job DSNTIJRA to complete the following tasks for each member of the group:

- Define the administrative task scheduler started task module to RACF program control
- Define the administrative task scheduler as a trusted context in RACF

### Related concepts

[Getting started with Db2 security \(Managing Security\)](#)

## Connecting Db2 to IMS (optional)

Connecting Db2 to IMS is an optional part of adding a new data sharing member. Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. [Make Db2 load modules available to IMS.](#)
2. [Define Db2 to IMS.](#)
3. [Define new programs and transactions to IMS.](#)

4. Prepare IMS applications for Db2.
5. Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications](#).
  - [Generate a user language interface](#).

#### **Related tasks**

[Connecting the IMS attachment facility](#)

Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

## **Connecting CICS to Db2 (optional)**

When you add a new member, you have the option of connecting CICS to the member.

#### **About this task**

To connect Db2 to CICS, you must regenerate several CICS tables with additional entries. Coordinate this connection with your CICS support group.

#### **Related tasks**

[Defining the CICS Db2 connection](#)

## **Defining Db2 to z/OS for adding data sharing members**

After you run job DSNTIJMV, you must define Db2 in SYS1.PARMLIB.

#### **Before you begin**

Enable data sharing on the originating member, as described in [“Enabling Db2 data sharing” on page 662](#).

#### **About this task**

Job DSNIJMV creates new subsystem definitions in the IEFSSNxx member of the SYS1.PARMLIB library.

#### **Procedure**

Complete one of the following actions:

- IPL z/OS.

During the z/OS IPL, message DSN3100I appears on the z/OS console, stating that Db2 is ready for the START DB2 command.
- Use the z/OS command SETSSI to dynamically add the new Db2 and IRLM subsystems. For example, the following two commands can be used to add subsystems for Db2 and IRLM to MVS3:

```
RO MVS3,SETSSI ADD,SUB=DB3A,INITRTN=DSN3INI,INITPARM='DSN3EPX,-DB3A,S,DB0A'  
RO MVS3,SETSSI ADD,SUB=DJ3A
```

**Recommendation:** Add z/OS to the IEFSSNxx member so that it can be used on a subsequent IPL.

#### **Related tasks**

[Strategy for creating a Db2 data sharing group](#)

When you create a data sharing group, add one member at a time. You can install a new Db2 for the first member (the *originating member*), or you can enable an existing Db2 subsystem as the originating member.

#### **Related reference**

[z/OS SETSSI Command \(MVS System Commands\)](#)

#### **Related information**

[DSN3100I \(Db2 Messages\)](#)

## Starting the Db2 subsystem

During the process of adding a data sharing member, start the Db2 subsystem after you define Db2 to z/OS.

### Procedure

To start the Db2 member:

1. Start Db2 from the z/OS console.

Use the following command:

```
-DSN1 START DB2
```

where (-DSN1) is the subsystem command prefix that you defined for Db2.

Db2 uses the subsystem parameter module that is specified in the start-up JCL procedure in SYS1.PROCLIB:

```
//IEFPROC EXEC PGM=DSNYASCP,PARM='ZPARM(DSNZPxxx)',...
```

where *DSNZPxxx* is the value that you specified for the PARAMETER MODULE field on installation panel DSNTIPO3.

If you need to change the name of the *DSNZPxxx* module, you can edit SYS1.PROCLIB. Alternatively, you can override the *DSNZPxxx* name by using the PARM option as follows:

```
-DSN1 START DB2,PARM(DSNZPxxx)
```

If you have not run yet job DSNTIJRT on any member of the group, and the administrative task scheduler for this member starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If Db2 starts successfully, two to five address spaces also start. These address spaces are *ssnmMSTR* and *ssnmDBM1*, possibly *ssnmDIST*, possibly *ssnmADMT*, and *irlmproc*, where *ssnm* is the Db2 subsystem name, *ssnmADMT* is the Db2 administrative task scheduler procedure name, and *irlmproc* is the IRLM procedure name.

If Db2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

After you start Db2, identify unusual conditions for databases with the command:

```
-DSN1 DISPLAY DATABASE(*) SPACENAM(*) RESTRICT
```

If Db2 does not start successfully, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. Ensure that the DSNTIJID, DSNTIJIN, and DSNTIJUZ jobs ran correctly. Also, verify that the subsystem parameter member that you specified (or allowed by default) when you started Db2 is the one that is built by job DSNTIJUZ. Check the JCL for the Db2 startup procedure.

If you use distributed data facility, you must define VTAM before DDF can start. However, you do not need to have TCP/IP configured to start DDF. In addition, transactions such as those from DDF or CICS may fail because work files have not yet been defined.

2. Optional: Start TSO.

After Db2 starts, it is available to TSO. If you want to use the TSO SUBMIT command to do housekeeping and installation verification, you must start TSO (if it is not already started).

## Results

Transactions that run on a new member might initially fail because work files are not defined until you run that member's job DSNTIJTM.

## Creating the default storage group, defining temporary work files, and binding Db2 REXX Language Support: DSNTIJTM

After you start Db2 when you add a data sharing member, you must activate its buffer pools and create its work file database.

### Procedure

Run job DSNTIJTM.

If job DSNTIJTM runs successfully, it produces the return codes that are shown in the following table:

*Table 62. DSNTIJTM return codes*

Step	PROCSTEP	Return code
DSNTIAB	(none)	0000
DSNTIAS	(none)	0000
DSNTICR	(none)	0000
DSNTIST	(none)	0000

## Results

DSNTIJTM defines the new member's initial buffer pools according to the sizes that are specified on installation panels DSNTIP1 and DSNTIP2. It also creates the work file database for the new member according to the values that you specified on panel DSNTIP9.

DSNTIJTM also provides some cleanup to ease reruns.

### What to do next

For data sharing installations, the work file database name is the name that was specified in the WORK FILE DB field on installation panel DSNTIPK. After creating the work file database, the DSNTIJTM job creates the work file table spaces as specified on installation panel DSNTIP9.

You can increase the number of additional temporary work file table spaces by increasing the values in the work file table space fields on panel DSNTIP9, particularly if you expect a large amount of sorting at your site. Additional temporary work file table spaces can improve Db2 performance by reducing device contention among applications. These additional work files also can be used for sorting indexes on large tables during index creation.

You can choose to have job DSNTIJTM create these additional table spaces, or you can create them after you run DSNTIJTM. To create additional work file table spaces after you run job DSNTIJTM, use the DSNTWFG exec in job step DSNTIST. See the comment block for job step DSNTIST for information about the parameters for DSNTWFG.

If you do not run the installation CLIST, customize DSNTIJTM or the DSNTWFG exec to create at least one 4 KB and one 32 KB work file table space.

### Related concepts

[Work file database storage requirements](#)

The work file database is used as storage for processing SQL statements that require working storage.

## Creating an image copy of the Db2 directory and catalog: DSNTIJIC

After you add a data sharing member, you need to create a backup copy of the Db2 directory and catalog. Use the DSNTIJIC job that was generated during the installation or migration of the originating member to create the image copy.

### Procedure

To create an image copy of the directory and catalog:

1. Run job DSNTIJIC.

The DSNTIJIC job contains a list of all the Db2 directory and catalog table spaces. When you run job DSNTIJIC, it invokes the Db2 image copy utility to copy these table spaces to disk or tape, depending on the value that you select for [“IC DATA SET UNIT NAME field” on page 102](#). Having copies of table spaces enables you to recover the Db2 catalog and Db2 directory in case of a failure.

2. If the DSNTIJIC job fails or abends, verify that no problems exist with the tape or disk setup for image copy. If you find no problems with the setup, examine the utility job output (JOBLOG) or the console log for problems. For example, look for I/O errors or incorrect sizes.

### What to do next

Run the DSNTIJIC job periodically, perhaps daily or weekly, to reduce the amount of time required for recovering the directory or catalog. The copied data and log data sets are needed for recovery.

### Related concepts

[Privileges and authorities \(Managing Security\)](#)

## Verifying that adding a data sharing member was successful

When you complete the procedure to add a new data sharing member, you should verify that the member was added successfully.

### Procedure

Run the verification jobs that are described in [Chapter 9, “Verifying successful Db2 12 installation or migration with sample applications,” on page 727](#).

### What to do next

After you successfully add all the data sharing members for the group, you should [Test the data sharing group](#).

## Ensuring that the WLM address space is defined and available

After you verify that the data sharing member was added successfully, you must ensure that the WLM address space for the member is defined and available.

### About this task

When the WLM address space is defined correctly and available, the WLM address spaces can start without errors when connections land on any member of the group.

### Procedure

Update the JCL startup procedure for the WLM application environment by using one of the following methods:

- Add the WLM application environments that are specific for each member of the group.



- Modify existing definitions to work for any member of the group.

### Related concepts

[Special considerations for WLM-managed stored procedures in coexistence](#)

The WLM-managed stored procedure address space (WLM-SPAS) that processes a stored procedure or UDF program always connects to the Db2 member that processes the SQL call request. Therefore, the Db2 code that is executed in the WLM-SPAS must match the Db2 release of the database services address space (*ssnmDBM1*), or an error occurs.

## Merging existing Db2 data into the group

---

Although Db2 cannot automatically merge catalogs, you can merge existing Db2 subsystems into a data sharing group. Consider carefully a decision to merge existing Db2 subsystems.

Merging is a very complicated process. It involves not only the physical issue of moving data, but also many other management issues, including:

- Naming conventions for users, plans, packages, databases, tables, views, and more
- Authorization techniques
- Backup and recovery conventions
- Availability practices

Before you consider merging existing Db2 subsystems into a single data sharing group, ask yourself the following question: Why are the Db2 subsystems separate now?

## Merging subsystems

You can merge existing Db2 subsystems into a single Db2 data sharing group.

### Procedure

To merge existing subsystems into a single Db2 data sharing group, complete the following steps:

1. Choose one of the subsystems to be the originating member.
2. Move data and data definitions from the other Db2 subsystems to the subsystem that you designated as the originating member.

For more information, see [“Moving data that you are merging” on page 688](#).

**Tip:** Use a location alias, remote applications do not have to change aliases during the merging processes. Remote applications use a location name to access the Db2 subsystem. You can define the previous location names of each subsystem as location alias names for the group. After the subsystems are merged, remote applications continue to connect, without changes to the location names in the applications. For more information, see [Specifying a location alias name for multiple sites \(Db2 Application programming and SQL\)](#).

3. Enable data sharing on the originating member, as described in [“Enabling Db2 data sharing” on page 662](#).
4. Add the other Db2 subsystems as members of the data sharing group, as described in [“Adding a new data sharing member” on page 675](#).

## Merging data

If you have an application that is currently running on independent Db2 subsystems, you might decide that the application will work well in a data sharing group.

In that case, you must move the data and merge the catalog definitions for that data from the independent Db2 subsystems into the data sharing group. Because the Db2 subsystems still exist, you cannot reuse their subsystem names when installing the subsystems as new members into the data sharing group.

Db2 does not provide an automated way to move catalog definitions from an independent Db2 subsystem into the catalog of the data sharing group. If you have procedures and tools to move applications from test to production, or to handle merging databases from enterprise reorganizations or mergers, those same procedures can be used to move applications into the data sharing group.

## Existing distributed applications

If you move existing data to the data sharing group, it is likely that the location name of objects will change.

Existing distributed applications that remotely reference an object by its three-part name must be changed to reference the new name. Aliases that exist on that table must also be dropped and re-created with the new location name.

Applications that contain explicit SQL CONNECT statements that reference an old location name must be modified. Any Db2 plan that uses an old location name for the CURRENTSERVER keyword must be bound again.

## Moving data that you are merging

In the context of Db2 data sharing, a *target* refers to the Db2 subsystem to which you are moving data (the data sharing group). A *source* refers to the Db2 subsystem from which you are moving data.

## Procedure

To move data that you are merging:

1. Decide the method that you will use to move data.

Three options are outlined below; you can use a combination of the specified methods. Each of the methods assumes that the objects that are to be created in the target system are created with the exact DDL that is used in the source system. Descriptions of methods 1, 2, and 3 are referred to throughout the procedure, and are described in detail below.

- **Method 1: Unload and Reload:** The data that is to be moved is unloaded from the source Db2 subsystem and loaded into the target data sharing group by using the Db2 online utilities, UNLOAD and LOAD. This approach is the most simple because tables are created without concern for object IDs, and data is unloaded or reloaded using conventional techniques. The major disadvantage of this method is that it is the slowest of the three methods, in terms of performance. The unload and reload methods operate against rows of a table, whereas the other techniques operate against pages or data sets as their level of granularity. Additionally, this method requires two to three times the disk space that the other methods require, depending on how you unload or reload (source, target and intermediate unload).
  - **Method 2: DSN1COPY with OBID translation:** The data that is to be moved is copied from the source system to the target system using the Db2 offline utility DSN1COPY. DSN1COPY is usually faster than unload and reload because it moves pages of data, rather than rows. This method is more complicated because the object IDs in the source data will need to be translated.
  - **Method 3: Use Db2 VSAM data sets from the source system in the target system:** The VSAM data sets that are used to hold the table space and index space data from the source system are used in the target system, without copying any data. Because this method does not require copying the data, it is the fastest of the three methods, in terms of performance. It is, however, the most complicated. Another advantage of this method is that it requires less disk space than the other methods; this method is generally used for very large table or index spaces. Method 3 assumes that all of the disk volumes in the source system used by objects being moved by this method are shared and accessible with the target system.
2. Choose a catalog that belongs to one of the Db2 subsystems to be the "original" catalog for the data sharing group.  
This Db2 subsystem is considered the originating member of the group.

You should consider many different factors when choosing which Db2 subsystem to be the originating member of the group. For example, it makes sense to choose the member with the most database objects as the originating member in order to minimize the number of objects that you move.

However, if all Db2 subsystems are mostly equivalent, and you are not planning to use DSN1COPY, consider the log RBA values of the existing subsystems. Compare the end-of-log RBAs with the high-order 10 bytes (for 10-byte RBAs) or 6 bytes (for 6-byte RBAs) of the time-of-day clock timestamp on each of their systems. This value is called the *truncated timestamp*. The usual case is that the RBA is less than the truncated timestamp. In this case, any Db2 subsystem is chosen as the originating member.

In the event that the current end-of-log RBA in any of the existing Db2 subsystems is higher than the truncated timestamp value at the time you are ready to enable sharing, you have the following choices:

- Choose the Db2 subsystem that has the highest RBA as the originating member.
  - Use DSN1COPY with the RESET option to reset the log RBAs in each data and index page to 0 when you move databases from other Db2 subsystems to the data sharing group.
3. Resolve name conflicts among the objects and authorization IDs in the data sharing group.
  4. Create the objects on the target subsystem.

When creating objects while you are using methods 1 or 2 to move the data, the CREATE statements can be entered in any order. Db2 assigns new OBIDs for these objects.

If you are using method 3, you must perform the following steps:

- a. Consider creating the data sets with the minimum size settings to save space. The actual target system VSAM data sets created by the DDL execution are not used because the VSAM data sets that are from the source system are used instead. By choosing to create the objects with minimum sizes, you eventually need to issue ALTER TABLESPACE and ALTER INDEX statements to change the PRIQTY and SECQTY after the CREATE. If, however, you are using the same high-level qualifier for the source and target systems (which is not recommended), you must create the objects with DEFINE NO, and take additional steps later. DEFINE NO is needed when keeping the same high-level qualifier, because the VSAM data set name would be identical in the source and target systems. In this case, Db2 would not be able to define the data set on the target system during the create processing because the data set already exists.
- b. Query the SYSIBM.SYSTABLES table in the Db2 catalog on the source subsystem to get the table OBID for tables that are within the databases that are being moved. Additionally for both the source and target systems, the DBID and PSID are needed for table spaces (from SYSIBM.SYSTABLESPACE) and the DBID and ISOBID are needed for indexes (from SYSIBM.SYSINDEXES). These will be used to build REPAIR jobs to modify these IDs in the header page, and potentially the first space map page in a later step.
- c. Use the OBID clause on the CREATE TABLE statement on the target subsystem to specify an OBID that is the same as the table OBID on the source subsystem. Verify that the OBID that you specify is available. If an OBID is being used for another object within the same database, such as an index or referential constraint, Db2 does not allow you to create the table with the specified OBID.

**Recommendation:** To help guarantee the availability of OBIDs for all tables within a database, defer the creation of all indexes and referential constraints until all tables are created. All CREATE TABLE statements must have the OBID clause to guarantee that they are assigned the correct OBID. If an explicit table space name is specified, then the CREATE TABLESPACE statement must come immediately before the first CREATE TABLE statement for that table space. This helps prevent a group of CREATE TABLESPACE statements from using up OBIDs that are needed for the tables.

For methods two or three, the objects in the target system will be created with several assumptions that might require the additional steps that are outlined below:

- The VSAM data sets for each new object are created using the 'I' prefix for each of the data sets. It is possible that on the source system online REORG has executed, causing the data sets to have a 'J' prefix. If this is the case, you will need to code the DSN1COPY for method two, to have the correct 'J' data set designation or rename the data set back to the 'I' prefix for method three in a

later step. You should query the source catalog for column IPREFIX in SYSIBM.SYSTABLEPART for table spaces, and SYSIBM.SYSINDEXPART for indexes, to find any 'J' prefix objects.

- If any of the index names involved in the move are greater than eight characters in length, Db2 generates a unique INDEXSPACE name to be used in naming the VSAM data set. The INDEXSPACE name generated will most likely be different in the source and target systems. You should query the source and target catalogs to get a list of the INDEXSPACE names for the indexes that have a name greater than eight characters (found in SYSIBM.SYSINDEXES). These will be used in a later step.
5. On the source Db2 subsystem, run the REORG utility on any table spaces for which a table alteration has occurred with no subsequent REORG.

If you are unsure if a table meets this criteria, query SYSIBM.SYSTABLES for those tables in which CREATEDTS does not equal ALTEREDTS. However, there is no way to tell from the Db2 catalog what kind of ALTER was performed and whether it would have affected this process. By comparing the CREATEDTS and ALTEREDTS, you will at least gather a list of candidates. If all rows have CREATEDTS equal to ALTEREDTS, running the REORG utility is unnecessary.

6. Move the data choosing one of the three methods that match the ones listed above:

- **Method 1: Unload / Reload:**

- a. Start the objects on the source system in RO mode.
- b. Execute the UNLOAD utility on the source system to unload the data to a sequential file.
- c. Execute the LOAD utility on the target system to load the data that was unloaded when performing the step listed above.

- **Method 2: DSN1COPY with OBID translation :**

- a. Stop the object, for both table space and index, on the source and target systems.
- b. Execute DSN1COPY with OBID translation and the RESET option to copy the data from the source system to the target system. If the online REORG utility has been run, be sure to code the proper I/J data set names in the DSN1COPY job. Also, if any indexes were created with names greater than eight characters long you will need to incorporate the INDEXSPACE name differences retrieved in an earlier step.
- c. Start the objects on the target systems R/W.

- **Method 3: Use Db2 VSAM data sets from source system in the target system:**

- a. Stop the table spaces and index spaces in the target system.
- b. If the high level qualifier (HLQ) is not changing between the source and target systems, which is not recommended, then perform the following steps on the target system. Note that this process assumes that the objects were created in the target system with DEFINE NO utility.
  - i) Change SPRMCTU in the DSN6SPRM macro to one. This enables the catalog to be updated. Also, change DLDFREQ to zero, which disables the down level detection. You must note the original value, because you will change DLDFREQ back to the original value in a later step. Assemble the changed zparm and restart the target system to pick up the change.
  - ii) Using SQL, update the SPACE column from SYSIBM.SYSTABLEPART and SYSIBM.SYSINDEXPART from -1 to 0 for the table and index spaces that you are moving using method three.
  - iii) Run the REPAIR DBD REBUILD utility for the databases created earlier. This step is needed because the above step changed the SPACE value in the Db2 catalog from -1 to 0, but the value is also in the DBD. This means that when the REPAIR DBD REBUILD utility is run, it will take the information from the catalog and rebuild the DBD in the directory, making Db2 think that the data set has already been defined.

**Note:** Do not try to access the tables at this point. Both systems will think that the data set is theirs, but only one system will actually be able to access the data set. The REPAIR DBD REBUILD utility only should be executed after all table spaces and index spaces that are being moved by method three for a particular database, have their catalogs updated via SQL.

- iv) Change SPRMCTU back to zero, and then DLDFREQ to the previous value it was assigned. Next, reassemble the zparm and recycle the target system so it recognizes the change.
  - c. Delete the target system VSAM data sets for the table spaces and indexes, unless they were created with DEFINE NO, because the HLQ did not change.
  - d. Use the REPAIR utility on the source system to change the identifiers in the page set header page, or header pages, if you have a partitioned page set, to match the new identifiers on the target subsystem.
 

The identifiers consist of two, 2-byte fields, HPGDBID and HPGPSID. You must locate and replace these identifiers with the new DBID and PSID of the target system as follows:

    - For non-partitioned page sets, locate and replace the 4-byte fields starting at X'0C', which begins on page zero.
    - For partitioned page sets, locate and replace the 4-byte fields starting at X'0C' on page zero for each partition.
  - e. If the table space that you are working with is segmented and compressed, and a dictionary exists, you must also run the REPAIR utility on the source system to change the OBID in the first space map page.
  - f. Stop the object, for table space and index, on the source system.
  - g. If the HLQs of the source and target systems are different, you must run the IDCAMS ALTER statements. Running the IDCAMS ALTER statements changes the HLQ of the VSAM data sets from the source system to be the new HLQ of the target system. If the HLQ is changing, then the VSAM data sets of the target system must be first deleted before running IDCAMS ALTER. Additionally, if you know from completing one of the previous steps that the online REORG utility has been executed on the source system, make sure that you change any 'J' data sets to match the target system. The target system should have all 'I' data sets, as they were newly created. Also, if any indexes were created with names greater than eight characters long, you will need to incorporate the INDEXSPACE name differences retrieved in an earlier step.
  - h. Start the table spaces and index spaces in the target system.
  - i. Use the REPAIR utility with the LEVELID option to reset the level indicator of the page sets to a neutral value on the target system.
  - j. Stop the object, for table space and index, on the source system.
7. You now have the option to drop the database objects on the source subsystem. If you do not choose to drop the objects at this point, and used method three to move data while keeping the same HLQ for the data sets, then you should consider altering the VCAT name in the source system to a different invalid value. You should alter the VCAT name so that the source Db2 does not try to open the data set that is now in use by the target system.
  8. Take full image copies of all data. This is the earliest time at which data recovery can occur after the merge.
  9. Run the RUNSTATS utility on the target system.
  10. Bind all plans and packages on the target subsystem that were bound on the source subsystem. Bind any plans and packages on the target subsystem that have changed because of name conflict resolution. Grant the appropriate authorizations to all plans and packages.

**Related reference**

[DSN1COPY \(Db2 Utilities\)](#)

[REPAIR \(Db2 Utilities\)](#)

## Running REPAIR to modify OBID for a compression dictionary

Additional invocations of the REPAIR utility might be necessary if you use Db2 VSAM data sets from the source system to move data that you are merging in the target system and the table space is segmented and compressed.

### About this task

If the segmented, compressed table space has a dictionary, the space map page that contains the dictionary has an OBID that is the same as the table space that was modified in the header page when you moved and merged your data. The OBID in the space map must be modified to match the new value in the header page.

### Procedure

To modify the OBID in the space map to match the new value in the header page:

1. Use the DSN1PRNT utility to view the data set header page and space map.

The following is an example from DSN1PRNT with the FORMAT option. On the header page, or page zero, you will see something similar to the output displayed in the following figure:

```
PAGE: # 00000000
-----
HEADER PAGE:  PGCOMB='10'X  PGLGRBA='BC8DB9277831'X  PGNUM='00000000'X  PGFLAGS='38'X
HPGOBID='018E0002'X  HPGHPREF='000000B4'X  HPGCATRL='00'X  HPGREL='D3'X  HPGZLD='D3'X
```

Figure 85. Sample header page of DSN1PRNT command with the FORMAT option.

The following figure shows the first space map page, or page 1:

```
FIRST PART OF SEGMENTED SPACE MAP:
SEG 0001  000000020002C0  FFFF
SEG 0002  00000003000280  FFFF
SEG 0003  00000004000280  FFFF
SEG 0004  00000000000280  FFFF
SEG 0005  000000060003C0  3333
SEG 0006  00000007000380  3333
SEG 0007  00000008000380  3333
SEG 0008  00000009000380  3333
SEG 0009  0000000A000380  3333
SEG 000A  0000000B000380  3333
SEG 000B  0000000C000380  3333
SEG 000C  0000000D000380  3333
SEG 000D  0000000E000380  3333
SEG 000E  00000000000380  3300
```

Figure 86. Sample output from first space map page of DSN1PRNT command with FORMAT option.

In the header page, HPGOBID is the DBID concatenated with the OBID. In the first figure above, HPGOBID is X'018E0002', so the DBID is X'018E' and the OBID is 0002'X. You can see that same OBID in the first four segments in the space map page, or bytes 5 and 6, following the segment number.

If you run DSN1PRNT on pages 0 and 1, and you do not see the same OBID in the space map page as the one listed on the header page, it means that the dictionary is not yet built. If the dictionary is not built, you only see the table segments (segments X'5' thru X'E' shown above). If this is the case, you do not need to modify the OBID and you can stop this task.

2. Use the REPAIR utility to modify the OBIDs in the space map to match the new OBID in the header page. Only the segments that match the OBID in the old header page must be modified. The remaining segments are for the table and do not need to be modified.

In the second figure above, you can see that the first four segments need to be modified and that the table OBID is X'0003'.

The number of segments that need to be modified is dependent on the SEGSIZE value of the table space. The following table shows the offset of the OBIDs that need to be modified for each SEGSIZE.

Table 63. The offset of OBIDs that need to be modified in order of SEGSIZE	
SEGSIZE	Offset of OBIDs to REPAIR
4	X'20' X'29' X'32' X'3B'
8	X'20' X'2B'
12	X'20' X'2D'
16-64	X'20'

## Release coexistence in Db2 data sharing

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

Db2 12 supports coexistence with Db2 11 members as long as every member remains at function level 100. Release coexistence begins when you migrate the first data sharing member to Db2 12. You must successfully migrate the first data sharing member to Db2 12 before attempting to migrate the other data sharing members.

**Important:** Apply the for fallback SPE (APAR PI33871) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration”](#) on page 3.

For maximum availability, you can migrate the members to Db2 12 one member at a time. When developing your migration plan, remember that most new functions that are introduced in Db2 12 are not available to any members of the group until all members are migrated to Db2 12 and is activated.



If you do not require continuous availability, consider shutting down the group during the migration to avoid the coexistence environment. If you must run in coexistence, plan to migrate the members in as short a time as possible to minimize the operational complexity.

Plan migrations for periods of low activity because of the locks used by the catalog migration utility (CATMAINT). These locks make parts of the Db2 catalog are unavailable during migration of the first member. The locks used varies from release to release, depending on the catalog parts that require modification.

Coexistence considerations are similar to those that you need to understand for the fallback environment. For example, objects that are frozen in fallback are generally not accessible from a Db2 11 member.

### Activation of Db2 12 function levels

In Db2 12, new function is activated when you successfully issue the ACTIVATE command on any single member of the data sharing group.

**Tip:**  You can determine the catalog level and function level for a Db2 subsystem or data sharing group, and the code levels of individual subsystems or members, by issuing DISPLAY GROUP commands. For more information, see [Determining the Db2 code level, catalog level, and function level \(Db2 for z/OS What's New?\)](#) 

Before attempting this process, confirm that all members are running Db2 12. The ACTIVATE command is successful only if all active members are running Db2 12.

**Important:** Do not issue the ACTIVATE command or run job DSNTIJAF for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the ACTIVATE command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.

**Important:** Apply the for fallback SPE ([APAR PI33871](#)) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration” on page 3](#).

## TSO, CAF, and RRSF logon procedures

You can attach to either release of Db2 with your existing TSO, CAF, or RRSF logon procedures without changing the load libraries for your applications. After you migrate completely to the latest level of Db2, you must update those procedures and jobs to point to the latest level of Db2 load libraries. If you forget to update those procedures and jobs before migrating to any release subsequent to Db2 12, those procedures and jobs can no longer work in that subsequent release.

### Related tasks

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

[Activating Db2 function levels in a data sharing](#)

After all active members in the data sharing group are running Db2 12, you can activate function level 500 or higher to enable the use of new capabilities.

[Preparing for Db2 12 migration in Db2 data sharing](#)

When planning the migration of data sharing members to Db2 12 it is best to take certain actions to reduce or avoid unnecessary operation complexity.

### Related reference

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

## Special considerations for WLM-managed stored procedures in coexistence

The WLM-managed stored procedure address space (WLM-SPAS) that processes a stored procedure or UDF program always connects to the Db2 member that processes the SQL call request. Therefore, the Db2 code that is executed in the WLM-SPAS must match the Db2 release of the database services address space (*ssnmDBM1*), or an error occurs.

When running in a data sharing group, each member has a different database services address space (*ssnmDBM1*). This means that the Db2 code in the WLM-SPAS will have to match more than one Db2 release level. This can cause a problem when you want to use a single JCL definition for the procedure name listed in the WLM definition.

To define one JCL procedure to reference Db2 code data sets at different release levels, use a simple data set and alias naming convention. If the procedure library is shared throughout the SYSPLEX, this allows for a single JCL definition for the Procedure Name that is listed in the WLM definition.



In the following example, the DB2SSN parameter is used as a part of the data set name in STEPLIB. This allows redirection to a data set name based on the SSN of the member that is invoking the stored procedure or UDF.

In the WLM definition:

```
Application Environment Name . . : DB2GROUP1
Description . . . . . GROUP 1 APPS
Subsystem Type . . . . . DB2
Procedure Name . . . . . DB2AWLM1
Start Parameters . . . . . DB2SSN=&IWMSSNM
-----
Limit on starting server address spaces for a subsystem instance:
1 1. Managed by WLM
   2. Single address space per system
   3. Single address space per Sysplex
```

The special keyword &IWMSSNM in the WLM definition causes WLM to send the subsystem name as the DB2SSN parm when the address space is started. In the WLM-SPAS JCL:

```
//DB2AWLM1 PROC RGN=0M,DB2SSN=,NUMTCB=1,APPLENV=DB2GROUP1
//IEFPROC EXEC PGM=DSNX9WLM,REGION=&RGN,TIME=NOLIMIT,
//          PARM='&DB2SSN,&NUMTCB,&APPLENV'
//STEPLIB DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNEXIT
//          DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNLOAD
//          DD DISP=SHR,DSN=DSNT2.&DB2SSN..SDSNLOD2
//          DD DISP=SHR,DSN=DSNT2.RUNLIB.LOAD
```

If one subsystem name is DT21 then the following alias can be used to redirect the library name to a release-specific library for that member. This would allow you to have a single release-specific library for a data sharing group.

```
DSNT2.DT21.SDSNLOAD *ALIAS
```

As members are migrated, the ALIAS can be changed to reflect the new release that the member is running.

## Determining the release of a data sharing group in coexistence

When the first data sharing member starts in Db2 12, the catalog level is V12R1M500 and the function level is V12R1M100, even though not all members of the group have migrated.

### Procedure

Issue the DISPLAY GROUP command.

The catalog level is shown near the top of the display.

### Examples for -DISPLAY GROUP

The following examples show output from DISPLAY GROUP commands in Db2 12:

```
-DB2A DISPLAY GROUP DETAIL
```

#### Example: Data sharing group with coexisting Db2 12 and Db2 11 members

In the following example, two members are migrated to Db2 12 and ready for the activation of new function in Db2 12. However, the code level of member DB2B indicates that it is not migrated to Db2 12, which means the group is not ready for activation of function level 500. The DB2 LVL value is 111500, which indicates the code level of Db2 11 in new-function mode.

Also, the migration readiness report shows that the Db2 data sharing group is not ready for migration to Db2 13 due to coexistence with Db2 11.

```
-DISPLAY GROUP DETAIL
DSN7100I -DB2A DSN7GCMD
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL(V12R1M500)
```

```

CURRENT FUNCTION LEVEL(V12R1M100)
HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M100)
HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M100)
PROTOCOL LEVEL(2)
GROUP ATTACH NAME(DSNG)
-----
DB2      SUB      DB2      SYSTEM      IRLM
MEMBER  ID  SYS  CMDPREF  STATUS  LVL  NAME  SUBSYS  IRLMPROC
-----
DB2A    1  DB2A -DB2A    ACTIVE  121500 MVSA  DJ2A  DB2AIRLM
DB2B    2  DB2B -DB2B    ACTIVE  111500 MVSB  DJ2B  DB2BIRLM
DB2C    3  DB2C -DB2C    ACTIVE  121500 MVSC  DJ2C  DB2CIRLM
-----

MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER  LEVEL      APAR     ELIGIBLE
-----
DB2A    V12R1M500  .....  NO
DB2B    V11R1M500  .....  NO
DB2B    V12R1M500  .....  NO
-----

MIGRATION READINESS STATUS: IS NOT READY FOR DB2 13
REASON: COEXISTENCE PRECLUDES MIGRATION TO THE NEXT DB2 RELEASE
-----

DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----

SCA  STRUCTURE SIZE:  12288 KB, STATUS= AC,   SCA IN USE:  8 %
LOCK1 STRUCTURE SIZE:  12288 KB
NUMBER LOCK ENTRIES:  1048576
NUMBER LIST ENTRIES:  23073, LIST ENTRIES IN USE:  7
SPT01 INLINE LENGTH:  32138
*** END DISPLAY OF GROUP(DSNCAT )
DSN9022I -DB2C DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION

```

**Example: Data sharing group with all active members migrated to Db2 12 code, before the activation of function level 500**

The following DISPLAY GROUP output illustrates a data sharing group with all active members migrated to Db2 12 and ready for the activation of function level 500.

Also, the migration readiness report shows that the Db2 data sharing group is not ready for migration to Db2 13 due to the highest activated function level and not all members have the fallback SPE APAR.

```

DSN7100I -DB2B DSN7GCMD
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL(V12R1M500)
CURRENT FUNCTION LEVEL(V12R1M100)
HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M100)
HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M500)
PROTOCOL LEVEL(2)
GROUP ATTACH NAME(DSNG)
-----
DB2      SUB      DB2      SYSTEM      IRLM
MEMBER  ID  SYS  CMDPREF  STATUS  LVL  NAME  SUBSYS  IRLMPROC
-----
DB2A    1  DB2A -DB2A    ACTIVE  121500 MVSA  DJ2A  DB2AIRLM
DB2B    2  DB2B -DB2B    ACTIVE  121510 MVSB  DJ2B  DB2BIRLM
DB2C    3  DB2C -DB2C    ACTIVE  121500 MVSC  DJ2C  DB2CIRLM
-----

MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER  LEVEL      APAR     ELIGIBLE
-----
DB2A    V12R1M510  .....  NO
DB2B    V12R1M510  PH37108 NO
DB2C    V12R1M510  .....  NO
-----

MIGRATION READINESS STATUS: GROUP IS NOT READY FOR DB2 NEXT
REASON: HIGHEST ACTIVATED FUNCTION LEVEL NOT V12R1M510
-----

DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----

SCA  STRUCTURE SIZE:  12288 KB, STATUS= AC,   SCA IN USE:  9 %
LOCK1 STRUCTURE SIZE:  12288 KB
NUMBER LOCK ENTRIES:  1048576
NUMBER LIST ENTRIES:  23073, LIST ENTRIES IN USE:  17

```

```
SPT01 INLINE LENGTH:      32138
*** END DISPLAY OF GROUP(DSNCAT )
DSN9022I  -DB2B DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION
```

**Example: Data sharing group with all active members migrated to Db2 12 after the activation of function level 500**

The following DISPLAY GROUP output illustrates a data sharing group with function level 500 activated.

Also, the migration readiness report shows that the Db2 data sharing group is not ready for migration to Db2 13 due to the highest activated function level and the missing SPE APAR.

```
DSN7100I  -DB2A DSN7GCMD
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL(V12R1M500)
          CURRENT FUNCTION LEVEL(V12R1M500)
          HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M500)
          HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M500)
          PROTOCOL LEVEL(2)
          GROUP ATTACH NAME(DSNG)
-----
DB2      SUB      DB2      SYSTEM      IRLM
MEMBER  ID  SYS  CMDPREF  STATUS  LVL  NAME  SUBSYS  IRLMPROC
-----
DB2A    1  DB2A -DB2A    ACTIVE  121500  MVSA  DJ2A  DB2AIRLM
DB2B    2  DB2B -DB2B    ACTIVE  121500  MVSB  DJ2B  DB2BIRLM
DB2C    3  DB2C -DB2C    ACTIVE  121500  MVSC  DJ2C  DB2CIRLM
-----
MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER  LEVEL      APAR      ELIGIBLE
-----
DB2A    V12R1M500  .....  NO
DB2B    V12R1M500  .....  NO
DB2B    V12R1M500  .....  NO
-----
MIGRATION READINESS STATUS:  GROUP IS NOT READY FOR DB2 13
REASON:  HIGHEST ACTIVATED FUNCTION LEVEL NOT V12R1M510
-----
DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----
SCA  STRUCTURE SIZE:  12288 KB, STATUS= AC,   SCA IN USE:    9 %
LOCK1 STRUCTURE SIZE:  12288 KB
NUMBER LOCK ENTRIES:  1048576
NUMBER LIST ENTRIES:  23073, LIST ENTRIES IN USE:    0
SPT01 INLINE LENGTH:  32138
*** END DISPLAY OF GROUP(DSNCAT )
DSN9022I  -DB2A DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION
```

**Example: Db2 12 data sharing group ready for migration to Db2 13**

The example single-member Db2 12 data sharing group is ready for migration to Db2 13.

```
DSN7100I  -DB2A DSN7GCMD
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL(V12R1M509)
          CURRENT FUNCTION LEVEL(V12R1M510)
          HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M510)
          HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M510)
          PROTOCOL LEVEL(2)
          GROUP ATTACH NAME(DSNG)
-----
DB2      SUB      DB2      SYSTEM      IRLM
MEMBER  ID  SYS  CMDPREF  STATUS  LVL  NAME  SUBSYS  PRLM2171
-----
DB2A    1  DB2A -DB2A    ACTIVE  121510  UTEC5  PR21  PRLM21
-----
MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER  LEVEL      APAR      ELIGIBLE
-----
DB2A    V12R1M510  PH37108  YES
-----
MIGRATION READINESS STATUS:  GROUP IS READY FOR MIGRATION TO DB2 13
-----
DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----
```

```

SCA STRUCTURE SIZE: 12288 KB, STATUS= AC, SCA IN USE: 5 %
LOCK1 STRUCTURE SIZE: 12288 KB
NUMBER LOCK ENTRIES: 1048576
NUMBER LIST ENTRIES: 23151, LIST ENTRIES IN USE: 0
SPT01 INLINE LENGTH: 32138
*** END DISPLAY OF GROUP(DSNCAT )
-DB2A DSN7GCMD 'DISPLAY GROUP ' NORMAL DSN9022I COMPLETION

```

### Example: Db2 12 data sharing group not ready for migration to Db2 13

The example Db2 12 data sharing group not ready for migration to Db2 13 because of the coexistence with Db2 11.

```

DSN7100I -DB2A DSN7GCMD
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL(V12R1M500)
CURRENT FUNCTION LEVEL(V12R1M100)
HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M100)
HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M100)
PROTOCOL LEVEL(2)
GROUP ATTACH NAME(DSNG)
-----
DB2      SUB
MEMBER  ID  SYS  CMDPREF  STATUS  DB2  SYSTEM  IRLM
DB2A    1  DB2A -DB2A    ACTIVE  121510 UTEC5   PR21   PRLM2171
DB2B    2  DB2B -DB2B    ACTIVE  111500 UTEC5   QR21   QRLM21
-----
DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----
MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER   LEVEL      APAR      ELIGIBLE
-----
DB2A    V12R1M510  PH37108  YES
DB2B    V11R1M500  .....  NO
-----
MIGRATION READINESS STATUS: GROUP IS NOT READY FOR DB2 13
REASON: COEXISTENCE PRECLUDES MIGRATION TO THE NEXT DB2 RELEASE
-----
SCA STRUCTURE SIZE: 12288 KB, STATUS= AC, SCA IN USE: 5 %
LOCK1 STRUCTURE SIZE: 12288 KB
NUMBER LOCK ENTRIES: 1048576
NUMBER LIST ENTRIES: 23151, LIST ENTRIES IN USE: 5
SPT01 INLINE LENGTH: 32138
*** END DISPLAY OF GROUP(DSNCAT )
DSN9022I -DB2A DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION

```

### Example: standalone Db2 12 subsystem not ready for migration to Db2 13

The example Db2 subsystem has a sufficient code level and the fallback SPE APAR for migration to Db2 13. However, it is not ready for migration to Db2 13 because of its highest activated function level.

```

DSN7100I -DB2A DSN7GCMD
*** BEGIN DISPLAY OF GROUP(.....) CATALOG LEVEL(V12R1M500)
CURRENT FUNCTION LEVEL(V12R1M100)
HIGHEST ACTIVATED FUNCTION LEVEL(V12R1M100)
HIGHEST POSSIBLE FUNCTION LEVEL(V12R1M501)
PROTOCOL LEVEL(2)
GROUP ATTACH NAME(....)
-----
DB2      SUB
MEMBER  ID  SYS  CMDPREF  STATUS  DB2  SYSTEM  IRLM
.....  0  DB2A -DB2A    ACTIVE  121510 UTEC6   PR21   PRLMPR21
-----
DISPLAY SUBGROUP ATTACH INFORMATION FOR GROUP ATTACH DSNG
-----
MIGRATION READINESS REPORT
-----
DB2      CODE      SPE      MIGRATION
MEMBER   LEVEL      APAR      ELIGIBLE
-----
.....   V12R1M510  PH37108  YES
-----
MIGRATION READINESS STATUS: SUBSYSTEM IS NOT READY FOR DB2 13
REASON: HIGHEST ACTIVATED FUNCTION LEVEL NOT V12R1M510

```

```
-----  
SPT01 INLINE LENGTH:          32138  
*** END DISPLAY OF GROUP(.....)  
DSN9022I  -DB2A DSN7GCMD 'DISPLAY GROUP ' NORMAL COMPLETION
```

### FL 502 Example: Data sharing group with an encryption key label assigned to all members

If the subsystem parameter ENCRYPTION\_KEYLABEL is specified for the members of a data sharing group, issue the following command to display the key label:

```
-DISPLAY GROUP DETAIL
```

The output is similar to the following:

```
DSN7100I  -DB2C DSN7GCMD  
*** BEGIN DISPLAY OF GROUP(DSNCAT ) CATALOG LEVEL (V12R1M502)  
CURRENT FUNCTION LEVEL (V12R1M502)  
HIGHEST ACTIVATED FUNCTION LEVEL (V12R1M502)  
HIGHEST POSSIBLE FUNCTION LEVEL (V12R1M502)  
PROTOCOL LEVEL (2)  
GROUP ATTACH NAME (DSNG)  
ENCRYPTION KEY LABEL (SYSTEM.KEY01)
```

#### Related tasks

[Determining the Db2 code level, catalog level, and function level \(Db2 for z/OS What's New?\)](#)

#### Related reference

[-DISPLAY GROUP command \(Db2\) \(Db2 Commands\)](#)

## Determining the function level of an IRLM group in coexistence

IRLM communicates coexistence information by using function levels. A *function level* is an ever-increasing number that each IRLM can use to tell other IRLMs in the group what level of function it supports.

### About this task

The group function level is the **minimum** of the individual IRLM function levels for all IRLMs that can coexist. An IRLM that tries to join a data sharing group is prevented from doing so by active members that cannot coexist with the new IRLM's function level.

When the function level for the group changes, that change is serialized by IRLM with lock structure rebuilds. In most cases, however, the lock structure does not actually do a full rebuild. The first phase of the rebuild is enough to quiesce the work and cause the function level change to occur. These "partial" rebuilds take place when an IRLM joins the group and if that activity causes the group function level to change. For example, if the IRLM group is currently at function level *n*, and the IRLM member that wants to join the group is at *n-1*, the partial rebuild occurs to lower the group function level.

### Procedure

Enter the following command:

**GUI**

```
MODIFY irlmproc,STATUS,ALLI
```

## Examples

### Example 1

Assume a data sharing group exists with three members running Db2 Db2 12 in V12R1M100 and one member running Db2 11. Issuing the `MODIFY irmlproc,STATUS,ALLI` command from one of the three Db2 12 members produces output that is similar to the following output:

```
DXR103I QR21002 STATUS 622
        IRLMS PARTICIPATING IN DATA SHARING GROUP FUNCTION LEVEL=2.029
        IRLM_NAME IRLMID STATUS LEVEL SERVICE MIN_LEVEL MIN_SERVICE
        PR21*    001    UP    3.029 PM28625    1.022    PM28625
        QR21     002    UP    2.029 PM28625    1.022    PM28625
        SRLM     004    UP    3.029 PM28625    1.022    PM28625
        TRLM     005    UP    3.029 PM28625    1.022    PM28625
DXR103I End of display
```

#### GUPI

The IRLMs in the preceding example are at group function level 2.029, which is the lowest level of any of the individual members (QR21). The `MIN_LEVEL` field shows the minimum level with which this IRLM can coexist. `MIN_SERVICE` indicates the service or release that corresponds with that `MIN_LEVEL`.

#### GUPI

### Example 2

Assume the same data sharing group as described in the previous example. Issuing the `MODIFY irmlproc,STATUS,ALLI` command from the Db2 11 member produces output that is similar to the following output:

```
DXR103I DJ3A003 STATUS
        IRLMS PARTICIPATING IN DATA SHARING GROUP FUNCTION LEVEL=022
        IRLM_NAME IRLMID STATUS LEVEL SERVICE MIN_LEVEL MIN_SERVICE
        DJ1A     001    UP     094 HIR2220     022    HIR2220
        DJ2A     002    UP     094 HIR2220     022    HIR2220
        DJ3A     003    UP     022 PQ52360    012    PN90337
DXR103I End of display
```

#### GUPI

## Call attachment and TSO attachment in coexistence

While operating in a coexistence environment, you can attach to either Db2 release with your existing TSO logon procedures or with JCL.

After you migrate all members of the group to Db2 12, update those procedures and jobs to point to the Db2 12 load libraries.

## Automatic binds in coexistence

Changes to package structures that are introduced in Db2 12 are not available to members of the group that have not migrated. You must plan accordingly when developing your migration plan.

**Important:** To reduce coexistence problems, rebind all packages and plans that can run in Db2 11, but cannot run without an automatic rebind in Db2 12. To identify those packages, run job DSNTIJPM, and examine the premigration reports on package copies and plans that are not supported after migration to Db2 12. For details, see [“Run premigration queries \(DSNTIJPM\)” on page 487](#).

**Important:** Apply APAR PI87675 to eliminate the possibility of repeating automatic remigration binds during release coexistence.

Migration-related *automatic binds* (also called "autobinds") occur in Db2 12 because it cannot use runtime structures from a plan or package that was last bound in a release earlier than DB2 10. Plans and packages that were bound in Db2 11 can run in Db2 12, without the risk of migration-related autobinds.

However, plans and packages that are bound in Db2 12 cannot run on Db2 11 members without an autobind in Db2 11.

If the autobinds are allowed to occur, they are inevitably disruptive for rolling online migrations, or any time that different releases coexist in data sharing environments. During and after migration, such autobinds can result in costly problems, including performance regression and even application outages.

Autobinds occur the first time that any plan or package runs in Db2 12, which means that the autobinds, and resulting problems and application outages, can occur well after a migration window. That is, such problems and resulting outages can occur any time in the "first impression" window in Db2 12, which is any time until the plan or package first runs in Db2 12.

The best approach is to bind all packages and plans that might be subject to migration-related autobinds in Db2 11 with good performance before you start the migration to Db2 12. Doing so reduces the risk of the following problems that can result from autobinds:

- Application failures because of contention between releases. For any migration that brings into release coexistence, autobinds might fail for plans or packages that are in use by a Db2 11 member, causing applications to fail on the Db2 12 member.

Successful autobinds on Db2 12 in a coexistence environment also create a package or plan that Db2 11 members cannot run without another autobind. The autobind might also fail if the plan or package is in use by a Db2 12 member.

- Application failures, when autobinds fail for access control authorization exit users because the authorization ID for the autobind has insufficient privileges, compared to the owner of the package or the plan.
- Difficult to resolve performance regressions. For packages, a migration-related autobind also destroys the current package. If the autorebind succeeds but introduces an access path regression, REBIND SWITCH is not possible. Any performance regression that occurs in Db2 12 might also occur in Db2 11.

For more information about avoiding automatic binds during or after the Db2 12 migration process, see [“Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12” on page 487.](#)

The migration process binds new packages in Db2 12, including packages for Db2-supplied stored procedures, user defined functions, and tools such as SPUFI and the Db2 REXX language support. Data sharing members in the Db2 12 load and execute those programs from the Db2 12 SDSNLOAD library. Data sharing members on Db2 11 continue to load this packages from the SNDSNLOAD library for Db2 11.

If you must rebind some of your application packages in Db2 12 while coexistence with Db2 11 continues, you must consider how to handle the resulting binds and automatic rebinds while the different releases coexist.

### **Related concepts**

[Automatic rebinds \(Db2 Application programming and SQL\)](#)

[Release coexistence in Db2 data sharing](#)

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

### **Related tasks**

[Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12](#)

By taking appropriate actions in Db2 11 well before migration to Db2 12, you can minimize the risk of disruptive automatic binds of application plans and packages during and after migration to Db2 12.

### **Related reference**

[AUTO BIND field \(ABIND subsystem parameter\)](#)

The ABIND subsystem parameter specifies whether Db2 automatically rebinds packages and plans in certain situations at run time.

## Recommendations for BIND in coexistence

If DSN is at Db2 12 and the member that is named in the DSN command is at Db2 11, using certain bind options causes a BIND or REBIND subcommand to be rejected.

If you are migrating from Db2 11, the following options cause BIND and REBIND commands to be rejected:

- APPLCOMPAT(V12R1|V12R1M500|V12R1M100)
- APREUSESOURCE(PREVIOUS|ORIGINAL|CURRENT)
- CONCENTRATESTMT(YES|NO)

To avoid problems, make sure that the member that is named in the DSN subcommand matches the load libraries that are used for the DSN command.

### Related concepts

[Automatic binds in coexistence](#)

Changes to package structures that are introduced in Db2 12 are not available to members of the group that have not migrated. You must plan accordingly when developing your migration plan.

### Related tasks

[Rebind old plans and packages in Db2 11 to avoid disruptive autobinds in Db2 12](#)

By taking appropriate actions in Db2 11 well before migration to Db2 12, you can minimize the risk of disruptive automatic binds of application plans and packages during and after migration to Db2 12.

### Related reference

[DSN command \(TSO\) \(Db2 Commands\)](#)

[BIND PACKAGE subcommand \(DSN\) \(Db2 Commands\)](#)

[REBIND PACKAGE subcommand \(DSN\) \(Db2 Commands\)](#)

## Db2 utilities coexistence recommendations

Until all members of the data sharing group are running Db2 12, avoid use of new utility capabilities in Db2 12. If you use utility options that are supported in Db2 11, utilities can attach to either a Db2 11 or Db2 12 member.

**Important:** In data sharing release coexistence, you must restart a utility on a member on the same Db2 release as the member where the utility job was originally submitted. The same utility ID (UID) must be used to restart the utility. That UID is unique within a data sharing group. However, if Db2 fails, you must restart Db2 on either the same or another z/OS system before you restart the utility.

The utilities batch program (DSNUTILB) is split into multiple load modules: a release-independent load module called DSNUTILB, multiple release-dependent modules DSNUT111 or DSNUT121, and for Db2 11 it includes multiple utility-dependent feature load modules. To operate in a mixed-release data sharing environment, you must have DSNUT111, and DSNUT121. You must also have all utility-dependent load modules and their aliases for utilities that you purchased for use with Db2 11 available to the utility jobs that operate across the data sharing group. The following examples show how you can make the required load modules available.

## Changing STEPLIB in DSNUPROC

The recommended method for making the release-dependent modules available for utility jobs is to change the STEPLIB in DSNUPROC to include the other release, as in the following example:

```
//DSNUPROC PROC LIB= 'DSN1210.SDSNLOAD' ,  
//          SYSTEM=DSN,  
//          SIZE=0K,UID= ' ,UTPROC= '  
//DSNUPROC EXEC PGM=DSNUTILB,REGION=&SIZE,  
//          PARM= '&SYSTEM,&UID,&UTPROC'
```



```
//STEPLIB DD DSN=&LIB,DISP=SHR;
// DD DSN=DSN1110.SDSNLOAD,DISP=SHR <- coexistence
//SYSPRINT DD SYSOUT=*
//UTPRINT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//*DSNUPROC PEND REMOVE * FOR USE AS INSTREAM PROCEDURE
```

## Cross-copy into load libraries

Another approach, which is not recommended for long-term use, is to cross-copy the release-dependent modules into the load libraries of the other release. For example, copy DSNUT111 into the Db2 12 load libraries, and copy DSNUT121 into the Db2 11 load libraries. The problem with this approach is that you must repeat this procedure every time you apply maintenance to these modules. Thus, as with coexistence in general, this approach is only for short-term use.

The following shows sample JCL to complete the cross-copy:

```
//
CROSCOPY PROC D121TPRE='DSN1210',
//          D111TPRE='DSN1110',
//          RGN=4096K,SOUT='*'
//* *****
//* FOR EXECUTION OF IEBCOPY - DB2 POST-INSTALLATION ***
//* *****
//COPY EXEC PGM=IEBCOPY,REGION=&RGN
//SYSUT3 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//SYSUT4 DD UNIT=SYSDA,SPACE=(CYL,(5,1))
//* ***** DB2 TARGET LIBRARIES *****
//*
//D111LOAD DD DSN=&D111TPRE..SDSNLOAD,DISP=OLD
//D121LOAD DD DSN=&D121TPRE..SDSNLOAD,DISP=OLD
//*
//          PEND
//COEXIST EXEC PROC=DSNTIJCO
//SYSIN DD *
COPYMOD INDD=((D121LOAD,R)),OUTDD=D111LOAD
SELECT MEMBER=(DSNUT121)
COPYMOD INDD=((D111LOAD,R)),OUTDD=D121LOAD
SELECT MEMBER=(DSNUT111) <-- add any utility-dependent feature modules here
```

## When to update COPY, RECOVER, and REBUILD INDEX jobs for Db2 catalog objects

You might need to update COPY, RECOVER, and REBUILD INDEX utility jobs to add new or remove obsolete Db2 catalog objects after migration to Db2 12. When a utility encounters the following situations for Db2 catalog objects, it issues message DSNU1530I:

- The object is no longer used or no longer exists.
- The object is created in a higher catalog level or function level.

For best results, update the utility jobs for the new or obsolete Db2 catalog objects after you activate the function level that the changes support, when coexistence with Db2 11 is no longer a possibility. For more information about the catalog changes in Db2 12, see [Catalog changes in Db2 12 \(Db2 for z/OS What's New?\)](#).

## Recommendation for group restart in coexistence

If a group restart is necessary while the data sharing group is running in a coexistence environment, issue the START command only for Db2 12 members.

Do not start the Db2 11 members until the Db2 12 members have completed forward log recovery. If a Db2 11 member performs the group restart for a Db2 12 member, Db2 11 adds pages to the logical page list during the peer-forward recovery phase when it tries to apply redo log records against a release-dependent object.

## IRLM service and release coexistence

As you apply IRLM service to members of a data sharing group, some members run with the newer service level, and some run with the older service level.

A mix of service levels can raise issues that you must consider.

When the IRLM subsystems in the group are at different service levels, the group function level for IRLM is the lowest IRLM function level. All IRLM subsystems in the group are functional, but any enhancements or fixes that were made at the higher function levels are not available.

### Related tasks

[Determining the function level of an IRLM group in coexistence](#)

IRLM communicates coexistence information by using function levels. A *function level* is an ever-increasing number that each IRLM can use to tell other IRLMs in the group what level of function it supports.

## Preparing for Db2 12 migration in Db2 data sharing

---

When planning the migration of data sharing members to Db2 12 it is best to take certain actions to reduce or avoid unnecessary operation complexity.

### Procedure

To prepare for migration to Db2 12 in data sharing, complete the following steps:

- Ensure that all required maintenance, including the Db2 12 fallback SPE, is applied on every member.  
**Important:** Apply the for fallback SPE ([APAR PI33871](#)) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration”](#) on page 3.
- After all members have migrated to Db2 12, do not activate new function until your data sharing group has processed a full range of typical work. The amount of time that a data sharing group needs before new function is activated depends on the size of the data sharing group and the complexity of its typical work.  
**Important:** Do not issue the ACTIVATE command or run job DSNTIJAF for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the ACTIVATE command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.
- Before you migrate to Db2 12, read the information about release incompatibilities and make any necessary changes.  
For more information, see [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#).
- Plan to minimize the amount of time that Db2 12 operates in release coexistence with members on Db2 11.  
For more information about release coexistence in Db2 data sharing, see [“Release coexistence in Db2 data sharing”](#) on page 693.
- Start only one Db2 member for migration processing. During the migration, other group members can be active. However, other active group members may experience delays or timeouts if they attempt to access catalog objects that are locked by migration processing. After migration completes on the first member, you can migrate the other data sharing group members.
- To prepare for possible fallback from Db2 12, keep the subsystem parameter load module that is used by Db2 11.

## Related concepts

[Planning for Db2 data sharing](#)

Db2 data sharing introduces special requirements for your Db2 and z/OS environments.

[Release coexistence in Db2 data sharing](#)

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

## Related tasks

[Installing, migrating, and enabling Db2 data sharing](#)

Whether you need to install, migrate, or enable data sharing depends on the type of system that you start with and the type of system that you want to create.

[Activating Db2 12 new function at migration](#)

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

[Migrating an existing data sharing group to Db2 12](#)

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

## Related reference

[-ACTIVATE command \(Db2\) \(Db2 Commands\)](#)

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

# Migrating an existing data sharing group to Db2 12

---

If you have a Db2 11 Db2 data sharing group, and you want a Db2 12 data sharing group, you can migrate to the newer release.

## Before you begin

Prepare your data sharing group for migration, as described in [“Preparing for Db2 12 migration in Db2 data sharing”](#) on page 704.

During the migration to Db2 12, other group members can be active, but they might experience delays or timeouts if they attempt to access catalog objects that are being updated or that are locked by migration processing. Before beginning the migration process, confirm that Db2 11 is at the proper service level. Also, check your coupling facilities to ensure that the appropriate service levels are installed. Having the wrong service levels installed can result in data corruption. No specific service level requirements exist for CFLEVELs other than 12, but CF levels 13 and 14 are recommended for additional function. Use the z/OS **D CF** command to display the service levels for IBM coupling facilities.

**Important:** Migration to Db2 12 is only supported from Db2 11.

**Important:** If you are migrating the source, proxy, and target data sharing groups in a GDPS Continuous Availability with zero data loss environment to Db2 12, see [Upgrading a Db2 11 GDPS Continuous Availability with zero data loss environment to a Db2 12 environment \(Db2 Administration Guide\)](#) for the order in which you need to perform the migrations.

**Important:** Apply the for fallback SPE ([APAR PI33871](#)) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration”](#) on page 3.

Before you start to migrate your data sharing group:

- Read the information about migration considerations in [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#).
- Read the information in [00C10207 \(Db2 Codes\)](#).

### Related concepts

[The scope and uniqueness of Db2 subsystem parameters in data sharing](#)

Although various parameters affect the operation of only a single member, some parameters must have the same value on all the members. For example, each catalog alias name must be the same. Other parameter values must be different on each member. For example, each member specifies a different BSDS name.

## Migrating the first member of a group to Db2 12

You must first complete the migration of one member of the data sharing group to Db2 12 before starting any other members at Db2 12. You may choose any member as the first member to migrate to the new release.

### About this task

The DB2I CLISTS are edited when the first member of a data sharing group migrates to Db2 12. The sample jobs are edited when the first member migrates to Db2 12.

### Jobs tailored by they CLIST

Jobs that are marked with an asterisk (\*) are modified only when you migrate the first member of a data sharing group.

DSNTIJCB  
 DSNTIJCX\*  
 DSNTIJEX\*  
 DSNTIJIC\*  
 DSNTIJFT  
 DSNTIJFV  
 DSNTIJGF  
 DSNTIJIN\*  
 DSNTIJMV  
 DSNTIJPD\*  
 DSNTIJPM  
 DSNTIJSG\*  
 DSNTIJVC\*  
 DSNTIJTC\*  
 DSNTIJTM  
 DSNTIJUZ  
 DSNTIJRT\*  
 DSNTIJRV\*  
 DSNTIJRW\*

### Procedure

**Important:** Follow these directions carefully. The first member of the data sharing group uses DSNTIDXA as its input member name. If you use SAP, specify DSNTIDXB, the SAP-specific CLIST input member, instead of DSNTIDXA. A subsequent member must use a previous member's output member name as its input member name.

To migrate the first member of a data sharing group to Db2 12:

1. Make a plan to migrate the data sharing group in as short a time period as possible. Migrating an existing data sharing group requires careful planning.

2. Apply maintenance through the Db2 12 fallback SPE to all active members.

**Important:** Apply the for fallback SPE (APAR PI33871) and stop and restart Db2 11 for every subsystem or data sharing member that you plan to migrate to Db2 12. For data sharing, every member must be started in Db2 11 after the fallback SPE is applied. Inactive members that never started with the fallback SPE applied in Db2 11 cannot start in Db2 12 or Db2 11 after migration to Db2 12 and activation of function level 500 on any other member. See [“Required maintenance for Db2 12 installation or migration”](#) on page 3.

In case fallback becomes necessary, keep the subsystem parameter load module that is used by Db2 11.

3. Generate tailored JCL jobs for migrating to Db2 12. You can use the Db2 installation CLIST. For more information, see [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode”](#) on page 52.
4. a. Specify the following settings on panel DSNTIPA1:

```
INSTALL TYPE ==> MIGRATE
DATA SHARING ==> YES
.
DATA SET(MEMBER)NAME ==> this member's previous release output member
.
INPUT MEMBER NAME ==> DSNTIDXA or DSNTIDXB
OUTPUT MEMBER NAME ==> this member's output PDS member
```

- b. On panel DSNTIP0B, specify option 1 to indicate that this is the first member of the group to migrate.

```
DSNTIP0B
FIRST MEMBER OF GROUP TO MIGRATE?
Select one.
  1 1. Yes
  2 2. No
```

- c. Proceed through the remaining Db2 installation CLIST panels, specify or accept values for your Db2 environment, and wait for the Db2 installation CLIST to tailor the jobs for the migration process. The output data set contains the tailored jobs for the migration process. For more information, see [“The Db2 installation CLIST panel session”](#) on page 56.

5. Complete all of the [steps to migrate to Db2 12](#).

### Related concepts

[Subsystem parameters and application defaults in a data sharing environment](#)

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

## Migrating subsequent members of a group to Db2 12

After you complete the migration of one member of a data sharing group to Db2 12, you can migrate subsequent members of the group.

### About this task

To migrate subsequent members of a group to Db2 12, complete these tasks for each member:

### Related tasks

[Starting inactive data sharing group members from earlier releases in Db2 12](#)

After migration to Db2 12, you might be able to activate data sharing group members that were last started in earlier Db2 releases.

## Generating tailored migration jobs for data sharing members

The process of migrating data sharing members to Db2 12 involves running some of the migration jobs. Before you can run the migration jobs, you must generate tailor the JCL jobs and input for your Db2 environment.

### Before you begin

Before you begin to migrate subsequent members to Db2 12, migrate the first data sharing member. For more information, see [“Migrating the first member of a group to Db2 12” on page 706](#).

### Procedure

Generate tailored migration jobs for the subsequent Db2 data sharing members. You can use the Db2 installation CLIST. For more information, see [“Generating tailored installation, migration, or function level activation jobs by running the Db2 installation CLIST in interactive mode” on page 52](#).

- a. On panel DSNTIPA1, specify the following fields.

```
INSTALL TYPE ==> MIGRATE
DATA SHARING ==> YES
.
DATA SET(MEMBER)NAME ==> this member's output member from the previous release
.
INPUT MEMBER NAME ==> first member's output PDS member
OUTPUT MEMBER NAME ==> this member's output PDS member
```

In the INPUT MEMBER NAME field, specify the same PDS member name that you specified in the OUTPUT MEMBER NAME field when you ran the CLIST to migrate the first (originating) member of the data sharing group.

- b. On panel DSNTIPOB, specify 2 on to indicate that this is not the first member of the group to migrate.

```
DSNTIPOB
FIRST MEMBER OF GROUP TO MIGRATE?
Select one.
  2 1. Yes
    2. No
```

- c. Proceed through the remaining Db2 installation CLIST panels, specify or accept values for your Db2 environment, and wait for the Db2 installation CLIST to tailor the jobs for the migration process. The output data set contains the tailored jobs for the migration process. For more information, see [“The Db2 installation CLIST panel session” on page 56](#).

### Related concepts

[Subsystem parameters and application defaults in a data sharing environment](#)

In a data sharing environment, you must consider the scope of subsystem parameters before setting the values for each member. Also consider the subsystem parameter load module and the application defaults load module that you will specify for each member.

## Connecting Db2 to IMS (optional)

Connecting Db2 to IMS is an optional part of migrating existing data sharing members to a new release. Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

### Procedure

To connect the IMS attachment facility:

1. [Make Db2 load modules available to IMS](#).

2. [Define Db2 to IMS.](#)
3. [Define new programs and transactions to IMS.](#)
4. [Prepare IMS applications for Db2.](#)
5. Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications.](#)
  - [Generate a user language interface.](#)

### Related tasks

[Connecting the IMS attachment facility](#)

Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

## Connecting CICS to Db2 (optional)

Connecting CICS to Db2 is an optional part of migrating members in a data sharing group. Connecting Db2 to CICS requires that you regenerate several CICS tables with additional entries.

### About this task

A macro is supplied with CICS to define the connection between CICS and Db2 by using a resource control table (RCT).

Ensure that you coordinate the attachment facility connection with your CICS support group.

### Procedure

To connect the CICS attachment facility:

1. Recalculate space requirements for the CICS attachment facility.
2. Define your CICS attachment facility parameters using the RCT.
3. Update the CICS system tables.
4. Update the CICS initialization JCL.
5. Coordinate Db2 and CICS security if necessary.
6. Prepare new CICS applications for Db2 if necessary.

### Related tasks

[Defining the CICS Db2 connection](#)

## Stopping Db2 activity

Before running any installation jobs to migrate a data sharing member, ensure that all work is stopped on the subsystem.

### Procedure

To stop work on Db2:

1. Issue the following command, where *-DSN1* is the subsystem command prefix that is defined for Db2. You must have system administrator (SYSADM) or system operator (SYSOPR) authority to issue this command.

 GUIP

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

 GUIP

The QUIESCE keyword allows Db2 to complete the processing of programs that are currently executing. This might require some processing time.

2. Issue the following command to allow only the system administrators and system operators that were defined during installation to access Db2:

**GUIP**

```
-DSN1 START DB2 ACCESS(MAINT)
```

**GUIP**

If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. For example, if the bootstrap data set (BSDS) does not match the subsystem parameter values, ensure that the correct jobs were run for DSNTIJUZ. Ensure that you started Db2 with the correct subsystem parameter option.

3. Follow these steps to ensure that all Db2 11 work is stopped:

- Make sure no units of recovery remain. Issue the following command:

**GUIP**

```
-DSN1 DISPLAY THREAD(*) TYPE(*)
```

**GUIP**

Then use `-DSN1 RECOVER INDOUBT` for any indoubt threads.

- Ensure that all utilities are completed or terminated. To ensure that no utility work remains, issue the following command:

**GUIP**

```
-DSN1 DISPLAY UTILITY(*)
```

**GUIP**

After you have determined the utilities that are running, you can let them complete processing or you can terminate the utility. To stop all utilities, issue the following command:

```
-DSN1 TERM UTILITY(*)
```

- Ensure that no table spaces and index spaces in the Db2 directory (DSNDB01) or the Db2 catalog (DSNDB06) have write error ranges or deferred restart states. To determine existing restrictions, issue the following commands:

**GUIP**

```
-DSN1 DISPLAY DATABASE(DSNDB01) SPACENAM(*) RESTRICT  
-DSN1 DISPLAY DATABASE(DSNDB06) SPACENAM(*) RESTRICT
```

**GUIP**

You must have system administrator or system operator authority (specified on installation panel DSNTIPP1) to issue this command.

Recover any table spaces and index spaces that have write error ranges or deferred restart states by using the RECOVER utility.

4. Stop Db2 by issuing the following command:

**GUIP**

```
-DSN1 STOP DB2 MODE(QUIESCE)
```

**GUIP**



A user with installation system administrator (installation SYSADM) or installation system operator (installation SYSOPR) authority must enter this command.

### Related reference

- [-DISPLAY DATABASE command \(Db2\) \(Db2 Commands\)](#)
- [-DISPLAY THREAD command \(Db2\) \(Db2 Commands\)](#)
- [-DISPLAY UTILITY command \(Db2\) \(Db2 Commands\)](#)
- [-STOP DB2 command \(Db2\) \(Db2 Commands\)](#)
- [-TERM UTILITY command \(Db2\) \(Db2 Commands\)](#)

## Defining Db2 12 initialization parameters for migrating data sharing members

For migrating data sharing members after the first to Db2 12, you must define Db2 12 initialization parameters in the subsystem parameter module (DSNZPxxx) and update DDF related information in the BSDS.

### About this task

The subsystem parameter module (DSNZPxxx) and application defaults module (*dsnhdec*p) names are specified in the following DSNITPO3 installation panel fields:

- [“PARAMETER MODULE field” on page 187](#)
- [“APPL DEFAULTS field” on page 187](#)

For migrating members, the application defaults load module (*dsnhdec*p) is not reassembled for each subsequent migrating member.

### Procedure

Run job DSNTIJUZ.

Job DSNTIJUZ defines the Db2 data-only subsystem parameter module (DSNZPxxx), which consists of the expansion of the following macros: DSN6ARVP, DSN6FAC, DSN6GRP, DSN6LOGP, DSN6SPRM, and DSN6SYSP.

You might need to make the following adjustments before running the job:

- If you added a STEPLIB DD statement to the Db2 start procedures ahead of *prefix*.SDSNEXIT and *prefix*.SDSNLOAD, you can move the SYSLMOD output to that library.

**Important:** If the DSNTIJUZ job ends with return code 4, check that any warning messages can be safely ignored before continuing to the next step.

When DSNTIJUZ completes, the DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

For more information, see [“Job DSNTIJUZ: define the Db2 data-only subsystem parameter module” on page 403](#).

### Results

The DSNTINST CLIST performs calculations by using the values that you specified for some of the parameter values that you entered on the panels. These calculations appear in the macro descriptions.

[Subsystem parameters \(Introduction to Db2 for z/OS\)](#)

[Application programming default values \(Introduction to Db2 for z/OS\)](#)

[Directory of subsystem parameters, panel fields, and application default values](#)

Subsystem, installation panel fields, and application default values are settings that apply to an entire Db2 subsystem. Most but not all subsystem parameters correspond to installation panel fields. Also, some panel fields do not correspond to a subsystem parameter.

[Bootstrap data set \(Introduction to Db2 for z/OS\)](#)

## Establishing subsystem security: DSNTIJRA (optional)

Db2 lets you control access to data within Db2. Db2 also works together with outside security systems, such as RACF, that control access to the Db2 subsystem.

### About this task

Because your Db2 12 subsystem reuses the data objects from your Db2 11 subsystem, you have probably already supplied the protection that those objects need. However, you probably want to protect the new (Db2 12) Db2 data objects.

### Procedure

To establish subsystem security:

1. Customize job DSNTIJRA, as described in the job prolog.
2. Run job DSNTIJRA.

Job DSNTIJRA defines the administrative task scheduler started task module to RACF program control and defines the administrative task scheduler as a trusted context in RACF. DSNTIJRA is intended for the site security administrator, and can be run any time prior to installing or migrating to Db2 12.

3. If you have a Db2 data sharing environment, customize and run DSNTIJRA for each member of the group.

### Related concepts

[Getting started with Db2 security \(Managing Security\)](#)

## Updating Db2 address space definitions for data sharing members to z/OS: DSNTIJMA

For data sharing members after the first, you must update the z/OS system procedure libraries for the Db2 12 address spaces.

### Before you begin

The authorization ID that runs the jobs must have authority to update the target system PROCLIB. You can enter that library name on installation panel DSNTIPW in the SYSTEM PROCEDURES field. You might want to use a procedure library other than SYS1.PROCLIB for the procedures.

Examine the updates from job DSNTIJMA carefully before you run it. Also, you might have additional procedures of your own to rename.

### Procedure

Tailor and run job DSNTIJMA.

Job DSNTIJMA renames and replaces the startup procedures in the target system procedure library for the following Db2 address spaces, where *ssnm* is the subsystem name:

- system services address space (*ssnmMSTR*)
- database services address space (*ssnmDBM1*)
- DDF address space (*ssnmDIST*)
- administrative task scheduler stored procedure address space (*ssnmADMT*)
- IRLM address space (*irlmproc*)

Examine the size of the private area on the Db2 startup procedures. If necessary, modify the procedures to satisfy the requirements for environmental descriptor manager (EDM) pool size, buffers, number of data sets open, and amount of available private address space. For more information, see [“Calculating working storage requirements”](#) on page 26.

The STEPLIB concatenation of the database services address space (*ssnmDBM1*) procedure includes a commented-out DD for the IBM Language Environment data sets SCEERUN and SCEERUN2. If your system does not include SCEERUN and SCEERUN2 in the system link list, you must uncomment this DD.

## Starting Db2 12

During migration to Db2 12, start the Db2 subsystem after you run job DSNTIJMV and IPL z/OS.

### Procedure

To start Db2, complete the following steps:

1. Start Db2 from the z/OS console with the following command, where *-DSN1* is the subsystem command prefix that you defined for Db2, and *DSNZPxxx* is the name of the Db2 initialization parameter module:

```
-DSN1 START DB2 PARM(DSNZPxxx)
```

If you omit the PARM parameter, and you specified a value in the PARAMETER MODULE field on installation panel DSNTIPO3, that value is used as the parameter module name. If you did not specify a parameter module on panel DSNTIPO3, Db2 uses the default, which is DSNZPARM. See [“PARAMETER MODULE field”](#) on page 187.

If you have not run job DSNTIJRT, and the administrative task scheduler starts, the administrative task scheduler issues error message DSNA679I to report SQLCODE -805 until you run job DSNTIJRT. The administrative task scheduler starts if you specified an address space procedure name in the ADMIN SCHEDULER field on installation panel DSNTIPX.

If Db2 starts successfully, some or all of the following address spaces start, where *ssnm* is the Db2 subsystem name.

- The system services address space (*ssnmMSTR*)
- The database services address space (*ssnmDBM1*)
- The IRLM address space (*irlmproc*), where *irlmproc* is the IRLM procedure name
- Possibly, the DDF address space (*ssnmDIST*)
- Possibly, the administrative task scheduler stored procedure address space (*ssnmADMT*)

If Db2 starts successfully, the series of RESTART messages that you receive concludes with these two messages:

```
DSNR002I  RESTART COMPLETED
DSN9022I  DSNYASCP '-DSN1 START DB2' NORMAL COMPLETION
```

If Db2 does not start properly, it usually abends with a reason code that indicates where the error occurred. To find the error, check the set of definitions for the associated resource. A common cause of startup failure is that the BSDS does not match the subsystem parameter values; ensure that the correct job was run for DSNTIJUZ. Also, check that the subsystem parameter member that you specified (or used by default) when you started Db2 is the one that the DSNTIJUZ job built. Check the JCL for the Db2 startup procedure.

2. If you want to use the TSO SUBMIT command to do housekeeping and migration verification, start TSO (if it is not already started).
3. If you did not enable primary user IDs to issue Db2 commands from the z/OS console or TSO SDSF when you first installed the subsystem, take one of the following actions:

- Grant SYSOPR authority to all primary user IDs that issue Db2 commands from the z/OS console or TSO SDSF. Issue the following command:

```
GRANT SYSOPR TO userid
```

- Define RACF classes to authorize Db2 commands. Use the following statements:

```
SETR CLASSACT(DSNADM)
RDEFINE DSNADM DSN1.SYSOPR UACC(NONE)
SETR RACLIST(DSNADM) REFRESH
PERMIT DSN1.SYSOPR CLASS(DSNADM) ID(userid) ACCESS(READ)
SETR RACLIST(DSNADM) REFRESH
```

### Related reference

-START DB2 command (Db2) (Db2 Commands)

START irlmproc command z/OS IRLM) (Db2 Commands)

## Creating additional work file table spaces (optional)

During migration, you have the option of specifying on installation panel DSNTIP9 that additional work file table spaces are to be created for that member.

### Procedure

Run job DSNTIJTM.

## Verifying your Db2 12 system in V12R1M100 (optional)

Verify your Db2 12 system by running some of the sample jobs from the previous release.

### About this task

If all of the local Db2 objects from Db2 11 still exist (that is, if you have not run job DSNTEJ0), follow this procedure.

### Procedure

To verify the migration of IVP objects in your Db2 12 system:

1. Change the JOBLIB statements to point to *prefix*.SDSNLOAD.
2. Ensure that the DSN8EAE1 module that you created when you originally ran the Db2 11 sample jobs is copied to *prefix*.SDSNEXIT. DSN8EAE1 is an EDITPROC that is used by the employee sample table.
3. Edit the Db2 11 sample jobs before running them. Do not run all the sample jobs. Run only the specific jobs and job steps that are listed in the following steps.
4. Test the migration of the IVP phase 2 applications from your previous version:
  - a. DSNTEJ2A: Perform all except the first two steps of job DSNTEJ2A. Expect a return code of 4 because table spaces DSN8D11U.NEWDEPT and DSN8D11U.NEWPHONE are placed in COPY-pending states.
  - b. DSNTEJ2C: Issue only the RUN PROGRAM(DSN8BC3) PLAN(DSN8BH11) statement in step PH02CS04.
  - c. DSNTEJ2D: Issue only the RUN PROGRAM(DSN8BD3) PLAN(DSN8BD11) statement in step PH02DS03.
  - d. DSNTEJ2E: Issue only the RUN PROGRAM(DSN8BE3) PLAN(DSN8BE11) statement in step PH02ES04.
  - e. DSNTEJ2F: Issue only the RUN PROGRAM(DSN8BF3) PLAN(DSN8BF11) statement in step PH02FS03.
  - f. DSNTEJ2P: Run only step PH02PS05.
5. Test the migration of the IVP phase 3 applications from your previous version:

- a) Do not run job DSNTEJ3C or DSNTEJ3P.
- b) If you want to test the Db2 11 ISPF-CAF applications under Db2 12, place the Db2 11 SDSNSPFP panel library ahead of the Db2 12 SDSNSPFP panel library in the ISPPLIB concatenation.  
This placement is necessary so that the plans that are migrated from Db2 11 can be used. Remove the Db2 11 SDSNSPFP library from your ISPPLIB concatenation when you are finished testing the Db2 11 IVP applications under Db2 12.

## What to do next

Do not run any other Db2 11 sample jobs.

### Related tasks

Ensure that sample objects from your previous release are available

If you no longer have the IVP jobs from your previous release, you need to run the previous release's installation CLIST to regenerate them.

## Falling back and remigrating in a data sharing environment

---

In a data sharing environment, you can fall back from Db2 12 or remigrate one member at a time or all members at the same time.

**Important:** Fallback becomes impossible for any members of a data sharing group as soon as the -ACTIVATE command completes successfully to activate function level 500 or higher for any member of the data sharing group.

### Related concepts

Release coexistence in Db2 data sharing

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

### Related tasks

Activating Db2 12 new function at migration

The use of most new capabilities and enhancements that Db2 12 introduces is prevented until you activate function level 500 or higher. You cannot fallback to Db2 11 and Db2 12 cannot coexist with Db2 11 after you activate function level 500.

### Related reference

-ACTIVATE command (Db2) (Db2 Commands)

## Falling back in a data sharing environment

If you need to fall back to Db2 11, you can fall back one member of the data sharing group at a time. Other members can continue to run while one member is falling back.

### Before you begin

**Important:** Do not issue the ACTIVATE command or run job DSNTIJAF for activation of Db2 12 until you are certain that the subsystem or data sharing group can proceed on Db2 12, without the possibility of falling back to or coexistence with Db2 11. In data sharing, the ACTIVATE command has group scope. Fallback and coexistence become impossible with the successful activation of function level 500 or higher.

If all members have already been migrated to the new release, and you fall back one member at a time, the group is running in coexistence mode after the first member falls back.

### Procedure

To fall back to Db2 11:

1. Stop Db2 on the member that is falling back or stop Db2 on all members if you are falling back all members at once.
2. Run job DSNTIJFV to reactivate Db2 11 for that member or for all members.
3. Reconnect TSO, IMS, CICS to Db2 11.
4. Start Db2 11:
  - a) Enter the command **START DB2**:
    - i) Check for indoubt units of recovery.
    - ii) Check for outstanding restrictive states.
5. Verify Db2 11.
6. Repeat steps 1 through 5 for each member (or all members) of the data sharing group.

### Related concepts

#### Release coexistence in Db2 data sharing

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

### Related tasks

#### Creating an automatic restart policy

If the default action of restarting Db2 and IRLM is the action that you want, you do not need to create an automatic restart policy.

## Remigrating in a data sharing environment

You can remigrate one member at a time or all members of a data sharing group.

### Before you begin

Before you remigrate, refer to [Incompatible changes in Db2 12 \(Db2 for z/OS What's New?\)](#) because many of those considerations apply to remigration, too. Whether each consideration applies to your subsystem depends on the type of activity that took place on your Db2 11 subsystem after falling back.

Regardless of the ABIND subsystem parameter value, plans and packages continue to run on Db2 12 as bound on Db2 11, until you explicitly rebind them on Db2 12. It is best to do so only after you are certain that Db2 12 is stable and release coexistence and fallback are no longer a concern.

**Recommendation:** Avoid automatic rebinds during migration and remigration. After your remigrated system is stable, you can rebind your packages with PLANMGMT(EXTENDED). If a new package does not perform adequately, you can rebind with SWITCH(PREVIOUS) to return to the old package.

### Procedure

To remigrate your subsystem to Db2 12:

1. Check the integrity of your Db2 11 catalog and directory:
  - Run the DSN1COPY utility with the CHECK option on your catalog table spaces.
  - Run the CHECK DATA utility.
  - Run the queries in member DSNTESQ of *prefix.SDSNSAMP*.
2. Optional: Ensure that your Db2 11 DSNTIJIC job has been modified to copy new Db2 12 catalog table spaces, and then use DSNTIJIC to take an image copy of your Db2 11 catalog.  
This step is not required, but it is recommended.
3. Stop Db2 11.
4. Reconnect TSO, IMS, and CICS to Db2.

Re-establish your Db2 12 logon procedures and JCL, as well as your Db2 12 CICS and IMS connections.

5. Rebuild Db2 12 cataloged procedures.

Rename the Db2 12 procedures that were renamed by job DSNTIJFV during fallback. If job DSNTIJFV was not run, you need to rerun job DSNTIJMV. Comment out step 1 (DSNTIMP), which defines Db2 12 to z/OS, and run the job. (You do not need to define Db2 12 to z/OS a second time.)

6. Start Db2 12. Ensure that you are using your Db2 12 subsystem parameter load module.

7. Take an image copy of the Db2 12 catalog by using the DSNTIJIC job.

8. Verify your Db2 12 system.

### Related concepts

#### Release coexistence in Db2 data sharing

In *release coexistence*, applications can continue to access Db2 data while you migrate the members of the data sharing group. However, you must weigh the benefit of continuous availability against the operational costs of running in coexistence. Most new capabilities and enhancements in Db2 12 remain unavailable during coexistence, and additional system management considerations apply.

### Related tasks

#### Falling back in a data sharing environment

If you need to fall back to Db2 11, you can fall back one member of the data sharing group at a time. Other members can continue to run while one member is falling back.

#### Re-enabling Db2 data sharing

Re-enabling Db2 data sharing involves a subset of the original tasks that were required to enable data sharing. You cannot use the enabling process of installation to re-enable Db2 data sharing.

## Activating Db2 function levels in a data sharing

After all active members in the data sharing group are running Db2 12, you can activate function level 500 or higher to enable the use of new capabilities.

### Before you begin

Ensure that all active members are migrated to and running on Db2 12. For instructions, see [“Migrating an existing data sharing group to Db2 12”](#) on page 705

**Important:** Before you activate function level 500 or higher for the first time, read [“Activating Db2 12 new function at migration”](#) on page 545.

### About this task

Activating a Db2 12 function level for any single group member activates that function level on all members.

### Procedure

Complete one of the following tasks:

- [“Activating Db2 12 new function at migration”](#) on page 545
- [Activating Db2 12 function levels \(Db2 for z/OS What's New?\)](#)
- [Activating Db2 function levels by using z/OSMF \(Db2 for z/OS What's New?\)](#)

### Related tasks

[Adopting new capabilities in Db2 12 continuous delivery \(Db2 for z/OS What's New?\)](#)

### Related reference

[Db2 12 function levels \(Db2 for z/OS What's New?\)](#)

# Starting inactive data sharing group members from earlier releases in Db2 12

---

After migration to Db2 12, you might be able to activate data sharing group members that were last started in earlier Db2 releases.

## About this task

When you activate function level 500 or higher in a data sharing group, all active group members must be running on Db2 12.

## Procedure

To start data sharing members that were last started in a previous Db2 release:

1. If the inactive member was deactivated, reactivate it by following the instructions in [Restoring deactivated data sharing members \(Db2 Data Sharing Planning and Administration\)](#).
2. Convert the BSDS to the format supported by Db2 12. For example, you might need to complete the following conversions:
  - a) If the member was last started in a Db2 release before DB2 9, run the DSNJCNVB utility to convert the BSDS of the inactive member.  
If the inactive member was never started in the data sharing group after DB2 version 7, you must use the DSNJCNVB job from a DB2 9 or a newer release to complete this step.
  - b) If the member was last started in a release before Db2 12, and BSDS of the inactive data sharing member has not been converted to use the extended RBA and LRSN fields, run the DSNJCNVT utility complete the conversion.

You can use the DSNTIJCB sample job to run the DSNJCNVT utility. You must run the DSNJCNVB utility before you complete this step.

If the member was last started in a release earlier than Db2 11, the BSDS conversion must be completed. You can use the DSNJU004 (print log map) utility to determine whether the BSDS for that member has already been converted to support the extended format. If the output contains the following message, the BSDS conversion is required: DSNJCNVT CONVERSION PROGRAM HAS NOT RUN DDNAME=SYSUTx

3. Migrate the inactive member to each earlier Db2 release before by following the instructions for those releases, and then migrate the inactive member to Db2 12 by following the instructions in [“Migrating subsequent members of a group to Db2 12”](#) on page 707.
4. Ensure that the member has at least the minimum required catalog level and code level for the data sharing group.  
You can use the DISPLAY GROUP command to determine the required code and catalog levels. For more information about code and catalog levels, see [Db2 12 function levels \(Db2 for z/OS What's New?\)](#).
5. Start the inactive member.
6. Restart active members so that they can record the updated status of the reactivated member.

## Related concepts

[Starting a data sharing member \(Db2 Data Sharing Planning and Administration\)](#)

## Related tasks

[Deactivating data sharing members \(Db2 Data Sharing Planning and Administration\)](#)

[Convert the BSDS, Db2 catalog, and directory to 10-byte RBA and LRSN format](#)

If the bootstrap data set (BSDS) is not already converted to use the 10-byte RBA and LRSN fields, you must convert it before you start Db2 in Db2 12. By default, the BSDS of a Db2 11 subsystem is initialized to use 6-byte RBA and LRSN fields. It is strongly recommended that you convert the catalog and directory to the 10-byte format before or soon after you convert the BSDS to the 10-byte format.



## Related reference

[DSNJCNVB \(Db2 Utilities\)](#)

[Job DSNTIJCB](#)

Job DSNTIJCB supports the DSNJCNVT stand-alone utility for converting the BSDS records to support 10-byte RBA and LRSN fields.

[DSNJCNVT \(Db2 Utilities\)](#)

[-START DB2 command \(Db2\) \(Db2 Commands\)](#)

[DSNJU004 \(print log map\) \(Db2 Utilities\)](#)

## Job DSNTIJCB

Job DSNTIJCB supports the DSNJCNVT stand-alone utility for converting the BSDS records to support 10-byte RBA and LRSN fields.

DSNTIJCB consists of the following job steps:

### DSNTDEF

Activates IDCAMS to define new BSDS data sets with CLUSTER, DATA, and INDEX components under the temporary names *prefix.BSDS01.NEW* and *prefix.BSDS02.NEW*.

### DSNTCNVT

Activates DSNJCNVT to read records from the existing BSDS, converts them to support the extended RBA and LRSN format, and writes them into the *prefix.BSDS01.NEW* and *prefix.BSDS02.NEW* data sets.

### DSNTRENO

Renames the existing BSDS data sets to backup names, *prefix.BSDS01.OLDFMT* and *prefix.BSDS02.OLDFMT*.

### DSNTRENN

Renames *prefix.BSDS01.NEW* and *prefix.BSDS02.NEW* to *prefix.BSDS01* and *prefix.BSDS02*.

No job step can run unless all preceding job steps complete with return code 0.

When the installation CLIST customizes DSNTIJCB, it substitutes the BSDS names that are specified in fields COPY 1 NAME and COPY 2 NAME on installation panel DSNTIPH for *prefix.BSDS01* and *prefix.BSDS02*. The fields allow each name to support names up to 30 bytes in length, so no special handling is needed to rename the existing data sets.

## Related concepts

[The extended 10-byte RBA and LRSN in Db2 12 \(Db2 for z/OS What's New?\)](#)

## Related tasks

[Convert BSDS records to the extended 10-byte format: DSNTIJCB](#)

You must convert the BSDS to a new format that supports 10-byte RBA and LRSN fields before you start Db2 in Db2 12. By default, the BSDS of a Db2 11 subsystem is initialized in the 6-byte, pre-Db2 11 format.

## Testing the data sharing group

---

When you installed Db2, sample objects were created in job DSNTTEJ1. The DSNTESD member of *prefix.SDSNSAMP* contains SQL statements that refer to these objects. Use these SQL statements to test group buffer pool caching, global lock serialization, and concurrency in the data sharing group.

Perform these tests after installing several data sharing members.

## Testing group buffer pool caching

You can use SQL statements in member DSNTESD to verify that the group buffer pool caching operates correctly.

### Procedure

To verify that the group buffer pool operates correctly:

1. Run SPUFI on more than one data sharing member, using member DSNTESD as the input data set. Specify AUTOCOMMIT=YES on the SPUFI panel.

Run SPUFI on the different members serially, a few seconds apart if possible. (The runs must be close enough together to avoid having Db2 close the page set because of infrequent updates. The amount of time before Db2 switches the page set from read-write to read-only after the last update is specified by the PCLOSET subsystem parameter setting. See [“RO SWITCH TIME field \(PCLOSET subsystem parameter\)”](#) on page 291.

By running the SQL statements serially, Db2 detects inter-Db2 read/write interest on the table space and index and uses the group buffer pool.

2. Verify that ITEM\_COUNT increases by five after each run.
3. Issue the following command to determine whether the table space and index are using the group buffer pool:

**GUI**

```
DIS DB(DSN8D12A) SPACENAM(DSN8S12S,XPARTS) LOCKS
```

**GUI**

If the P-lock state is IX or SIX, then the table space and index are group buffer pool dependent, which is the correct state.

4. Issue the following command to display the statistics for GBP0:

**GUI**

```
DIS GBPOOL(GBP0) GDETAIL
```

**GUI**

In the group detail statistics, look for non-zero values in the READS and WRITES values of the display. This indicates that Db2 is using the group buffer pool successfully for caching.

## Testing global lock serialization

Use the SQL statements in member DSNTESD to verify that locks are acquired and released correctly across multiple data sharing members.

### Procedure

To test global lock serialization:

1. Run SPUFI, using member DSNTESD as input, on **member 1**. Specify AUTOCOMMIT=NO.

Because you have inserted data into DSN8C10.PARTS but have not committed, **member 1** holds global locks.

2. Run SPUFI, using member DSNTESD as input, on **member 2**. Specify AUTOCOMMIT=NO.

Because **member 1** holds global locks, **member 2** must wait to perform the insert.

3. In less than one minute, commit on **member 1**.

(If you wait too long to commit, **member 2** will experience a lock timeout.)

The global locks should be released, and **member 2** should be able to proceed. Verify that ITEM\_COUNT has increased by five.

## Testing concurrency

You can use the SQL statements in member DSNTESD to test concurrency within the data sharing group.

### Procedure

To test concurrency:

1. Run SPUFI concurrently on different data sharing members.

Specify AUTOCOMMIT=YES.

Global locking ensures that inserts to DSN8C10.PARTS are coordinated across data sharing members.

2. Verify that ITEM\_COUNT increases by five each time the run completes successfully.

## Disabling and re-enabling Db2 data sharing

---

Disabling Db2 data sharing is a complex procedure and is very disruptive. Do not attempt to disable Db2 data sharing without a thorough understanding of the process.

Do not make disabling Db2 data sharing part of your contingency plans for handling recovery situations. For temporary bypasses to data sharing problems, try moving to one-way data sharing, which involves stopping all but one member and having that member perform the work for the group. If one-way data sharing does not work, your data sharing problem might be resolved by performing a group restart.

The disabling procedure is included in this section for completeness, but it should rarely be used. Situations in which it might be necessary to disable Db2 data sharing are:

- You made a strategic decision to move away from a data sharing environment.
- One-way data sharing is not working.

After you disable Db2 data sharing, only one member of the data sharing group can access the previously shared data. That member is called the *surviving member*. Before you disable data sharing, all page sets must be converted to extended format. For details, see [What to do before RBA or LRSN limits are reached \(Db2 Administration Guide\)](#).

If you plan to re-enable data sharing for a group, do not change any group-wide information in the BSDS of the surviving member. Group-wide information includes the catalog alias name and the database password. It also includes the DDF name and password information, even if you do not plan to use DDF when you re-enable Db2 data sharing. If you change any of this information, you need to change the information in every member's BSDS before you start the group.

### Related tasks

[Converting page sets to the 10-byte RBA or LRSN format \(Db2 Administration Guide\)](#)

[Accessing currently committed data to avoid lock contention \(Db2 Performance\)](#)

## Disabling data sharing

You should only disable data sharing with caution and with a thorough understanding of the process and results. Very few situations create a need to disable Db2 data sharing, such as if you have data sharing problems and one-way data sharing does not work.

### Before you begin

All page sets must be converted to extended format. For details, see [What to do before RBA or LRSN limits are reached \(Db2 Administration Guide\)](#).

### About this task

The procedure to disable data sharing ensures that the most recent versions of all pages are externalized from the group buffer pool to disk. Db2 does not use the group buffer pool after data sharing is disabled. You must ensure that data is written to disk, or else you lose data when you start Db2 after disabling data sharing.

**Important:** Other members' logs are not available to the surviving member after you disable data sharing.

You must also ensure that there is no need to recover data from information that is contained in other members' logs after you disable data sharing. To prevent the surviving member from applying inconsistent updates during recovery processing, a cold start is required to disable data sharing.

**Important:** Do not attempt to go through the installation process to re-enable data sharing after you have disabled it.

### Procedure

To disable data sharing and return to a non-data-sharing environment:

1. Decide which member will be the surviving member of the group. The surviving member is the only member that can access previously shared data.
2. Stop all members by entering the following command for each member of the data sharing group:

**GUI**

```
STOP DB2 MODE(QUIESCE)
```

**GUI**

3. Start the surviving member in maintenance mode by using the following command:

**GUI**

```
START DB2 ACCESS(MAINT)
```

**GUI**

4. Make sure that data is consistent.

Enter the following commands from the surviving member of the group. Do not proceed to the next step until all problems are resolved.

- DISPLAY GROUP

Ensure that the status of the surviving member is ACTIVE and that the status of all other members is QUIESCED. If the status of a non-surviving member is not QUIESCED, take the following actions, depending on the member's status:

- If the member's status is FAILED, restart and then stop the member.
- If the member has castout problems, indoubt units of recovery, or outstanding resynchronization problems, start that member in maintenance mode and fix the problem.

- DISPLAY UTILITY(\*)

If any utility work remains for any member of the group, restart that member with ACCESS(MAINT) and either stop the utility or let it finish.

- DISPLAY DATABASE(\*) SPACENAM(\*) RESTRICT

If any restricted table spaces or index spaces (such as write error ranges, recovery pending status, or logical page list entries) exist, recover them from the surviving member.

5. Stop the surviving member by using the following command:

**GUI**

```
STOP DB2 MODE(QUIESCE)
```

**GUI**

6. Stop any IRLMs that have not stopped by using the following command:

**GUI**

```
STOP irmlproc
```

**GUI**

7. Dismantle the data sharing group.

- a) Enter the following command to display the structures for the data sharing group:

```
D XCF,STRUCTURE,STRNAME=grpname*
```

- b) For all structures that are still allocated (STATUS:ALLOCATED) and that still have connections (which appear as FAILED PERSISTENT), enter the following command to force the connections off of those structures:

```
SETXCF FORCE,CONNECTION,STRNAME=strname,CONNNAME=ALL
```

**Important:** If your site is running z/OS with APAR OA02620 applied, you do not need to force failed-persistent connections off of the lock structure. When you forcibly deallocate the lock structure (see the next step), the system deletes failed-persistent connections to the structure for you.

- c) Delete all the Db2 coupling facility structures by using the following command for each structure:

```
SETXCF FORCE,STRUCTURE,STRNAME=strname
```

- d) Edit the JCL in job DSNTIJGF to point to the correct BSDS data sets.

DSNTIJGF is a change log inventory job that sets up the surviving member for a cold start.

**Important:** Do not change the hex values that appear in the change log inventory CRESTART control statement. They are not real RBA values.

- e) Run job DSNTIJGF.

After you run this job, do not try to restart any of the non-surviving members. None of those members can start successfully.

8. Change the IRLM procedure to SCOPE=LOCAL.

9. Start the surviving member with ACCESS(MAINT).

Specify the old DSNZPxxx from the non-data sharing environment, where the DSHARE subsystem parameter is set to NO. If you do not have the old DSNZPxxx or if the surviving member is not the originating member, reassemble the surviving member's subsystem parameters with DSHARE=NO in the invocation of the DSN6GRP macro. Also, comment out all steps from the DSNTIJUZ job except for those that reassemble and link-edit the subsystem parameters.

When you start Db2 after running DSNTIJGF, respond with Y to a cold start prompt (message DSNJ246I on the z/OS console).

This is a cold start because Db2 increases the log RBA to a value higher than any LRSN used while sharing data. From this point on, your RBAs look like LRSNs.

10. Edit and run job DSNTIJFT, if necessary, to ensure that the surviving member's work file database is DSNDB07.

The surviving member must use DSNDB07 as its work file database. If the work file database for the surviving member is not DSNDB07, drop that work file database and run job DSNTIJFT.

11. Verify that the surviving member works by running a subset of the Db2 12 installation verification sample jobs.
12. To establish a new recovery point, take a full or incremental image copy or non-Db2 backup of all data.

Run job DSNTIJIC to image copy the Db2 catalog and directory.

**Recommendation:** Perform this step as soon as possible after data sharing is disabled.

13. Stop and restart Db2 for normal unrestricted access.

## What to do next

After disabling Db2 data sharing, you can continue to use the group attachment name or subgroup attachment name. The group attachment name or subgroup attachment name does not need to be changed to the surviving member's subsystem ID.

### Related concepts

[Data recovery after disabling Db2 data sharing](#)

After Db2 data sharing is disabled, you cannot recover to the current point or to a previous point in time if that recovery depends on any portion of the log that was made before you disabled data sharing.

### Related tasks

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## Data recovery after disabling Db2 data sharing

After Db2 data sharing is disabled, you cannot recover to the current point or to a previous point in time if that recovery depends on any portion of the log that was made before you disabled data sharing.

Therefore, if the table space is updated between the time of the copy and the time you disabled data sharing, Db2 does not let you use that copy as the basis for recovery. This is why you should create a new recovery point as soon as possible after you have disabled data sharing.

## Re-enabling Db2 data sharing

Re-enabling Db2 data sharing involves a subset of the original tasks that were required to enable data sharing. You cannot use the enabling process of installation to re-enable Db2 data sharing.

### About this task

The following output from the original Db2 data sharing enabling procedure remains intact after disabling Db2 data sharing and does not need to be re-created or re-specified:

- Data sharing subsystem parameters (output from the CLIST processing when enabling data sharing)
- XCF definitions
- Coupling facility definitions
- RACF definitions
- Db2 catalog and directory

## Procedure

To re-enable Db2 data sharing:

1. Edit the JCL in job DSNTIJGF.

DSNTIJGF is a change log inventory job that sets up the BSDS of the surviving member for data sharing.

2. Run job DSNTIJGF.
3. Change the IRLM procedure to SCOPE=GLOBAL.
4. Start the surviving member with the subsystem parameters that were used when data sharing was originally enabled.

During startup, you are asked to start all other members that were not quiesced at the time that you disabled Db2 data sharing. You must start all these members.

5. Edit and run job DSNTIJFT on the surviving member to re-create the work file database for data sharing.

See the directions in the prologue of job DSNTIJFT for information about editing this job to re-enable Db2 data sharing.





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# Chapter 9. Verifying successful Db2 12 installation or migration with sample applications

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## Before you begin



### Attention:

When migrating from Db2 11, do not run the Db2 12 IVP jobs before activating new function as described in [“Activating Db2 12 new function at migration” on page 545](#). That is, activate function level V12R1M500 or V12R1M501 before running the Db2 12 IVP jobs.

Until you complete this task, continue to use sample applications such as DSNTIAUL, DSNTPE2, and DSNTPE4 from Db2 11.

## About this task

### Recommendations:

- During verification, run all sample applications under the same user ID. This user ID must have SYSADM authority. Otherwise, errors might occur.
- Run the IVP jobs with Db2 started in unrestricted mode because restricted mode (ACCESS(MAINT)) does not allow use of stored procedures and user-defined functions.
- If you are installing a data sharing group, run the IVP jobs after you install or migrate the originating system. You do not need to run the IVP jobs after you enable the originating system or after you install a new data sharing member.
- You must use the same compiler for each job. For example, if you use IBMCOB for DSNTPE2C, you must use IBMCOB for all COBOL verification programs.
- After you designate a client and server subsystem, run all verification jobs on the same client and server subsystems.

## Procedure

To verify a successful installation or migration:

1. For testing purposes, identify one local subsystem to act as the client and one remote subsystem to act as the server. Both subsystems must be at Db2 12.  
Although not recommended, the client and server subsystem can be the same if a remote subsystem is not available for testing.
2. Ensure that the client subsystem is specified in the Db2 LOCATION NAME field of installation panel DSNTIPR.
3. Ensure that the server subsystem is specified in the REMOTE LOCATION field of installation panel DSNTIPY.
4. Identify the IVP jobs that you need to run based on the attachment facilities you installed, the languages you use, and whether the sample objects exist.
5. Edit the sample jobs as necessary based on the information that is provided for the jobs.
6. Run the necessary IVP jobs.

## What to do next

When you complete the verification procedure, save the verification objects. You will need them when you migrate to the next release of Db2.

## Related tasks

### [Enabling Db2 data sharing](#)

The enabling process allows an existing Db2 subsystem to be the originating member of a data sharing group; it does not allow you to change the subsystem name.

### [Migration step 28: Verify migration of Db2 11 IVP objects to Db2 12 \(optional\)](#)

Verify the migration of IVP objects to Db2 12 by running some of the sample jobs from your previous release.

### [Installation step 25: Verify successful installation of Db2 12](#)

You can run the sample applications to verify that your installation process was successful.

### [Verifying successful migration to Db2 12](#)

After you activate function level 500, you can run the sample applications to verify that your migration process was successful.

## Installation verification phases and programs

In each phase of the installation verification procedure (IVP), you must run specific programs. These programs need to be run sequentially by phase because the output of some jobs is used as input for subsequent jobs.

The IVP consist of eight phases: seven verification phases and one cleanup phase that drops sample objects (Phase 0). Each of the seven verification phases tests one or more Db2 functions or attachment facilities. Certain phases of the verification procedure might not apply to the environment in which your Db2 subsystem operates, so you might not need to complete all phases. In some cases, the steps and return codes differ when you run the fallback release and Db2 12 phases. These differences are noted under the proper phase.

Run Phase 0 (job DSNTTEJ0) only if you want to remove all the verification processing that you have completed so that you can begin the verification procedure again. Phases 1-3 test the TSO and batch environments, including user-defined functions. Phase 4 is for IMS users only, and Phase 5 is for CICS users only. Phase 6 sets up the sample tables and stored procedures for distributed processing. Phase 7 tests the LOB feature with sample tables, data, and programs.

*prefix*.SDSNSAMP contains the program source.

Each phase consists of one or more batch jobs and some phases also consist of online activities. You run the same jobs regardless of whether you are installing Db2 for the first time or migrating to Db2 12. The installation CLIST tailored and loaded these jobs into *prefix*.NEW.SDNSAMP, which you created during installation or migration to Db2 12. The verification jobs use source code and data from the untailored *prefix*.SDSNSAMP library. Most Db2 sample objects have unique names to differentiate them from objects of previous releases. This allows sample programs for multiple releases to coexist. The JCL that is provided for IMS sets up transaction identifiers for the sample applications.

The following table shows the programs and jobs that are run in each phase of the verification procedure. These jobs are designed to run with minimal interaction on your part. However, before running these jobs, you should make any modifications that are suggested in the information about each job.

Table 64. Relationship of IVP phases to programs

Phase	Job	Program	Description
0	DSNTEJ0	DSNTIAD	Remove sample applications and sample schema authorizations
1	DSNTEJ1	DSNTIAD	Create tables
		DSN8CA	Assembler interface to call attach facility
		DSN8EAE1	Edit exit routine
		DSN8HUFF	Huffman compression exit routine

Table 64. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
		DSNUTILB	Utilities
	DSNTEJ1L	DSNTEP2	Dynamic SQL program
	DSNTEJ1P	DSNTEP2	Dynamic SQL program
	DSNTEJ1S <sup>1</sup>	DSNHSP	See note 1
	DSNTEJ1T <sup>2</sup>	DSNUPROC	See note 2
	DSNTEJ1U	DSNTIAD	Create Unicode table
		DSNUTILB	Load Unicode table
		DSNTEP2	Select Unicode table
2	DSNTEJ2A	DSNTIAD	Grant execution
		DSNTIAUL	Unload and load tables
		DSNUTILB	Utilities
	DSNTEJ2C	DCLGEN	Generate declarations
		DSNTIAD	Grant execution
		DSN8BC3	COBOL phone application
	DSNTEJ2D	DSNTIAD	Grant execution
		DSN8BD3	C phone application
	DSNTEJ2E	DSN8MDG	Prepare error message routine
		DSN8BECL	Prepare classes used by C++ phone application
		DSNTIAD	Grant execution
		DSN8BE3	C++ phone application
	DSNTEJ2F	DSNTIAD	Grant execution
		DSN8BF3	Fortran phone application
	DSNTEJ2H	DSN8EDXR	Sample application to format and display an XML record
		DSN8EDXU	Sample application to format and update an existing XML record
		DSN8EDXI	Sample application to insert an XML record
		DSN8EDXD	Sample application to delete an XML record
	DSNTEJ2P	DCLGEN	Generate declarations
		DSNTIAD	Grant execution
		DSN8BP3	PL/I phone application
	DSNTEJ2U	DSNTIAD	Register sample user-defined functions
		DSN8DUAD	C program for ALTDAT function (current date)

Table 64. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
		DSN8DUCD	C program for ALTDAT function (given date)
		DSN8DUAT	C program for ALTTIME function (current time).
		DSN8DUCT	C program for ALTTIME function (given time)
		DSN8DUCY	C program for CURRENCY function
		DSN8DUTI	C program for TABLE_NAME, TABLE_SCHEMA, and TABLE_LOCATION functions
		DSN8EUDN	C++ program for DAYNAME function
		DSN8EUMN	C++ program for MONTHNAME function
		DSNTEP2	Dynamic SQL program
		DSN8DUWF	User-defined table function sample
		DSN8DUWC	C program on client for user-defined table function sample
3		SPUFI	Sample SPUFI input
	DSNTEJ3C	DSNTIAD	Grant execution
		DSN8CC	COBOL interface to call attachment facility
		DSN8SCM	COBOL connection manager
		DSN8SC3	COBOL phone application
		DSN8HC3	COBOL organization application
	DSNTEJ3M	DSNTIAD	Drop sample MQT objects, create sample MQT objects, grant authority to MQT objects, and populate sample MQT tables
		DSNUTILB	Produce statistics for MQT
		DSNTEP2	Process EXPLAINS on sample MQT tables
	DSNTEJ3P	DSNTEP2	Dynamic SQL application
		DSNTIAD	Grant execution
		DSN8SPM	PL/I connection manager
		DSN8SP3	PL/I phone application
4	DSNTEJ4C	DSNTIAD	Grant execution
		DSN8ICx	Organization application
		DSN8MCx	Copy code
	DSNTEJ4P	DSNTIAD	Grant execution
		DSN8IPx	Organization, project applications
		DSN8MPx	Copy code

Table 64. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
5	DSNTEJ5A	DSNTIAC	CICS SQLCA formatter front-end
	DSNTEJ5C	DSNTIAD	Grant execution
		DSN8CCx	Organization application
		DSN8MCx	Copy code
	DSNTEJ5P	DSNTIAD	Grant execution
		DSN8CPx	Organization, project applications
		DSN8MPx	Copy code
6	DSNTEJ6	DSNTIAD	Update location column in the department table to the sample location entered at installation time
	DSNTEJ6D	DSN8ED1	Compile, link-edit, bind, and run a sample application program that calls a stored procedure
	DSNTEJ6O	DSN8DTS1, DSN8DTS2	Create and run sample for IBM Text Search for Db2 for z/OS
	DSNTEJ6P	DSN8EP1	Invoke the sample stored procedure
	DSNTEJ6R	DSN8ED8	Compile, link-edit, bind, and run a sample application that calls DSNUTILU, the Db2 Utilities Unicode parser stored procedure
	DSNTEJ6S	DSN8EP2	Create sample stored procedure
	DSNTEJ6T	DSN8ED2	Register, prepare, and bind the stored procedure sample application
	DSNTEJ6U	DSN8EPU	Compile, link-edit, bind, and run a sample application that calls DSNUTILS, a stored procedure for executing Db2 utilities
	DSNTEJ6V	DSN8EE0	C++ class that calls DSNTIAR
		DSN8EE1	C++ class that calls DSNUTILS
		DSN8EE2	C++ client for DSN8EE1
	DSNTEJ6W	DSN8ED6	Call the WLM_REFRESH stored procedure
	DSNTEJ6X	DSN8EDA	Compile, link-edit, bind, and run a sample application that calls DSNUTILS, a stored procedure for executing Db2 utilities
	DSNTEJ6Z	DSN8ED7	C class that calls ADMIN_INFO_SYSPARM stored procedure
	DSNTEJ61	DSN8EC1	Create sample ODBA stored procedure
	DSNTEJ62	DSN8EC2	Invoke sample ODBA stored procedure
	DSNTEJ63	DSN8ES1	Run sample external SQL procedure that calculates employee earnings.
	DSNTEJ64	DSN8ED3	Call the sample external SQL procedure, DSN8ES1 from a client

Table 64. Relationship of IVP phases to programs (continued)

Phase	Job	Program	Description
	DSNTEJ65	DSN8ED4	Call the external SQL procedure processor, DSNTPSMP
		DSN8ES2	Run external SQL procedure that calculates employee bonuses
		DSN8ED5	Call external SQL procedure, DSN8ES2
	DSNTEJ66	DSN8ES3	Create and alter a sample native SQL procedure
		DSN8ED9	Prepare and execute a sample caller of the sample native SQL procedure
7	DSNTEJ7	DSNTIAD	Create sample LOB table
		DSNTIAD	Create synonyms, grant access to LOB tables
		DSNUTILB	Load sample LOB table
		DSNUTILB	Produce statistics for LOB table spaces
	DSNTEJ71	DSNTIAD	Grant access to plans
		DSN8DLPL	Populate sample LOB table with BLOB data
		DSN8DLTC	Verify contents of LOB table
	DSNTEJ73	DSNTIAD	Grant access to plans
		DSN8DLRV	C employee resume application
	DSNTEJ75	DSNTIAD	Grant access to plans
		DSN8DLPV	C employee photo application
	DSNTEJ76	DSN8CLPL	Create COBOL LOB sample table
		DSN8CLTC	Create synonyms, grant access to COBOL LOB tables
	DSNTEJ77	DSN8CLRV	Load sample COBOL LOB table
	DSNTEJ78	DSN8CLPV	Produce statistics for COBOL BLOB table spaces

**Notes:**

1. Job DSNTEJ1S, which contains the sample JCL to run the schema processor, is not a part of the sample applications to verify installation.
2. Job DSNTEJ1T, which adds rows to SYSIBM.SYSSTRINGS for character conversion purposes, is not a part of the sample applications to verify installation.

**Related concepts**

Printing options for the sample application listings

The source statements that are contained in *prefix*.SDSNSAMP can be printed using ISPF facilities, IEBTPCH, or local facilities.

**Related tasks**

Falling back to Db2 11

If you encounter serious errors after tailoring the catalog and directory for Db2 12, you can return to Db2 11. Fallback to Db2 11 is only supported if Db2 12 is at function level 100.

[Creating a schema by using the schema processor \(Db2 Administration Guide\)](#)

## Planning for verification

Before performing any of the verification phases, you must make certain decisions about your verification strategy.

### About this task

Db2 system administrators and system administrators for ISPF, TSO, batch, IMS, and CICS must be involved in these decisions.

### Procedure

To prepare for verification

- Determine the verification phases that you plan to perform.

Examine the description of each verification phase in this topic, and determine which phases apply to your needs.

- Identify any phases that you want to modify before you perform them.

Verification is designed to run with little interaction on your part. This topic does not discuss how to modify any of the phases, but you can adapt any of the seven phases to your needs. If this is your intent, identify and describe any modifications you plan to make.

- Establish additional testing steps to complete the verification.

The verification phases and the jobs that you run to perform them are valuable tools for testing Db2. They are not a substitute for a thorough subsystem test. You must plan and perform your own additional testing to complete the verification. To help you assess which additional tests might be necessary, examine the sample applications that are provided with Db2.

- Start any Db2 databases that are not currently started.

## COBOL options to use with the installation verification procedures

The Db2 COBOL samples can be run with some compiler options, which control compilation.

IBM tested these options, which are shown in the table below.

If you have a problem executing the Db2 COBOL samples, ensure that your compiler options are consistent with the Enterprise COBOL options in the table below. Remember that if you are using CICS, the options that you need to use depend on the CICS environment. To verify that you are using the correct options in your CICS environment, refer to [COBOL programming restrictions and requirements](#).

COBOL options	COBOL options	COBOL options
ADV	NOEXIT	NOTYPECHK
BUFSIZE(4096)	NOFASTSRT	NOVBREF
DATA(31)	NOFLAGMIG	NOWORD
FLAG(I)	NOFLAGSTD	NOXREF
INTDATE(ANSI)	NOIDLGEN	NUMPROC(NOPFD)
LANGUAGE(EN)	NOLIB	OBJECT
LINECOUNT(60)	NOLIST	OUTDD(SYSOUT)
NOADATA	NOMAP	PGMNAME(LONGUPPER)
NOAWO	NONAME	QUOTE

COBOL options	COBOL options	COBOL options
NOCMPR2 NOCOMPILE(S) NOCURRENCY NODBCS NODECK NODUMP NODYNAM	NONUMBER NOOFFSET NOOPTIMIZE NOSEQUENCE NOSSRANGE NOTERM <sup>1</sup> or TERM <sup>2</sup> NOTEST	RENT <sup>3</sup> RMODE(AUTO) SIZE(MAX) SOURCE SPACE(1) TRUNC(STD) ZWB

**Notes:**

<sup>1</sup> Refers to jobs DSNTEJ2C, DSNTEJ3C, and DSNTEJ4C only.

<sup>2</sup> Refers to job DSNTEJ5C only.

<sup>3</sup> See the CICS documentation for actual options to use.

For more detailed instructions, see [Enterprise COBOL for z/OS and Language Environment Programming Guide \(z/OS Language Environment Programming Guide\)](#).

**Related reference**

[DSNH command procedure \(TSO CLIST\) \(Db2 Commands\)](#)

## C and C++ language options to use with the installation verification procedures

The Db2 C and C++ samples can be run with some compiler options.

These options, which were tested by IBM, are shown in the following tables.

If you have a problem executing the Db2 C and C++ samples, ensure that your compiler options are consistent with the options in the following tables.

*Table 65. C language options*

Options	Options	Options	Options	Options
NOAGGR	NOEVENTS	NOHWOPTS	NOMEMORY	NOPPONLY
NOALIAS	EXECOPS	NOINLINE <sup>3</sup>	NESTINC(255)	REDIR <sup>1</sup>
ARGPARSE <sup>1</sup>	NOEXPMAC	LIST	OBJECT	NORENT
NOCHECKOUT <sup>2</sup>	NOEXPORTALL	NOLOCALE	NOOE <sup>1</sup>	NOSEARCH
NOCSECT	FLAG(I)	NOLONGNAME	NOOFFSET	NOSHOWINC
NODECK	NOGONUMBER	NOLSEARCH	NOOPTIMIZE	SOURCE
NODLL	HALT(16) <sup>1</sup>	MAXMEM(2000) <sup>4</sup>	PLIST(HOST <sup>1</sup> )	SPILL(128) <sup>4</sup>
NOSSCOMM	START	TARGET(LE)	TERMINAL	NOTEST <sup>5</sup>
NOUPCONV	XREF			

**Note:**

- <sup>1</sup> This option is used by IBM C/C++ for z/OS.
- <sup>2</sup> NOPPTRACE, PPCHECK, GOTO, ACCURACY, PARM, NOENUM, NOEXTERN, TRUNC, INIT, NOPORT, GENERAL.
- <sup>3</sup> AUTO, NOREPORT, 100, 1000.
- <sup>4</sup> This option is used only by IBM AD/Cycle C/370 V1R2.
- <sup>5</sup> SYM, BLOCK, LINE, NOPATH.

The table below contains the C++ language options.



Table 66. C++ language options

Options	Options	Options	Options	Options
ARGPARSE	NOINFO	NESTINC(255)	NOSHOWINC	TERMINAL
NOATTRIBUTE	NOINLRPT	OBJECT	NOSOM	NOTEST
NOCSECT	LANGLVL(EXTENDED)	NOOE	SOMEINIT	XREF
EXECOPS	NOLIST	NOOFFSET	NOSOMGS	HALT(16)
NOEXPMAC	NOLOCALE	OPTIMIZE(0)	SOURCE	MEMORY
NOEXPORTALL	LONGNAME	PLIST(HOST)	NOSRCMSG	NOSEQUENCE
FLAG(I)	MARGINS	NOPPONLY	START	TEMPINC
NOGONUMBER		REDIR	TARGET(LE)	

The installation CLIST customizes C++ compiler parameters in sample job DSNTEJ2E if you have specified C++ for MVS/ESA V3R2 or a subsequent release on panel DSNTIPU.

## PL/I options to use with the installation verification procedures

The Db2 PL/I samples can be run with some compiler options, which control compilation.

These options, which were tested by IBM, are shown in the table below.

If you have a problem executing the Db2 PL/I samples, ensure that your compiler options are consistent with these options.

Table 67. Enterprise PL/I options

Options	Options	Options	Options	Options
CHARSET(60,EBCDIC)	LINECOUNT(55)	LMESSAGE	MARGINS(2,72,0)	NOAGGREGATE
NOATTRIBUTES	NOCOMPILE(S)	NOCOUNT	NOESD	NOFLOW
NOGONUMBER	NOGOSTMT	NOGRAPHIC	NOIMPRECISE	NOINCLUDE
NOINTERRUPT	NOLIST	NOMAP	NOMARGINI	NONEST
NONUMBER	NOOFFSET	NOOPTIMIZE	NOSTORAGE	NOSYNTAX(S)
NOTERMINAL	NOXREF	OBJECT	ODECK	SEQUENCE(73,80)
SIZE(506756)	SOURCE	STMT		

## Phase 0: Deleting the sample objects (DSNTEJ0)

Phase 0 consists of one job, DSNTEJ0. It frees all plans, drops all objects, and deletes data sets so that Phase 1 can be run again.

Run Phase 0 (job DSNTEJ0) only if you want to remove all the verification processing that you have done so far so that you can begin the verification procedure again. When you complete the verification procedure, save the verification objects; you need them when you migrate to the next release of Db2.

If a sample application abends while running a utility, ensure that the utility is terminated before attempting to rerun the job.

Even when DSNTEJ0 runs successfully, some of the FREE, DROP, and DELETE commands often fail because the object was not created earlier. You can ignore these errors, even though they might generate return codes of 8 or 12. Check other errors.

If DSNTEJ0 runs successfully, it produces the return codes that are shown in the table below.

Table 68. DSNTEJ0 return codes

Step	PROCSTEP	Return code
PH00S01		0000, 0008, or 0012

Table 68. DSNTTEJO return codes (continued)

Step	PROCSTEP	Return code
PH00S02		0000, 0004, or 0008
PH00S03	DSNUPROC	0004 or 0008
PH00S04		0000, 0004, or 0008
PH00S05		0000, 0004, or 0008
PH00S06		0000, 0004, or 0008
PH00S07		0000, 0004, or 0008
PH00S08		0000, 0004, or 0008

If this job fails or abends, ensure that the user that is specified on the JOB statement is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to Db2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups. Then correct any other problems, and rerun the job from the last successful step.

If the subsystem data sets were deleted before the Db2 sample objects are deleted, you must delete the data sets by using access method services commands or TSO commands. In all of the following examples, *vcatalog* is the catalog alias name that you specified for the CATALOG ALIAS field on installation panel DSNTIPA2. The *y* is either I or J.

The following access method services commands, which can be executed under TSO, delete the Db2 12 sample data sets:

```
DELETE 'vcatalog.DSNDBD.DSN8D12A.*.y0001.*'
DELETE 'vcatalog.DSNDBC.DSN8D81L.*.y0001.*'
DELETE 'vcatalog.DSNDBD.DSN8D12P.*.y0001.*'
DELETE 'vcatalog.DSNDBC.DSN8D12U.*.y0001.*'
DELETE 'vcatalog.DSNDB04.STAFF.y0001.A001'
DELETE 'vcatalog.DSNDB04.TESTSTUF.y0001.A001'
DELETE 'vcatalog.DSNDBC.DSN8D81E.*.y0001.*'
DELETE 'vcatalog.DSNDBC.DSN8D81Y.*.y0001.*'
DELETE 'vcatalog.DSNDBC.DSN8D81X.*.y0001.*'
```

#### Related reference

[-TERM UTILITY command \(Db2\) \(Db2 Commands\)](#)

## Phase 1: Creating and loading sample tables

Phase 1 of installation or migration verification consists of four jobs: DSNTTEJ1, DSNTTEJ1L, DSNTTEJ1P, and DSNTTEJ1U.

DSNTTEJ1 invokes program DSNTIAD, which creates objects during the verification procedure. Run DSNTTEJ1 before running any other sample jobs.

DSNTTEJ1L and DSNTTEJ1P prepare and invoke program DSNTTEP2, which lists the contents of the sample tables. The difference between the jobs is that DSNTTEJ1P requires the PL/I compiler and allows you to customize DSNTTEP2.

DSNTTEJ1U creates, populates, and tests a sample Unicode database.

### Job DSNTTEJ1

Job DSNTTEJ1 creates all objects that are to be used by the sample verification jobs. Run this job before any other verification job.

If reason code 00C9008A continues to occur, do one of the following:

- Restart Db2 and run the job again.
- If you are using a partitioned data set (PDS) for the DSNEXIT data set, run IEBCOPY to compress the data set when no application is using the DSNEXIT data set.

The job consists of the following steps.

*Table 69. Steps in job DSNTEJ1*

<b>Step</b>	<b>Function</b>
1-4	Creates all objects (storage group, databases, table spaces, tables, indexes, and views) that are used by the samples. <sup>1</sup>
5	Drops synonyms.
6	Creates synonyms and grants authorization on objects to PUBLIC. This step creates synonyms for the sample tables, indexes, and views, so that the currently running authorization ID can execute the sample application and grant appropriate authority. The sample dynamic SQL program DSNTIAD processes the Db2 object definitions in this step and several others.
7	Uses the ASMCL procedure to create DSN8EAE1, an edit exit routine.
8	Assembles and link-edits DSNHUFF.
9	Assembles and link-edits DSN8FPRC, a sample field procedure.
10	Prepares the sample call attachment facility assembler interface. You must link-edit ISPLINK, the ISPF interface module, with this CAF sample load module. To do this, ensure that the link-edit SYSLIB statement that retrieves the ISPF load module library in procedure DSNHASHM is not commented out.
11	Creates the sample utility list.
12	Loads the programming-related tables by using the LOAD utility.
13	Loads the sample tables by using the LOAD utility.
14	Checks data for referential integrity.
15	Establishes a quiesce point by using both log and image copies.
16	Makes an image copy of all the sample tables by using the COPY utility.
17	Establishes another quiesce point by using only image copies.
18	Reorganizes a table space and compiles statistics on all table spaces by using the REORG and RUNSTATS utilities.
19	Performs a REORG TABLESPACE with SHRLEVEL CHANGE.
20	Loads the sample tables by using the LOAD utility.
21	Sets the CURRENT RULES register and adds a check constraint using ALTER TABLE.
22	Checks data for referential integrity.
23	Checks data for check integrity.
24-27	Performs the operations in steps 15-18 except for the REORG on partition 3 of the Employee table space.
28	Unloads data from a partitioned table.
29	Reduces the partition key on the fourth partition of table space DSN8S81E.

Table 69. Steps in job DSNTEJ1 (continued)

Step	Function
30	Processes an online schema change to add a fifth partition to table space DSN8S81E.
31	Reorganizes a partitioned table space.
32	Performs various online schema changes, including lengthening a character field and converting an integer field to a decimal field.
33	Reorganizes table spaces DSN8S91R and DSN8S91S to reset advisory REORG-pending (AREO) status.

**Notes:**

1. Job DSNTEJ1 creates table spaces that contain multiple tables. However, applications that run at application compatibility level V12R1M504 or higher must create or use UTS table spaces, which can contain only single tables. To enable the installation verification jobs to run at any application compatibility level in Db2 12, steps 1 and 2 include this statement to set the application compatibility level to V11R1.

```
SET CURRENT APPLICATION COMPATIBILITY = 'V11R1';
```

If DSNTEJ1 runs successfully, it produces the return codes that are shown in the following table.

Table 70. DSNTEJ1 return codes

Step	PROCSTEP	Return code
PH01S01		0000
PH01S02		0000
PH01S03		0000
PH01S04		0000
PH01S05		0000
PH01S06		0000
PH01S07	ASM LKED	0000 0000
PH01S08	ASM LKED	0000 0000
PH01S09	ASM LKED	0000 0000
PH01S10	PC ASM LKED	0004 0000 0000
PH01S11	IEBGENER	0000
PH01S12	DSNUPROC	0000
PH01S13	DSNUPROC	0004

Table 70. DSNTEJ1 return codes (continued)

Step	PROCSTEP	Return code
PH01S14	DSNUPROC	0000
PH01S15	DSNUPROC	0000
PH01S16	DSNUPROC	0000
PH01S17	DSNUPROC	0000
PH01S18	DSNUPROC	0000 or 0004
PH01S19	DSNUPROC	0000
PH01S20	DSNUPROC	0004
PH01S21		0004
PH01S22	DSNUPROC	0004
PH01S23		0000
PH01S24	DSNUPROC	0000
PH01S25	DSNUPROC	0000
PH01S26	DSNUPROC	0000
PH01S27	DSNUPROC	0000
PH01S28	DSNUPROC	0000
PH01S29		0000 or 0004
PH01S30		0004
PH01S31	DSNUPROC	0000
PH01S32		0000
PH01S33	DSNUPROC	0000

Db2 issues the following message for every SQL statement, except for the drop synonym and insert statements:

```
DSNT400I SQLCODE = 0, SUCCESSFUL EXECUTION
```

If the synonyms in the DROP SYNONYM statements are not defined, SQL return codes of -204 result. The INSERT statements violate a check constraint on the EMP table. This results in an SQL return code of -545.

## Job DSNTEJ1L

DSNTEJ1L link-edits the DSNTEP2 object deck (DSNTEP2L) to create an executable load module DSNTEP2.

DSNTEJ1L link-edits the DSNTEP4 object deck (DSNTEP4L) to create an executable load module DSNTEP4.

DSNTEJ1L also binds and runs programs DSNTEP2 and DSNTEP4. DSNTEP2 lists the sample database tables and views. DSNTEP2 is a dynamic PL/I program that accepts SQL statements. DSNTEP2 produces a listing of the results of SELECT statements. DSNTEP4 is identical to DSNTEP2, except that it uses multi-row fetch.

Job DSNTEJ1L requires the Language Environment link-edit and run time libraries. DSNTEJ1L does not require the PL/I compiler.

If DSNTSJ1L runs successfully, it produces the return codes that are shown in the table below.

Table 71. DSNTSJ1L return codes

Step	PROCSTEP	Return code
PH01PS01		0000
PH01PS02		0000 or 0004
PH01PS03		0000
PH01PS04		0000 or 0004

You can compare the output from this job with the sample output for DSNTSJ1L, which is found in member DSN8TJ1L in your *prefix*.SDSNIVPD data set.

If you run DSNTSJ1P before DSNTSJ1L, you can expect step PH01PS02 of job DSNTSJ1L to produce a return code of 0004 and the following message:

```
SQLWARNING ON GRANT COMMAND, EXECUTE FUNCTION
RESULT OF SQL STATEMENT:
DSNT404I  SQLCODE = 562, WARNING:  A GRANT OF A PRIVILEGE WAS IGNORED
        BECAUSE THE GRANTEE ALREADY HAS THE PRIVILEGE FROM THE GRANTOR
```

If either DSNTSJ1 or DSNTSJ1L fails or abends, ensure that the user that is specified in the JOB statements is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to Db2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups.

Then, correct any other problems. Before rerunning DSNTSJ1, run DSNTSJ0 to drop the sample data. If you rerun DSNTSJ1L, rerun it from the last successful step.

#### Related reference

[DSNTEP2 and DSNTEP4 sample programs \(Db2 Application programming and SQL\)](#)

## Job DSNTSJ1P

DSNTSJ1P precompiles, compiles, and link-edits PL/I program DSNTEP2. This program then lists the sample database tables and views. It is a dynamic PL/I program that accepts SQL statements. It produces a listing of the results of SELECT statements.

**Tip:** If you already ran job DSNTSJ1L, you do not need to run DSNTSJ1P because these jobs produce the same results. The major difference is that DSNTSJ1P uses the PL/I compiler and allows you to customize DSNTEP2 and DSNTEP4.

If you do run job DSNTSJ1P after job DSNTSJ1L, and you previously bound the packages that were produced by job DSNTSJ1L at multiple sites, you also need to bind the packages that are produced by job DSNTSJ1P at the same sites. Otherwise, you will receive SQLCODE -805 errors when you use DSNTEP2 or DSNTEP4 to access data at the remote sites.

If DSNTSJ1P runs successfully, it produces the return codes that are shown in the table below.

Table 72. DSNTSJ1P return codes

Step	PROCSTEP	Return code
PH01PS01	PPLI	0000
	PC	0000
	PLI	0000
	PLKED <sup>1</sup> on page 741	0004
	LKED	0000

Table 72. DSNTEJ1P return codes (continued)

Step	PROCSTEP	Return code
PH01PS02		0000 or 0004
PH01PS03	PPLI	0000
	PC	0000
	PLI	0000
	PLKED <sup>“1”</sup> on page 741	0004
	LKED	0000
PH01PS04		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ1P, which is found in member DSN8TJ1P in your *prefix*.SDSNIVPD data set.

If you run DSNTEJ1L before DSNTEJ1P, you can expect step PH01PS02 of job DSNTEJ1P to produce a return code of 0004 and the following message:

```
SQLWARNING ON GRANT  COMMAND, EXECUTE FUNCTION
RESULT OF SQL STATEMENT:
DSNT404I SQLCODE = 562, WARNING:  A GRANT OF A PRIVILEGE WAS IGNORED
      BECAUSE THE GRANTEE ALREADY HAS THE PRIVILEGE FROM THE GRANTOR
```

If either DSNTEJ1 or DSNTEJ1P fails or abends, ensure that the user that is specified in the JOB statements is an authorized ID. If the name that you specified for either SYSTEM ADMIN 1 or SYSTEM ADMIN 2 on installation panel DSNTIPP1 is a primary authorization ID, use this name. If the sample authorization exit routine and RACF are installed, and if the SYSTEM ADMIN 1 and SYSTEM ADMIN 2 are known to Db2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups.

Then, correct any other problems. Before rerunning DSNTEJ1, run DSNTEJ0 to drop the sample data. If you rerun DSNTEJ1P, rerun it from the last successful step.

**Related reference**

[DSNTEP2 and DSNTEP4 sample programs \(Db2 Application programming and SQL\)](#)

## Job DSNTEJ1U

DSNTEJ1U creates a database, table space, and table with Unicode CCSID.

DSNTEJ1U loads data into the table from a data set that contains a full range of characters in an EBCDIC Latin-1 code page, which results in a mix of single and double-byte characters in the Unicode table. It then runs DSNTEP2 to select and display the data in hex format.

If DSNTEJ1U runs successfully, it produces the return codes that are shown in the table below.

Table 73. DSNTEJ1U return codes

Step	PROCSTEP	Return code
PH01US01		0000
PH01US02		0000
PH01US03	DSNUPROC	0000
PH01US04		0000

## Phase 2: Testing the batch environment

Phase 2 of the installation or migration verification process consists of several jobs. Run the jobs to test the program preparation procedures for various languages.

If any of the Phase 2 jobs fail or abend, be sure that the user that is specified in the JOB statements is authorized. Use the name that you specified for either the SYSTEM ADMIN 1 option or the SYSTEM ADMIN 2 option on installation panel DSNTIPP1. Then correct any other problems, and rerun the jobs from the last successful step.

### Job DSNTJ2A

DSNTJ2A tests the assembler program preparation procedures.

This job prepares and invokes program DSNTIAUL, which demonstrates the use of dynamic SQL in assembler to unload the data from tables or views. It also generates LOAD utility statements so the data can be loaded into another table. DSNTJ2A then uses the LOAD utility to put data into copies of the unloaded tables.

If DSNTJ2C runs successfully, it produces the return codes that are shown in the table below.

Table 74. DSNTJ2A return codes

Step	PROCSTEP	Return code
PREPUNL	PC	0000
	ASM	0000 or 0004
	LKED	0000 or 0004
BINDUNL		0000
DELETE		0000
CREATE		0000
UNLOAD		0000
EDIT		0000
LOAD	DSNUPROC	0004

You can compare the output from this job with the sample output for DSNTJ2A found in member DSNTJ2A in your *prefix*.SDSNIVPD data set.

#### Related reference

[DSNTIAUL sample program \(Db2 Application programming and SQL\)](#)

### Job DSNTJ2C

Job DSNTJ2C tests the COBOL program preparation procedures. This job runs the phone application.

The phone application processes a table of telephone numbers, executing various types of SELECT statements and producing the corresponding listings. It can also update a phone number.

If DSNTJ2C runs successfully, it produces the return codes that are shown in the following table.

Table 75. DSNTJ2C return codes

Step	PROCSTEP	Return code
PH02CS01		0000



Table 75. DSNTEJ2C return codes (continued)

Step	PROCSTEP	Return code
PH02CS02	PC	0004
	COB	0000 or 0004
	PLKED <a href="#">“1” on page 743</a>	0004
	LKED	0000 or 0004
PH02CS03	PC	0000
	COB	0000 or 0004
	PLKED <a href="#">“1” on page 743</a>	0004
	LKED	0000
PH02CS04		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ2C found in member DSN8TJ2C in your *prefix.SDSNIVPD* data set.

**Related concepts**

[COBOL options to use with the installation verification procedures](#)

The Db2 COBOL samples can be run with some compiler options, which control compilation.

**Related tasks**

[Working with the phone application scenario](#)

The phone application retrieves information from a phone directory and updates employee phone numbers.

## Job DSNTEJ2D

Job DSNTEJ2D tests the C program preparation procedures.

You must have sequence numbering on to run this job from an ISPF session. The C job runs only the phone application.

If DSNTEJ2D runs successfully, it produces the return codes that are shown in the table below.

Table 76. DSNTE2D return codes

Step	PROCSTEP	Return code
PH02DS01	PC	0004
	C	0000
	PLKED <a href="#">“1” on page 744</a>	0000 or 0004
	LKED	0004
PH02DS02	PC	0000
	C	0000
	PLKED <a href="#">“1” on page 744</a>	0000 or 0004
	LKED	0000 or 0004
PH02DS03		0000

Table 76. DSNTE2D return codes (continued)

Step	PROCSTEP	Return code
------	----------	-------------

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ2D found in member DSN8TJ2D in your *prefix*.SDSNIVPD data set.

**Related concepts**

[Job DSNTEJ2C](#)

[Job DSNTEJ2C](#) tests the COBOL program preparation procedures. This job runs the phone application.

## Job DSNTEJ2E

Job DSNTEJ2E tests the C++ program preparation procedures.

You must have sequence numbering on to run this job from an ISPF session. The C++ job runs only the phone application.

If DSNTEJ2E runs successfully, it produces the return codes that are shown in the table below.

Table 77. DSNTE2E return codes

Step	PROCSTEP	Return code
PH02ES01	PC	0004
	C	0000
	PLKED <a href="#">“1” on page 744</a>	0000 or 0004
	LKED	0004
PH02ES02	PC	0000
	CP	0000
	PLKED <a href="#">“2” on page 744</a>	0000 or 0004
	LKED	0004
PH02ES03	PC	0004
	CP	0000
	PLKED <a href="#">“2” on page 744</a>	0000 or 0004
	LKED	0000
PH02ES04		0000

**Notes:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.
2. The PLKED step does not exist in the job if the value of the CPP LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ2E found in member DSN8TJ2E in your *prefix*.SDSNIVPD data set.

**Related concepts**

[Job DSNTEJ2C](#)

Job DSNTEJ2C tests the COBOL program preparation procedures. This job runs the phone application.

## Job DSNTEJ2F

Job DSNTEJ2F tests the Fortran program preparation procedures.

The FORTRAN job runs only the phone application.

If DSNTEJ2F runs successfully, it produces the return codes that are shown in the table below.

Table 78. DSNTE2F return codes

Step	PROCSTEP	Return code
PH02FS01	PC	0004
	ASM	0000
	LKED	0004
PH02FS02	PC	0000
	FORT	0000
	LKED	0000
PH02FS03		0000

You can compare the output from this job with the sample output for DSNTEJ2F found in member DSN8TJ2F in your *prefix*.SDSNIVPD data set.

### Related concepts

[Job DSNTEJ2C](#)

Job DSNTEJ2C tests the COBOL program preparation procedures. This job runs the phone application.

## Job DSNTEJ2H

Job DSNTEJ2H tests the XML program preparation procedures.

If this job runs successfully, it produces the following return codes:

Table 79. DSNTEJ2H return codes

Step	PROCSTEP	Return code
PH02HS01	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0000
PH02HS02	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0000
PH02HS03	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0000

Table 79. DSNTEJ2H return codes (continued)

Step	PROCSTEP	Return code
PH02HS04	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0000
PH02HS05		0000
PH02HS06		0000
PH02HS07		0000
PH02HS08		0000
PH02HS09		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

## Job DSNTEJ2P

Job DSNTEJ2P tests the PL/I program preparation procedures.

The PL/I job runs the phone application.

If DSNTEJ2P runs successfully, it produces the return codes that are shown in the table below.

Table 80. DSNTEJ2P return codes

Step	PROCSTEP	Return code
PH02PS01		0000
PH02PS02	PPLI	0000
	PC	0004
	PLI	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0004
PH02PS03	PPLI	0000
	PC	0000
	PLI	0000
	PLKED <sup>1</sup> on page 746	0004
	LKED	0000
PH02PS04		0000
PH02PS05		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PLI LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ2P found in member DSN8TJ2P in your *prefix*.SDSNIVPD data set.

## Job DSNTJ2U

DSNTEJ2U prepares and tests several sample user-defined functions and a driver program that exercises the user-defined functions.

In order for the installation CLIST to generate job DSNTEJ2U, you must complete the following steps during installation:

- Specify that the host has access to C/C++ for z/OS on installation panel DSNTIPU.
- Specify the name of the default WLM environment on installation panel DSNTIPX.

The sample user-defined functions are:

### Function

#### Description

#### ALTDATE

Returns the current date in a user-specified format or converts a user-specified date from one format to another.

#### ALLTIME

Returns the current time in a user-specified format or converts a user-specified time from one format to another.

#### CURRENCY

Formats a floating point number as a currency value.

#### DAYNAME

Returns the day of the week for a user-specified date in ISO format.

#### MONTHNAME

Returns the month for a user-specified date in ISO format.

#### TABLE\_LOCATION

Returns the location name of a table, view, or undefined object found after resolving aliases for a user-specified object.

#### TABLE\_NAME

Returns the name of a table, view, or undefined object found after resolving aliases for a user-specified object.

#### TABLE\_SCHEMA

Returns the schema name of a table, view, or undefined object found after resolving aliases for a user-specified object.

#### WEATHER

Returns sample weather data obtained from a TSO data set by way of demonstrating the usefulness of a user-defined function table function.

If you do not have C++ installed, skip steps PH02US08 and PH02US09. Also remove all statements that refer to DAYNAME and MONTHNAME from part DSNTESU in the *prefix.SDSNSAMP* library.

Job DSNTEJ2U consists of the steps that are listed in the table below.

Step	Function
1	Drops all specific sample user-defined functions.
2	Creates and registers all sample user-defined functions. Grants EXECUTE authority to PUBLIC for the sample user-defined functions.
3-10	Prepares the eight external programs used by specific user-defined functions.

Table 81. Steps in job DSNTEJ2U (continued)

Step	Function
11	Binds the package for the TABLE_NAME, TABLE_SCHEMA, and TABLE_LOCATION functions. These are the only sample functions that issue SQL statements. This step also grants EXECUTE authority on these two samples to PUBLIC.
12	Invokes DSNTEP2 to exercise the sample user-defined functions.
13	Prepares DSN8DUWF, the external module for the sample user defined table function, WEATHER.
14	Prepares DSN8DUWC, a sample client function for statically invoking the WEATHER user-defined table function.
15	Binds the package and plan for DSN8DUWC and grants the necessary authorities.
16	Invokes DSN8DUWC.

If DSNTEJ2U runs successfully, it produces the return codes that are shown in the table below.

Table 82. DSNTEJ2U return codes

Step	PROCSTEP	Return code
PH02US01		0000
PH02US02		0000 or 0004
PH02US03 - PH02US07	PC	0004
	C	0000
	PLKED <sup>1</sup> on page 749	0004
	LKED	0000
PH02US08 - PH02US09	PC	0004
	CP	0000
	PLKED <sup>2</sup> on page 749	0004
	LKED	0000
PH02US10	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 749	0004
	LKED	0000
PH02US11		0000
PH02US12		0004
PH02US13	PC	0004
	C	0000
	PLKED <sup>1</sup> on page 749	0004
	LKED	0000
PH02US14	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 749	0004
	LKED	0000

Table 82. DSNTMJ2U return codes (continued)

Step	PROCSTEP	Return code
PH02US15		0000 or 0004
PH02US16		0000

**Notes:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.
2. The PLKED step does not exist in the job if the value of the CPP LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTMJ2U found in member DSN8TJ2U in your *prefix*.SDSNIVPD data set.

**Related concepts**

[Sample user-defined functions \(Db2 SQL\)](#)

[Steps to creating and using a user-defined function \(Db2 Application programming and SQL\)](#)

**Related reference**

[DSNTIPU: Host language data set names panel 1](#)

The entries on panels DSNTIPU, DSNTIPU1, and DSNTIPW establish data set names for other product libraries. The values that you enter on these panels are edited into sample and installation jobs. If you do not have the product, accept the default values. Jobs for those particular products should not be run.

[DSNTIPX: Routine parameters panel](#)

The entries on this panel are used to start the stored procedures address space so that it can run stored procedures or user-defined functions.

## Phase 3: Testing SPUFI, DRDA access, dynamic SQL, and TSO

Phase 3 of the installation or migration verification process allows you to test SPUFI (SQL Processor Using File Input) and DRDA access. You can also run dynamic SQL statements, run the phone application in TSO, and bind packages at the local and remote locations.

SPUFI is a facility of Db2I. You can only run SPUFI under ISPF. You can run dynamic SQL whether or not you have ISPF.

**Related tasks**

[Testing SPUFI](#)

During Phase 3 of the installation or migration verification process, you can test SPUFI to ensure that it is working properly.

### Testing SPUFI

During Phase 3 of the installation or migration verification process, you can test SPUFI to ensure that it is working properly.

**Procedure**

To test SPUFI:

1. Log on to TSO.
2. Enter ISPF (this might be done for you, depending on your site's standard practice).
3. On the DB2I defaults panel, change the Db2 name to the Db2 subsystem name you entered on panel DSNTIPM during installation. Then select DB2I on the ISPF Primary Option Menu.
4. Select SPUFI on the DB2I menu.
5. Enter the library name '*prefix*.NEW.SDSNSAMP(DSNTESA)' as input to SPUFI on line 1, the DATASET NAME parameter.

If your site uses the comma as a decimal point, the library name entered must be for the tailored version of job DSNTESA that was modified by the installation CLIST.

6. Define an output data set name on line 4, the output DATASET NAME parameter of the panel.

This allows you to review the output.

7. Press ENTER, and examine the results.

These SQL statements require a significant amount of Db2 processing; you could have to wait for the output.

8. Run steps 5, 6, and 7 three times:

- Once with member DSNTESA, which uses a set of SQL statements to create a short-lived table space and table.
- Once with member DSNTESC, which creates objects that support EXPLAIN information. If you are migrating from Db2 11, DSNTESC is customized by the installation CLIST to migrate your Db2 11 PLAN\_TABLE, DSN\_FUNCTION\_TABLE, DSN\_STATEMNT\_TABLE, and DSN\_STATEMENT\_CACHE\_TABLE to Db2 12 using a schema name of DSN8C10. If these Db2 11 tables have a different schema name, edit DSNTESC to use your schema name. Migration of these tables from a prior release should not be performed more than once. Also, some table spaces that are created by DSNTESC specify non-default buffer pools, BP8K1 and BP16K1. Verify that these buffer pools are enabled on Db2 before you process this DDL.
- Once with member DSNTесе, which retrieves the EXPLAIN information.

## What to do next

If any step fails or abends, be sure that the Db2 subsystem name is specified in the NAME field on the DB2I Defaults panel.

If you must drop either a Db2 11 or Db2 12 PLAN\_TABLE, remove the appropriate comments from the job to issue the DROP statements.

Also, make sure that the user ID that you are using is authorized. If the name that you specified for either the SYSADM or SYSADM2 subsystem parameter is a primary authorization ID, use this name. If the sample authorization exit and RACF are installed, and both SYSADM and SYSADM2 are known to Db2 as secondary authorization IDs, you can run these jobs under a user ID in either of these RACF groups. Then, correct any other problems and rerun the scenario from the last successful step.

### Related concepts

Dynamic SQL statements: DSNTESA, DSNTESQ  
*prefix*.SDSNSAMP library members DSNTESA and DSNTESQ contain dynamic SQL statements to help verify the success of an installation or migration.

### Related tasks

[Creating EXPLAIN tables \(Db2 Performance\)](#)

### Related reference

[EXPLAIN tables \(Db2 Performance\)](#)

## Dynamic SQL and the ISPF/CAF application

The Phase 3 jobs of the installation or migration verification process install the ISPF/CAF sample application. This sample consists of an assembler or COBOL call attachment facility (CAF) interface, a connection manager program, and the phone application. The sample also includes the distributed application that uses DRDA access.

Job DSNTЕJ1 prepares the assembler interface, and job DSNTЕJ3C prepares the COBOL interface. The connection manager program and the phone application each exist in COBOL and PL/I. Job DSNTЕJ3C prepares the COBOL version; job DSNTЕJ3P prepares the PL/I version. The distributed application using DRDA access is written in COBOL.

### Related concepts

[COBOL options to use with the installation verification procedures](#)



The Db2 COBOL samples can be run with some compiler options, which control compilation.

## Jobs DSNTJ3C and DSNTJ3P

Job DSNTJ3C prepares a COBOL ISPF/CAF sample application and job DSNTJ3P prepares a PL/I ISPF/CAF sample application.

To prepare for the distributed sample application, job DSNTJ3C binds a package at the local (client) and remote (server) subsystems. For concurrent installations at two Db2 locations, designate one location as the client and the other location as the server. Both the client and server subsystems must be running Db2 12. Because DSNTJ3C does a remote bind, you must set up your client and server systems for remote communication before running this job. The sample jobs DSNTJ1 and DSNTJ2C or DSNTJ2P must have been run on the server subsystem.

PH03CS06, the last job step of DSNTJ3C, binds the sample organization application at a server Db2 subsystem if the following conditions are met. If these conditions are not met, job step PH03CS06 is removed by the installation CLIST.

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY and it does not match the name that is specified in the Db2 LOCATION NAME field of panel DSNTIPR.

If DSNTJ3C runs successfully, it produces the return codes that are shown in the following table.

*Table 83. DSNTJ3C return codes*

Step	PROCSTEP	Return code
PH03CS01	PC	0004
	COB	0000 or 0004
	PLKED <sup>1</sup> on page 751	0004
	LKED	0000
PH03CS02	PC	0004
	COB	0000 or 0004
	PLKED <sup>1</sup> on page 751	0004
	LKED	0000
PH03CS03	PC	0000
	COB	0004
	PLKED <sup>1</sup> on page 751	0004
	LKED	0000
PH03CS04	PC	0000 or 0004
	COB	0000 or 0004
	PLKED <sup>1</sup> on page 751	0004
	LKED	0000
PH03CS05		0000 or 0004
PH03CS06		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

Step PH03CS06 can give a return code of 0004 if sample job DSNTJ1 was not run on the remote system. For testing, you should run job DSNTJ1 on the remote system.

If job DSNTTEJ3P runs successfully, it produces the return codes that are shown in the following table.

Table 84. DSNTTEJ3P return codes

Step	PROCSTEP	Return code
PH03PS01	PPLI	0000
	PC	0004
	PLI	0000
	PLKED <sup>1</sup> on page 752	0004
	LKED	0000
PH03PS02	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 752	0004
	LKED	0000
PH03PS03		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

**Related concepts**

[Connecting distributed database systems](#)

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

**Related reference**

[DSNTIPY: Job editing panel](#)

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

## Job DSNTTEJ3M

Job DSNTTEJ3M creates, populates, and processes a database that demonstrates the use of Db2 materialized query tables (MQTs).

Before you run job DSNTTEJ3M, you must create a PLAN\_TABLE. To create this table, specify the member DSNTESC as an input data set name to SPUFI.

If DSNTTEJ3M runs successfully, it produces the return codes that are shown in the table below.

Table 85. DSNTTEJ3M return codes

Step	PROCSTEP	Return code
PH03MS00		0000
PH03MS01		0000
PH03MS02		0000
PH03MS03		0000 or 0004
PH03MS04		0000
PH03MS05		0000
PH03MS06		0000

Table 85. DSNTEJ3M return codes (continued)

Step	PROCSTEP	Return code
PH03MS07		0000

## Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

### Procedure

To start an application in a TSO environment:

1. Enter a CALL command for option 6 of the ISPF primary option menu.
2. To start the COBOL phone sample version of the connection manager, enter the following command:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SCM)'
```

3. To start the PL/I phone sample version of the connection manager, enter the following command:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SPM)'
```

After you enter one of these commands, Db2 displays the sample applications panel, which is shown in the following figure.

```

====>          DB2 SAMPLE APPLICATIONS MENU

Select one of the following options and press enter.

 1 COBOL PHONE SAMPLE      (DB2 ISPF COBOL Application)
 2 PL/I  PHONE SAMPLE      (DB2 ISPF PL/I  Application)
 3 COBOL ORGANIZATION      (DB2 ISPF COBOL Application)

 4 C  EMPLOYEE RESUME      (DB2 ISPF C  Application)
 5 C  EMPLOYEE PHOTO       (DB2 ISPF & GDDM C Application)

 6 COBOL EMPLOYEE RESUME   (DB2 ISPF COBOL Application)
 7 COBOL EMPLOYEE PHOTO    (DB2 ISPF & GDDM COBOL Application)

SPECIFY DB2 SUBSYSTEM NAME ====> DSN

PRESS:  END TO EXIT

```

Figure 87. Initial panel of the ISPF/CAF application

Choosing option 1 or 2 on the sample applications panel during Phase 3 invokes either the COBOL or the PL/I version of the phone application. Choosing option 3 on the sample applications panel during Phase 6 invokes the COBOL organization application, which uses DRDA access to distributed data.

Choosing options 4, 5, 6, and 7 on the sample applications panel during Phase 7 invokes the "Employee Resume" and "Employee Photo" applications, which processes LOB data. Options 4 and 5 access the C language sample applications, and options 6 and 7 access the COBOL language sample applications. You must run job DSNTEJ73 before you can access option 4. You must run job DSNTEJ75 before you can access option 5. You must run job DSNTEJ77 before you can access option 6. You must run job DSNTEJ78 before you can access option 7.

### Related tasks

[Working with the distributed organization application scenario](#)

The distributed organization application scenario shows how to work with department and employee data in a distributed environment.

[Working with the employee resume and photo scenarios](#)

The LOB sample application extends the existing Db2 sample employee database by adding a new table for storing employee resumes and photographs as CLOB and BLOB entries.

Make DB2I panels, messages, and load modules available to ISPF and TSO

During migration, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

Working with the phone application scenario

The phone application retrieves information from a phone directory and updates employee phone numbers.

## Phase 4: Testing the IMS environment

---

Phase 4 of the installation or migration verification process installs the sample IMS transactions for both COBOL and PL/I.

In the PL/I version, the phone application discussed in Phase 2 is also installed as an online transaction.

### Related tasks

Working with the phone application scenario

The phone application retrieves information from a phone directory and updates employee phone numbers.

## Jobs DSNTEJ4C and DSNTEJ4P

Job DSNTEJ4C is for COBOL; DSNTEJ4P is for PL/I. Both jobs complete the same functions.

Jobs DSNTEJ4C and DSNTEJ4P complete the following tasks:

- Precompile, compile, and link-edit the IMS online applications.
- Bind the IMS online applications.
- Create the message format service (MFS) panels for the online applications.
- Run the required PSBGEN and ACBGEN.

Select the proper job and define the applications and transactions to IMS. Member DSN8FIMS in *prefix.SDSNSAMP* contains information to assist in the definition step.

The verification transactions are single mode, single segment, and nonconversational.

**Recommendation:** Use SSM error option R because the program handles any errors. A resource translation table is not required.

Invoke the transaction by using the FORMAT command. The programs accept several lines of input on the first panel and display the results after you press ENTER.

If DSNTEJ4C runs successfully, it produces the return codes that are shown in the following table.

*Table 86. DSNTEJ4C return codes*

Step	PROCSTEP	Return code
PH04CS01	PC	0004
	COB	0000
	PLKED <a href="#">"1" on page 755</a>	0004
	LKED	0004
PH04CS02	PC	0000
	COB	0000
	PLKED <a href="#">"1" on page 755</a>	0004
	LKED	0004

Table 86. DSNTEJ4C return codes (continued)

Step	PROCSTEP	Return code
PH04CS03	PC	0000
	COB	0000
	PLKED <sup>1</sup> on page 755	0004
	LKED	0004
PH04CS04		0000
PH04CS05		0000
PH04CS06	S1	0000
	S2	0004
PH04CS07	S1	0000
	S2	0004
PH04CS08	C	0000
	L	0000
PH04CS09	G	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

For DSNTEJ4C, the warning code that is expected from the precompiler step PH04CS01 is:

```
DB2 SQL PRECOMPILER      MESSAGES
DSNH0531 W  NO SQL STATEMENTS WERE FOUND
```

If DSNTEJ4P runs successfully, it produces the return codes that are shown in the following table.

Table 87. DSNTEJ4P return codes

Step	PROCSTEP	Return Code
PH04PS01	PPLI	0000
	PC	0004
	PLI	0004
	PLKED <sup>1</sup> on page 757	0004
	LKED	0004
PH04PS02	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 757	0004
	LKED	0004
PH04PS03	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 757	0004
	LKED	0004

Table 87. DSNTEJ4P return codes (continued)

Step	PROCSTEP	Return Code
PH04PS04	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <a href="#">"1" on page 757</a>	0004
	LKED	0004
PH04PS05	PPLI	0000
	PC	0004
	PLI	0004
	PLKED <a href="#">"1" on page 757</a>	0004
	LKED	0004
PH04PS06	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <a href="#">"1" on page 757</a>	0004
	LKED	0004
PH04PS07	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <a href="#">"1" on page 757</a>	0004
	LKED	0004
PH04PS08		0000
PH04PS09		0000
PH04PS10	S1	0000
	S2	0004
PH04PS11	S1	0000
	S2	0004
PH04PS12	S1	0000
	S2	0000 or 0004
PH04PS13	S1	0000
	S2	0000 or 0004
PH04PS14	S1	0000
	S2	0000 or 0004
PH04PS15	S1	0000
	S2	0000 or 0004
PH04PS16	C	0000
	L	0000
PH04PS17	G	0000

Table 87. DSNTEJ4P return codes (continued)

Step	PROCSTEP	Return Code
PH04PS18	C	0000
	L	0000
PH04PS19	G	0000
PH04PS20	C	0000
	L	0000
PH04PS21	G	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

For DSNTEJ4P, the warning code expected from the precompiler step PH04PS01 is:

```
DB2 SQL PRECOMPILER      MESSAGES
DSNH0531 W   NO SQL STATEMENTS WERE FOUND
```

If either job DSNTEJ4C or job DSNTEJ4P fails or abends, rerun the jobs from the last successful step.

**Related concepts**

[COBOL options to use with the installation verification procedures](#)

The Db2 COBOL samples can be run with some compiler options, which control compilation.

## Starting an application in an IMS environment

After logging on to IMS, you can start the organization application or project application.

### Procedure

Enter an IMS FORMAT command

The FORMAT commands are:

- /FORMAT DSN8IPGO, which starts the PL/I organization version
- /FORMAT DSN8ICGO, which starts the COBOL organization version.

When you enter either of these two commands, the panel that is shown in the following figure is displayed.

```
MAJOR SYSTEM ... : 0           ORGANIZATION
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
```

Figure 88. Organization version of FORMAT command display

When the following command is entered, the panel that is shown in the figure below is displayed.

```
/FORMAT DSN8IPFO
```

starts the PL/I projects version.

```

MAJOR SYSTEM ... : P          PROJECTS
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:

```

Figure 89. Project version of FORMAT command display

## Using the phone application in IMS

When you use IMS, information is interactively processed.

### Procedure

Clear the screen and type in a FORMAT command. The FORMAT command that starts PL/I phone application is:

```
/FORMAT DSN8IPNO
```

When the FORMAT command is entered, the panel that is shown in the following figure is displayed.

```

----- TELEPHONE DIRECTORY -----

                LAST  NAME ==>
                FIRST NAME ==>

LAST NAME           : * FOR LIST OF ENTIRE DIRECTORY
                    % FOR GENERIC LIST (EX. K% = ALL  K - NAMES)
FIRST NAME(OPTIONAL): % FOR GENERIC LIST

```

Figure 90. Starting the phone application

## Phase 5: Testing the CICS environment

Phase 5 of the installation or migration verification process tests the CICS environment. Phase 5 installs the sample applications for COBOL and PL/I, and it prepares the CICS SQLCA formatter front-end.

### Job DSNTEJ5A

Job DSNTEJ5A assembles and link-edits DSNTIAC, the CICS SQLCA formatter front-end. DSNTEJ5A also assembles and link-edits the RCT and optionally adds the sample definitions to the CSD.

Use DSNTIAC as an alternative to DSNTIAR when you want CICS services to do storage handling and program loading. If you are using CICS Version 4 or CICS Transaction Server 1.1, you need to modify job DSNTEJ5A to use steps DSN8FRCT and DSN8FRDO. You might need to tailor step DSN8FRDO for your system.

If DSNTEJ5A runs successfully, it produces the return codes that are shown in the table below.

Table 88. DSNTEJ5A return codes

Step	PROCSTEP	Return code
PH05AS01		0000
PH05AS02		0000
PH05AS03		0000



## Jobs DSNTJ5C and DSNTJ5P

Job DSNTJ5C installs the sample application transactions in COBOL and prepares the organization application. Job DSNTJ5P installs the transactions in PL/I and prepares the organization, project, and phone applications.

Both phase 5 jobs perform the following functions:

- Compile and link-edit the CICS online applications
- Bind the CICS online applications
- Create the BMS maps for the online applications.

Select the proper job, and define transactions, programs, and BMS maps to CICS.

*prefix*=.SDSNSAMP members DSN8FPPT, DSN8FPCT, and DSN8FRCT contain the respective PPT, PCT, and RCT entries required for the phase 5 applications. These members help you perform the definition step. Make sure that the subsystem ID (SUBID) in the RCT entry matches your Db2 subsystem ID.

If DSNTJ5C runs successfully, it produces the return codes that are shown in the following table.

*Table 89. DSNTJ5C return codes*

<b>Step</b>	<b>PROCSTEP</b>	<b>Return code</b>
MAPG	ASSEM	0000
MAPD	ASSEM	0000
DSNH		0000 or 0004
BIND		0000
MAPGP	ASSEM	0000
MAPGL		0000
MAPDP	ASSEM	0000
MAPDL		0000

If DSNTJ5C fails or abends, rerun the job from the last successful step. To receive more prepare-time detail from DSNTJ5C, change the parameters TERM(LEAVE) and PRINT(LEAVE) to TERM(TERM) and PRINT(TERM).

If DSNTJ5P runs successfully, it produces the return codes that are shown in the following table.

*Table 90. DSNTJ5P return codes*

<b>Step</b>	<b>PROCSTEP</b>	<b>Return code</b>
PH05PS01	ASSEM	0000
PH05PS02	ASSEM	0000
PH05PS03	ASSEM	0000
PH05PS04	ASSEM	0000
PH05PS05	ASSEM	0000
PH05PS06		0004

Table 90. DSNTEJ5P return codes (continued)

Step	PROCSTEP	Return code
PH05PS07	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS08		0004
PH05PS09	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS10		0004
PH05PS11	PPLI	0004
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS12		0004
PH05PS13	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS14	ASSEM	0000
PH05PS15	ASSEM	0000
PH05PS16		0004
PH05PS17	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS18		0004
PH05PS19	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS20		0004

Table 90. DSNTEJ5P return codes (continued)

Step	PROCSTEP	Return code
PH05PS21	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>1</sup> on page 761	0004
	LKED	0004
PH05PS22		0000 or 0004
PH05PS23		0000
PH05PS24	ASSEM	0000
PH05PH25		0000
PH05PS26	ASSEM	0000
PH05PH27		0000
PH05PS28	ASSEM	0000
PH05PH29		0000
PH05PS30	ASSEM	0000
PH05PH31		0000
PH05PS32	ASSEM	0000
PH05PH33		0000
PH05PS34	ASSEM	0000
PH05PH35		0000
PH05PS36	ASSEM	0000
PH05PH37		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

If DSNTEJ5P fails or abends, rerun the job from the last successful step. You might find it convenient to break up DSNTEJ5P and run only the unsuccessful steps.

**Related concepts**

[COBOL options to use with the installation verification procedures](#)

The Db2 COBOL samples can be run with some compiler options, which control compilation.

**Related reference**

[DSNH command procedure \(TSO CLIST\) \(Db2 Commands\)](#)

## Starting an application in a CICS environment

After logging on to CICS, you can start an organization application or project application in the CICS environment.

**Procedure**

Enter a CICS transaction code.

The CICS transaction codes are:

- D8PP, which starts the PL/I project version
- D8PS, which starts the PL/I organization version
- D8CS, which starts the COBOL organization version.

When these transaction codes are entered, the panels that are shown in the following two figures are displayed.

```
                ACTION SELECTION
MAJOR SYSTEM ...: 0          ORGANIZATION
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
SELECT AN ACTION FROM FOLLOWING LIST

A    ADD (INSERT)
D    DISPLAY (SHOW)
E    ERASE (REMOVE)
U    UPDATE (CHANGE)
```

Figure 91. Initial panel for the organization application in CICS

```
                ACTION SELECTION
MAJOR SYSTEM ...: P          PROJECTS
ACTION .....:
OBJECT .....:
SEARCH CRITERIA.:
DATA .....:
SELECT AN ACTION FROM FOLLOWING LIST

A    ADD (INSERT)
D    DISPLAY (SHOW)
E    ERASE (REMOVE)
U    UPDATE (CHANGE)
```

Figure 92. Initial panel for the project application in CICS

### Related concepts

[The sample application panels](#)

When you run the interactive sample applications, the sample application panels require you to enter information such as the action you want to complete.

## Using the phone application in CICS

When you use CICS, information is interactively processed.

### Procedure

Clear the screen and type in the transaction code:

```
D8PT
```

You can change the transaction codes when you install Db2. Check with your system administrator to find out if they have been changed from those shown.

## Using CICS storage-handling facilities

You can use the CICS storage-handling facilities when you run the CICS sample applications.

### Procedure

To use the CICS storage-handling facilities when running the CICS sample applications:

1. Change your DSNTIAR calls to DSNTIAC calls in DSN8MCxx and DSN8MPxx.

The calls should look like this:

```
CALL DSNTIAC(EIB,COMMAREA,SQLCA,MSG,LRECL)
```

2. Define DSNTIAC and DSNTIA1 in the CSD.
3. Rerun job DSNTEJ5C or job DSNTEJ5P.

## Phase 6: Accessing data at a remote site

---

You can use phase 6 of the Db2 installation or migration verification process to verify that the features of DRDA access are working correctly, to prepare and call sample stored procedures, and to prepare and execute sample callers of certain Db2-supplied stored procedures.

During this optional phase, you test accessing data at a remote site by using the DRDA access application (job DSNTEJ6 in conjunction with job DSNTEJ3C).

You can use the following jobs to test creating and calling stored procedures at either the local site or a remote site.

### **DSNTEJ6S and DSNTEJ6P**

Tests the stored procedure without result set sample

### **DSNTEJ6T and DSNTEJ6D**

Tests the stored procedure with result set sample

### **DSNTEJ61 and DSNTEJ62**

Tests the stored procedure for IMS Open Database Access

### **DSNTEJ63 and DSNTEJ64**

Tests the external SQL procedure batch sample

### **DSNTEJ65**

Tests the external SQL procedures processor invocation sample

### **DSNTEJ66**

Tests the stored procedure that prepares a sample native SQL procedure and caller

You can use the following jobs to test calling Db2-supplied stored procedures at the local site:

### **DSNTEJ6U, DSNTEJ6R, DSNTEJ6V, and DSNTEJ6X**

Tests the stored procedure for invoking utilities

### **DSNTEJ6W**

Tests the stored procedure for invoking WLM\_REFRESH

### **DSNTEJ6Z**

Tests the stored procedure for formatting the IFCID 106 trace record to obtain current Db2 configuration settings

## ISPF panel requirements

The installation CLIST prepares samples DSNTEJ6, DSNTEJ6S, DSNTEJ6P, DSNTEJ6T, DSNTEJ6D, DSNTEJ6Z, DSNTEJ61, DSNTEJ62, DSNTEJ63, DSNTEJ64, DSNTEJ65 and DSNTEJ66 only if you specify COMMAND or AUTO in the DDF STARTUP OPTION field of panel DSNTIPR. If you specify NO, the installation CLIST does not prepare these samples. In this case, you should not try to run these samples.

The installation CLIST prepares the stored procedures samples only if you specify a sample WLM environment name in the WLM ENVIRONMENT field on panel DSNTIPX. If you replace the default value with blanks in the WLM ENVIRONMENT field, you cannot start the sample WLM-established stored procedures address space until you update the subsystem parameter.

The installation CLIST tailors the phase 6 sample jobs according to the information that you specify in the REMOTE LOCATION field of panel DSNTIPY. The guidelines for this field are:

- If the field is blank, the installation CLIST only customizes phase 6 sample jobs DSNTEJ63, DSNTEJ64, DSNTEJ65, DSNTEJ66, DSNTEJ6R, DSNTEJ6U, DSNTEJ6V, DSNTEJ6W, and DSNTEJ6Z. Jobs DSNTEJ63, DSNTEJ64, DSNTEJ65, and DSNTEJ66 use the local location name when the REMOTE LOCATION field is blank. Jobs DSNTEJ6R, DSNTEJ6U, DSNTEJ6V, DSNTEJ6W, and DSNTEJ6Z do not use a remote location name.
- If the value in the field is the same as the location name for the Db2 subsystem that you are installing (DB2 LOCATION NAME field of panel DSNTIPR), the stored procedures samples are prepared and customized for local use. However, the DRDA access sample is not prepared, including job DSNTEJ6 and the DRDA access component of job DSNTEJ3C.
- If the value in the field is different from the DB2 LOCATION NAME field, the installation CLIST prepares the phase 6 samples assuming that the remote location is the server and that the local system is the client.

The following table summarizes the ISPF panel values that are required for the installation CLIST to prepare the phase 6 sample jobs.

*Table 91. IVP phase 6 job requirements.* The installation CLIST only customizes the phase 6 sample jobs if certain fields on the ISPF panels meet requirements.

<b>Job name</b>	<b>Requires COMMAND or AUTO in the DDF STARTUP OPTION field of panel DSNTIPR?</b>	<b>Requires a name in the REMOTE LOCATION field of panel DSNTIPY?</b>	<b>Requires a name in the WLM ENVIRONMENT field of panel DSNTIPX?</b>
DSNTEJ6	Yes	Yes	No
DSNTEJ6S	Yes	Yes	Yes
DSNTEJ6P	Yes	Yes	Yes
DSNTEJ6T	Yes	Yes	Yes
DSNTEJ6D	Yes	Yes	Yes
DSNTEJ6R	No	No	Yes
DSNTEJ6U	No	No	No
DSNTEJ6V	No	No	No
DSNTEJ6W	No	No	Yes
DSNTEJ6Z	Yes	No	Yes
DSNTEJ61	Yes	Yes	Yes
DSNTEJ62	Yes	Yes	Yes
DSNTEJ63	Yes	No	Yes
DSNTEJ64	Yes	No	Yes
DSNTEJ65	Yes	No	Yes
DSNTEJ66	Yes	No	Yes

## Testing multiple subsystems

If you are installing and testing two Db2 subsystems concurrently, you must designate one as the server and the other as the client. If you change these designations during your testing, your results will be unpredictable. Verify that your VTAM APPL statement has the parameter SYNCLVL=SYNCPT defined. This setting allows updates at several locations.

## DRDA access sample

The distributed sample application that uses DRDA access is executed as part of Phase 6 of the installation or migration verification process.

The application is prepared in Phase 3 as part of DSNTJ3C. Before this application can be run correctly as a DRDA access sample, you must run job DSNTJ6 at both the local and remote sites to tailor the DEPT sample table for use in a distributed environment.

To set up your samples testing for concurrent installations at two Db2 locations, follow these guidelines:

- Designate one location as the requester (the client) and the other location as the server.
- Run the client version of DSNTJ6 at the client site only; do **not** run the client version of DSNTJ6 at the server.
- Edit the server version of DSNTJ6 at the remote server site; do **not** run the server version of DSNTJ6 at the client.
- **GUI** Locate the following text in the server version of DSNTJ6 within step PH06S01:

```
UPDATE DEPT SET LOCATION = (your remote location name) WHERE DEPTNO = 'F22';  
UPDATE DEPT SET LOCATION = (your location name) WHERE LOCATION = ' ';
```

This text should be replaced with:

```
UPDATE DEPT SET LOCATION = (your location name) WHERE DEPTNO = 'F22';  
UPDATE DEPT SET LOCATION = (your remote location name) WHERE LOCATION = ' ';
```

**GUI**

## Job DSNTJ6

Job DSNTJ6 consists of a single step that updates the location column in the sample DEPT table at the client and server Db2 subsystems.

The employees in department F22 are recorded as working at the server location that was entered in the REMOTE LOCATION field of panel DSNTIPY. All other employees are recorded as working at the client location.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY and it does not match the name specified in the DB2 LOCATION NAME field of panel DSNTIPR

Before you run DSNTJ6, ensure that the server Db2 subsystem's DSNTJ1 job has been run on the server Db2 subsystem. Run the client Db2 subsystem's DSNTJ6 job only on the server Db2 subsystem.

If DSNTJ6 runs successfully, it produces the return code that is shown in the table below.

Table 92. DSNTJ6 return codes

Step	PROCSTEP	Return code
PH06S01		0000

### Related tasks

Starting an application in an ISPF/TSO environment in phase 6

You must have access to ISPF load module libraries in order to run the ISPF/CAF sample application.

### Related reference

[DSNTIPR: Distributed data facility panel 1](#)

The entries on the DSNTIPR panel control the starting of the distributed data facility (DDF). The entries on the DSNTIPR panel also specify location names that are used to connect another Db2 subsystem.

#### DSNTIPY: Job editing panel

The entries on the DSNTIPY panel specify values and information about job statements for the installation and sample application jobs.

## Starting an application in an ISPF/TSO environment in phase 6

You must have access to ISPF load module libraries in order to run the ISPF/CAF sample application.

### Procedure

To start the sample application:

1. Enter a CALL command from option 6 of the ISPF primary option menu.
2. To start the COBOL sample version of the connection manager, enter the following:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SCM)'
```

After you enter this command, Db2 displays the sample applications panel. Choosing option 3 on the sample applications panel during Phase 6 invokes the COBOL organization application, which uses DRDA access for distributed data.

### Related tasks

#### Working with the distributed organization application scenario

The distributed organization application scenario shows how to work with department and employee data in a distributed environment.

#### Starting an application in an ISPF/TSO environment in phase 6

You must have access to ISPF load module libraries in order to run the ISPF/CAF sample application.

#### Make DB2I panels, messages, and load modules available to ISPF and TSO

During migration, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

## Stored procedure samples

Db2 provides a set of stored procedure sample applications. These sample applications demonstrate different ways that a stored procedure can be used by a client to issue Db2 commands to a Db2 server.

Most of these applications prepare and run two programs. One program prepares a stored procedure, and one program executes a client program that calls the stored procedure and returns some response.

Db2 provides the following stored procedure samples:

- A sample stored procedure without a result set
- A sample stored procedure with a result set
- Samples that invoke the following utilities stored procedures:
  - DSNUTILS
  - DSNUTILU
  - DSNUTILV
- A sample that invokes the stored procedure WLM\_REFRESH, which refreshes the WLM environment
- A sample that invokes the stored procedure ADMIN\_INFO\_SYSPARM, which lists the settings of subsystem parameters
- A sample stored procedure that uses IMS Open Database Access (ODBA) support
- Two samples of external SQL procedures



All of these samples are part of the installation verification samples, which are located in *prefix.NEW.SDSNSAMP*. The installation CLIST tailored and loaded these jobs during your installation or migration to new-function mode.

To edit any of these sample jobs, specify the appropriate fields on the installation panels. Using the installation panels is the only method that you can use to edit these jobs.

Before you run the sample stored procedures, ensure that you have completed one of the following tasks:

- [Configure Db2 for running stored procedures and user-defined functions during installation](#)
- [Configure Db2 for running stored procedures and user-defined functions during migration](#)

### Related concepts

[Installation verification phases and programs](#)

In each phase of the installation verification procedure (IVP), you must run specific programs. These programs need to be run sequentially by phase because the output of some jobs is used as input for subsequent jobs.

## Stored procedure sample without result set

Db2 provides a sample stored procedure that uses the instrumentation facility interface (IFI) to issue Db2 commands. The sample stored procedure also returns the responses to the calling program in a parameter.

This sample application consists of two jobs: DSNTJ6S and DSNTJ6P. These jobs are part of the installation verification samples, which are located in *prefix.NEW.SDSNSAMP*. The installation CLIST tailored and loaded these jobs during your installation or migration.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTJ6S before job DSNTJ6P.
- Ensure that the PL/I product is installed on your client and server systems.
- Ensure that Language Environment is installed.

This application prepares and runs the following programs:

- A stored procedure that uses the IFI to issue Db2 commands.
- A client program that receives Db2 command text and calls the stored procedure to issue the commands. When the program receives the responses from the stored procedure in a parameter that is passed back, it prints the results.

For concurrent installations at two Db2 locations, perform the following actions:

- Run the server version of DSNTJ6S on the server system only; do **not** run the client version of DSNTJ6S on the server.
- Run the client version of DSNTJ6P on the client system only; do **not** run the server version of DSNTJ6P on the client.

### Job DSNTJ6S

Job DSNTJ6S compiles and link-edits the sample stored procedure DSN8EP2. DSNTJ6S also updates the SYSIBM.SYSROUTINES catalog table with information about the stored procedure.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

If you have SQL statements in your stored procedure, you must remove the comment character in the JCL from the step that binds the stored procedure package.

You must run job DSNTJ6S on the server Db2 subsystem.

If DSNTJ6S runs successfully, it produces the return codes that are shown in the table below.

Table 93. DSNTJ6S return codes

Step	PROCSTEP	Return code
PH06SS01		0000
PH06SS02		0000
PH06SS03	PPLI	0000
	PC	0004
	PLI	0004
	PLKED <sup>1</sup>	0004
	LKED	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

If SQLCODE -592 is received during the execution of DSNTJ6T, ensure that SPA is active.

**Job DSNTJ6P**

Job DSNTJ6P compiles, link-edits, binds, and runs a sample program, DSN8EP1, which calls the sample stored procedure that is created by job DSNTJ6S.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local Db2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before you run DSNTJ6P, ensure that DSNTJ6S has been run on the server Db2 subsystem to create the sample stored procedure.

If DSNTJ6P runs successfully, it produces the following return codes.

Table 94. DSNTJ6P return codes

Step	PROCSTEP	Return code
PH06PS01	PPLI	0000
	PC	0000
	PLI	0004
	PLKED <sup>“1” on page 768</sup>	0004
	LKED	0000
PH06PS02		0004
PH06PS03		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

Output from a successful execution of DSNTEJ6P lists each Db2 command that was executed, followed by the messages that were generated by the Db2 command processor.

You can compare the output from this job with the sample output for DSNTEJ6P, which is in member DSN8TJ6P of your *prefix*.SDSNIVPD data set.

## Stored procedure sample with result set

Db2 provides a sample stored procedure that uses the instrumentation facility interface (IFI) to issue Db2 commands. The sample stored procedure also returns the responses to the calling program in a result set.

This sample application consists of two jobs: DSNTEJ6T and DSNTEJ6D. These jobs are part of the installation verification samples, which are located in *prefix*.NEW.SDSNSAMP. The installation CLIST tailored and loaded these jobs during your installation or migration.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTEJ6T before job DSNTEJ6D.
- Ensure that C for z/OS is installed.
- Ensure that Language Environment is installed.

This application prepares and runs the following programs:

- A stored procedure that uses the IFI to issue Db2 commands.
- A client program that receives Db2 command text and calls the stored procedure to issue the commands. When the program receives the responses from the stored procedure in a result set, it prints the results.

For concurrent installations at two Db2 locations, perform the following actions:

- Run the server version of job DSNTEJ6T on the server side only; do **not** run it on the client side.
- Run the client version of job DSNTEJ6D on the client side only; do **not** run it on the server side.

### Job DSNTEJ6T

Job DSNTEJ6T registers, prepares, and binds the sample stored procedure DSN8ED2 on the server. DSNTEJ6T also defines a created temporary table to receive the IFI output that is returned as a result set.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

You must run job DSNTEJ6T on the server Db2 subsystem.

If DSNTEJ6T runs successfully, it produces the return codes that are shown in the table below.

Table 95. DSNTEJ6T return codes

Step	PROCSTEP	Return code
PH06TS01		0000
PH06TS02		0000
PH06TS03	PC	0004
	C	0000
	PLKED <sup>“1”</sup> on page 770	0004
	LKED	0000
PH06TS04		0000 or 0004

Table 95. DSNTSJ6T return codes (continued)

Step	PROCSTEP	Return code
1.	The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.	

If SQLCODE -592 is received during the execution of DSNTSJ6T, ensure that SPA is active.

### Job DSNTSJ6D

Job DSNTSJ6D compiles, link-edits, binds, and runs sample program DSN8ED1, which calls the sample stored procedure that is created by job DSNTSJ6T.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local Db2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before you run DSNTSJ6D, ensure that DSNTSJ6T has been run on the server Db2 subsystem to create the sample stored procedure.

If DSNTSJ6D runs successfully, it produces the return codes that are shown in the table below.

Table 96. DSNTSJ6D return codes

Step	PROCSTEP	Return code
PH06DS01	PC	0000
	C	0000 or 0004
	PLKED <a href="#">"1" on page 770</a>	0000 or 0004
	LKED	0000
PH06DS02		0004
PH06DS03		0000

#### Note:

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

Output from a successful execution of DSNTSJ6D lists each Db2 command that was executed, followed by the messages that were generated by the Db2 command processor.

You can compare the output from this job with the sample output for DSNTSJ6D, which is in member DSN8TJ6D of your *prefix*.SDSNIVPD data set.

### Sample callers of utilities stored procedures

You can use the Db2-supplied utilities stored procedures to run Db2 utilities from Db2 application programs by using the SQL CALL statement.

The following utilities stored procedures are supplied with Db2:

- DSNUTILS (deprecated)
- DSNUTILU
- DSNUTILV

When called, the utilities stored procedures perform the following actions:

1. Dynamically allocates the specified data sets
2. Creates the utility input stream (SYSIN)
3. Invokes Db2 utilities (DSNUTILB)
4. Deletes all rows currently in the created temporary table (SYSIBM.SYSPRINT)
5. Captures the utility output stream (SYSPRINT)
6. Puts the output into the created temporary table (SYSIBM.SYSPRINT)

The utilities stored procedures must run as a WLM-managed stored procedure.

#### **Related reference**

[DSNUTILS stored procedure \(deprecated\) \(Db2 SQL\)](#)

[DSNUTILU stored procedure \(Db2 SQL\)](#)

[DSNUTILV stored procedure \(Db2 SQL\)](#)

#### **Job DSNTEJ6X**

Job DSNTEJ6X compiles, link-edits, binds, and runs sample C program DSN8EDA, which invokes the DSNUTILV stored procedure to execute a utility. DSNTEJ6X executes DSN8EDA twice, first passing the utility control statement to DSNUTILV as a string and then passing it as a LOB file reference.

For convenience on TSO, the utility control statement that is input to DSN8EDA is encoded in EBCDIC and converted to Unicode before being passed to DSNUTILV.

Job DSNTEJ6X uses the local Db2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if you specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ6X, ensure that DSNUTILV has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILV.

If DSNTEJ6X completes successfully, it produces the return codes that are shown in the following.

*Table 97. DSNTEJ6X return codes*

<b>Step</b>	<b>PROCSTEP</b>	<b>Return code</b>
PH06XS00		0000
PH06XS01	PC	0000
	C	0000
	PLKED <sup>"1"</sup> on page 771	0004
	LKED	0000
PH06XS02		0000 or 0004
PH06XS03		0000
PH06XS04		0000
PH06XS05		0000
PH06XS06		0000

#### **Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

Output from a successful execution of DSNTEJ6X lists the parameters specified followed by the messages generated by the Db2 DIAGNOSE DISPLAY MEPL utility.

### Related tasks

[Installation step 22: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

[Migration step 24: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

### Related reference

[DSNUTILV stored procedure \(Db2 SQL\)](#)

## Job DSNTEJ6U

Job DSNTEJ6U compiles, link-edits, binds, and runs sample PL/I program DSN8EPU, which invokes the DSNUTILS stored procedure to execute a utility.

Job DSNTEJ6U uses the local Db2 subsystem as both the client and the server subsystem.

The installation CLIST always edits this job.

Before running job DSNTEJ6U, ensure that DSNUTILS has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILS.

If DSNTEJ6U completes successfully, it produces the return codes that are shown in the table below.

Table 98. DSNTEJ6U return codes

Step	PROCSTEP	Return code
PH06US01	PPLI	0000
	PC	0000
	PLI	0000
	PLKED <sup>“1”</sup> on page 772	0004
	LKED	0000
PH06US02		0000
PH06US03		0000

### Note:

1. The PLKED step does not exist in the job if the value of the PL/I LE PRELINKER PHASE field is set to NO.

Output from a successful execution of DSNTEJ6U lists the parameters specified followed by the messages generated by the Db2 DIAGNOSE DISPLAY MEPL utility.

You can compare the output from this job with the sample output for DSNTEJ6U found in member DSN8TJ6U in your *prefix.SDSNIVPD* data set.

### Related tasks

[Installation step 22: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

[Migration step 24: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

### Related reference

[DSNUTILS stored procedure \(deprecated\) \(Db2 SQL\)](#)

### Job DSNTEJ6R

Job DSNTEJ6R compiles, link-edits, binds, and runs sample C program DSN8ED8, which invokes the DSNUTILU stored procedure to execute a utility.

For convenience on TSO, the utility control statement that is input to DSN8ED8 is encoded in EBCDIC and converted to Unicode before being passed to DSNUTILU.

DSN8ED8 can accept either a utility statement or a file reference variable that specifies the name of a data set that contains a utility control statement. The specified data set must be in variable record format.

Job DSNTEJ6R uses the local Db2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if you specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ6R, ensure that DSNUTILU has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILU.

If DSNTEJ6R completes successfully, it produces the return codes that are shown in the table below.

Table 99. DSNTEJ6R return codes

Step	PROCSTEP	Return code
PH06RS00		0000
PH06RS01	PC	0000
	C	0000
	PLKED <a href="#">“1” on page 773</a>	0004
	LKED	0000
PH06RS02		0000 or 0004
PH06RS03		0000

### Note:

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

Output from a successful execution of DSNTEJ6R lists the parameters specified followed by the messages generated by the Db2 DIAGNOSE DISPLAY MEPL utility.

You can compare the output from this job with the sample output for DSNTEJ6U found in member DSN8TJ6U in your *prefix*.SDSNIVPD data set.

### Related concepts

[Utility control statements \(Db2 Utilities\)](#)

### Related tasks

[Installation step 22: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

[Migration step 24: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

### Related reference

[DSNUTILU stored procedure \(Db2 SQL\)](#)

### Job DSNTEJ6V

Job DSNTEJ6V compiles, link-edits, binds, and runs sample C++ program DSN8EE1, which invokes the DSNUTILS stored procedure to execute a utility.

Job DSNTEJ6V uses the local Db2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if the following conditions are met:

- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You indicated on panel DSNTIPU that an IBM C++ compiler is installed.

Before running job DSNTEJ6V, ensure that DSNUTILS has been created as part of the installation or migration process.

**Recommendation:** Use the DSNWLM\_UTILS core WLM environment for DSNUTILS.

If DSNTEJ6V completes successfully, it produces the return codes that are shown in the table below.

Table 100. DSNTEJ6V return codes

Step	PROCSTEP	Return code
PH06VS01	PC	0004
	CP	0000
	PLKED <sup>1</sup> on page 774	0004
	LKED	0004
PH06VS02	PC1	0000
	CP1	0000
	PC2	0004
	CP2	0000
	PLKED <sup>1</sup> on page 774	0004
	LKED	0000
PH06VS03		0000 or 0004
PH06VS04		0000

### Note:

1. The PLKED step does not exist in the job if the value of the CPP LE PRELINKER PHASE field is set to NO.

A successful execution of DSNTEJ6V unloads rows and columns from the PROJ sample table.

You can compare the output from this job with the sample output for DSNTEJ6V found in member DSN8TJ6V in your *prefix*.SDSNIVPD data set.

### Related tasks

[Installation step 22: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

[Migration step 24: Set up Db2-supplied routines](#)



Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

**Related reference**

[DSNUTILS stored procedure \(deprecated\) \(Db2 SQL\)](#)

**Job DSNTMJ6W**

Job DSNTMJ6W is a JCL job that creates and initializes a sample SAF resource profile. DSNTMJ6W also prepares, binds, and executes DSN8ED6.

DSN8ED6 is a C language caller of the WLM\_REFRESH stored procedure. It accepts the WLM environment name and, optionally, the subsystem ID and an SQLID to be in effect when WLM\_REFRESH is invoked.

If a name is specified in the WLM ENVIRONMENT field on installation panel DSNTIPX, the installation CLIST customizes DSNTMJ6W to run in and recycle that WLM environment.

DSNTMJ6W also includes commented-out job steps that show:

- How to prepare the DSNTWR external module from the DSNTWRS sample source code.
- How to prepare the DSNTWRE module from the DSNTWRE sample source code. DSNTWRE is used by DSNTWR.

Do not uncomment and run these jobs unless you maintain a customized copy of DSNTWRS or DSNTWRE. If you do not customize the source code, use the Db2-supplied DSNTWR and DSNTWRE modules in the *prefix*.SDSNLOAD library and the package that is bound by installation job DSNTIJRT.

Job DSNTMJ6W uses the local Db2 subsystem as both the client and the server subsystem.

Before running job DSNTMJ6W, ensure that WLM\_REFRESH has been created as part of the installation or migration process. If you are not authorized to create special resource profiles, have your system security administrator perform the first step of this job. The SQLID that is used to run DSNTMJ6W needs READ access to this profile.

If DSNTMJ6W completes successfully, it produces the return codes that are shown in the table below.

*Table 101. DSNTMJ6W return codes*

<b>Step</b>	<b>PROCSTEP</b>	<b>Return code</b>
PH06WS00 <sup>“1” on page 776</sup>	PC	0004
	ASM	0000
	LKED	0000
PH06WS01 <sup>“1” on page 776</sup>	PC	0000
	ASM	0000
	LKED	0000
PH06WS02 <sup>“1” on page 776</sup>		0000
PH06WS03	PC	0000
	C	0000
	PLKED <sup>“2” on page 776</sup>	0004
	LKED	0000
PH06WS04		0000 or 0004
PH06WS05		0000 or 0004

Table 101. DSNTEJ6W return codes (continued)

Step	PROCSTEP	Return code
<b>Notes:</b>		
1. Return codes for PH06WS00, PH06WS01 and PH06WS02 are generated only if the job steps are uncommented.		
2. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.		

### Related tasks

Installation step 22: Set up Db2-supplied routines

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

Migration step 24: Set up Db2-supplied routines

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

### Related reference

[WLM\\_REFRESH stored procedure \(Db2 SQL\)](#)

## Job DSNTEJ6Z

Job DSNTEJ6Z generates a report of current subsystem parameter settings. This report is generated by DSN8ED7, a C-language caller of stored procedure ADMIN\_INFO\_SYSPARM. You must have MONITOR1 privileges to run ADMIN\_INFO\_SYSPARM.

Job DSNTEJ6Z uses the local Db2 subsystem as both the client and the server subsystem.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ6Z, ensure that ADMIN\_INFO\_SYSPARM has been created as part of the installation or migration process.

If DSNTEJ6Z completes successfully, it produces the return codes that are shown in the table below.

Table 102. DSNTEJ6Z return codes

Step	PROCSTEP	Return code
PH06ZS01	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 776	0004
	LKED	0000
PH06ZS02		0000 or 0004
PH06ZS03		0000

### Note:

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

A successful execution of DSNTEJ6Z provides a report as shown in the figure below.

```
DSN8ED7: Sample DB2 Configuration Setting Report Generator
```

Macro Name	Parameter Name	Current Setting	Description/Install Field Name	Install Panel ID	Fld No.
DSN6SYSP	AUDITST	0000000000	AUDIT TRACE	DSNTIPN	1
DSN6SYSP	CONDBAT	0000010000	MAX REMOTE CONNECTED	DSNTIPE	4
DSN6SYSP	CTHREAD	00200	MAX USERS	DSNTIPE	2
DSN6SYSP	PCLOSEN	00010	RO SWITCH CHKPTS	DSNTIPL1	8
...					

Figure 93. DSNTJ6Z report format

### Related tasks

[Installation step 22: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

[Migration step 24: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

## Sample ODBA stored procedure

IMS Open Database Access (ODBA) support enables a Db2 stored procedure to directly connect to an IMS DBCTL system and issue DL/I calls to access IMS databases.

This sample ODBA stored procedure application consists of two jobs: DSNTJ61 and DSNTJ62. These jobs are part of the installation verification samples, which are located in *prefix*.NEW.SDSNSAMP. The installation CLIST tailored and loaded these jobs during your installation or migration.

**Requirements:** You must satisfy the following requirements when running these jobs:

- Run job DSNTJ61 before DSNTJ62.
- Ensure that Enterprise COBOL for z/OS is installed.
- Ensure that Language Environment is installed.
- Start a WLM-established stored procedure address space to run DSNTJ61 and DSNTJ62. You need to update the startup procedure for the WLM-established stored procedure address space to add the ODBA data set names to the STEPLIB and DFSRESLB concatenations. An example of a data set name for ODBA is IMSVS.RESLIB.

### Related tasks

[Assigning stored procedures and functions to WLM application environments \(Db2 Performance\)](#)

[Writing an external procedure to access IMS databases \(Db2 Application programming and SQL\)](#)

### Job DSNTJ61

Job DSNTJ61 prepares sample stored procedure DSN8EC1, which uses ODBA. DSN8EC1 can add, update, delete, and display telephone directory records from the IMS sample database, DFSIVD1. DSN8EC1 shows how the AERTDLI API is used to issue IMS DL/I calls.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before running job DSNTJ61, read the dependencies information of the job prolog to verify that the server site is correctly configured and has a connection to an IMS subsystem.

If DSNTJ61 runs successfully, it produces the return codes that are shown in the table below.

Table 103. DSNTEJ61 return codes

Step	PROCSTEP	Return code
PH061S01		0000
PH061S02		0000
PH061S03	PC	0004
	COB	0000
	PLKED <sup>“1” on page 778</sup>	0004
	LKED	0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related concepts**

Job DSNTEJ62

Job DSNTEJ62 prepares and invokes the sample client program DSN8EC2, which calls stored procedure DSN8EC1 multiple times to add, delete, and display telephone directory records. DSN8EC1 is created by job DSNTEJ61.

**Job DSNTEJ62**

Job DSNTEJ62 prepares and invokes the sample client program DSN8EC2, which calls stored procedure DSN8EC1 multiple times to add, delete, and display telephone directory records. DSN8EC1 is created by job DSNTEJ61.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local Db2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.
- You specified a name in the REMOTE LOCATION field of panel DSNTIPY. The name can match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR.

Before running DSNTEJ62, complete the manual editing that is described in the dependencies information in the job prolog.

If DSNTEJ62 runs successfully, it produces the return codes that are shown in the table below.

Table 104. DSNTEJ62 return codes

Step	PROCSTEP	Return code
PH062S01	PC	0000
	COB	0000
	PLKED <sup>“1” on page 779</sup>	0004
	LKED	0000
PH062S02		0000 or 0004

Table 104. DSNTEJ62 return codes (continued)

Step	PROCSTEP	Return code
PH062S03		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related concepts**

**Job DSNTEJ61**

Job DSNTEJ61 prepares sample stored procedure DSN8EC1, which uses ODBA. DSN8EC1 can add, update, delete, and display telephone directory records from the IMS sample database, DFSIVD1. DSN8EC1 shows how the AERTDLI API is used to issue IMS DL/I calls.

**Sample SQL procedures**

Db2 for z/OS provides applications for external SQL procedures and native SQL procedures.

The applications for external SQL procedures are:

- DSNTEJ63
- DSNTEJ64
- DSNTEJ65

C and Language Environment are required for jobs DSNTEJ63, DSNTEJ64, and DSNTEJ65.

The applications for native SQL procedures are:

- DSNTEJ66

**Related tasks**

[Assigning stored procedures and functions to WLM application environments \(Db2 Performance\)](#)

**Job DSNTEJ63**

Job DSNTEJ63 prepares the sample external SQL procedure, DSN8ES1, which accepts a department number and returns salary and bonus data.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

If a remote location was specified in the REMOTE LOCATION field of panel DSNTIPY, job DSNTEJ63 should be run on the remote server subsystem.

Before running DSNTEJ63, you should manually edit the job as described in the dependencies information in the job prolog.

If DSNTEJ63 runs successfully, it produces the return codes that are shown in the following table.

Table 105. DSNTEJ63 return codes

Step	PROCSTEP	Return code
PH063S01		0000

Table 105. DSNTEJ63 return codes (continued)

Step	PROCSTEP	Return code
PH063S02	PC	0004
	PCC	0004
	C	0000
	PLKED <sup>“1” on page 780</sup>	0004
	LKED	0000
PH063S03		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

**Job DSNTEJ64**

Job DSNTEJ64 prepares and executes DSN8ED3, which is a sample routine that calls the sample external SQL procedure, DSN8ES1. DSN8ES1 was created by job DSNTIJ63.

The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local Db2 subsystem is used as both the client and server.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTEJ64, ensure that job DSNTEJ6S was run on the server subsystem. Also run job DSNTEJ63 before running job DSNTEJ64. Before running DSNTEJ64, you should manually edit the job as described in the dependencies information in the job prolog.

If DSNTEJ64 runs successfully, it produces the return codes that are shown in the following table.

Table 106. DSNTEJ64 return codes

Step	PROCSTEP	Return code
PH064S01	PC	0000
	C	0000
	PLKED <sup>“1” on page 780</sup>	0004
	LKED	0000
PH064S02		0000 or 0004
PH064S03		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

You can compare the output from this job to the sample output for DSNTEJ64, which is found in member DSN8TJ64 in data set named *prefix*.SDSNIVPD.

## Job DSNTJ65

Job DSNTJ65 prepares and runs a sample application that calls the SYSPROC.DSNTPSMP stored procedure processor to create a sample external SQL procedure. The sample external SQL procedure is created at the location that is specified in the REMOTE LOCATION field of panel DSNTIPY.

Job DSNTJ65 then prepares and runs a sample application that calls the external SQL procedure. The sample caller first connects to the location that is specified in the REMOTE LOCATION field of panel DSNTIPY.

If a remote location is specified in the REMOTE LOCATION field name on installation panel DSNTIPY, ensure that both Db2 REXX language support and the DSNTPSMP stored procedure are available at that location. If the remote location name is the same as the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the local Db2 subsystem is used as both the client and server.

The major components of job DSNTJ65 are as follows:

- DSNWLM\_REXX is the WLM core environment for DSNTPSMP.
- DSN8ED4 is a sample C program that calls the Db2 external SQL procedures processor.
- DSN8ES2 is a sample external SQL procedure that calculates employee bonuses.
- DSN8ED5 is a sample C program that calls the external SQL procedure DSN8ES2.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running job DSNTJ65, ensure that DSNTPSMP has been created as part of the installation or migration process.

**Recommendation:** DSNTPSMP requires that the default EBCDIC CCSID that is used by Db2 also be compatible with the C compiler. Do not run DSNTJ65 if the default EBCDIC CCSID for Db2 is not compatible with the C compiler. Using an incompatible CCSID results in compile-time errors. Examples of incompatible CCSIDs include 290, 930, 1026, and 1155.

If DSNTJ65 runs successfully, it produces the return codes that are shown in the following table.

Table 107. DSNTJ65 return codes

Step	PROCSTEP	Return code
PH065S01	PC	0000
	C	0000
	PLKED <a href="#">"1" on page 782</a>	0004
	LKED	0000
PH065S02		0000 or 0004
PH065S03		0000 or 0004
PH065S04		0000 or 0004
PH065S05	PC	0000
	C	0000
	PLKED <a href="#">"1" on page 782</a>	0004
	LKED	0000
PH065S06		0000 or 0004

Table 107. DSNTEJ65 return codes (continued)

Step	PROCSTEP	Return code
PH065S07		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

You can compare the output from this job to the sample output for DSNTEJ65, which is found in member DSN8TJ65 in the data set named *prefix.SDSNIVPD*.

**Related tasks**

Installation step 22: Set up Db2-supplied routines

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects.

Migration step 24: Set up Db2-supplied routines

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

**Job DSNTEJ66**

Job DSNTEJ66 creates a sample native SQL procedure. It also prepares and executes a sample caller of that SQL procedure on the local Db2 subsystem. It then modifies the SQL procedure slightly, activates the change on the local subsystem, and executes the sample caller to call the updated SQL procedure.

Specifically, job DSNTEJ66 completes the following actions:

- Creates a sample native SQL procedure called DSN8.DSN8ES3 that generates and returns a CREATE PROCEDURE statement for a given stored procedure.
- Prepares and executes a sample caller of DSN8ES3 called DSN8ED9.
- Illustrates how to use ALTER PROCEDURE... ADD VERSION to create a version V2 of DSN8ES3 that does the same thing as the original version but also adds a terminating semicolon at the end of the generated CREATE PROCEDURE statement.
- Illustrates how to use ALTER ACTIVATE to make version V2 the active version of DSN8ES3.
- If you specify a remote Db2 subsystem in the REMOTE LOCATION field and it does not match the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, additional job steps do the following:
  - Deploys the sample native SQL procedure on the remote Db2 subsystem.
  - Binds the sample caller on the remote Db2 subsystem and execute it to call the native SQL procedure at that site.

If the REMOTE LOCATION field is blank or matches the name that is specified in the DB2 LOCATION NAME field of panel DSNTIPR, the deploy-related steps are removed from DSNTEJ66 by the installation CLIST.

As part of the setup for deploying DSN8ES3 on a remote server, the DSNTPE2 application needs to be able to connect to the remote site.

The installation CLIST edits this job only if the following conditions are met:

- You specified AUTO or COMMAND in the DDF STARTUP OPTION field of panel DSNTIPR.
- You specified a name in the WLM ENVIRONMENT field of panel DSNTIPX.

Before running DSNTEJ66, perform the manual editing described in the dependencies information in the job prolog. You must also manually tailor DSN8WLMPL, the sample WLM startup procedure for DSNTPSMP. If DSNTEJ66 runs successfully, it produces the return codes that are shown in the table below.



Table 108. DSNTEJ66 return codes

Step	PROCSTEP	Return code
PH066S01		0000
PH066S02		0000
PH066S03		0000
PH066S04	PC	0000
	C	0000
	PLKED <sup>“1”</sup> on page 783	0004
	LKED	0000
PH066S05		0000 or 0004
PH066S06		0000
PH066S07		0000
PH066S08		0000
PH066S09		0000
PH066S10		0000
PH066S11		0000
PH066S12		0000 or 0004
PH066S13		0000
PH066S14		0000
PH066S15		0000 or 0004
PH066S16		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

You can compare the output from this job to the sample output for DSNTEJ66, which is found in member DSN8TJ66 in the data set named *prefix*.SDSNIVPD.

**Job DSNTEJ67**

Job DSNTEJ67 shows how to convert sample external SQL procedure DSN8.DSN8ES2 to a sample native SQL procedure called DSN8.DSN8ES2. The conversion is performed by the Db2 precompiler and various Db2 sample REXX services that are provided in member DSN8ERL1.

Before running job DSNTEJ67, you must successfully run job DSNTEJ65 to create DSN8.DSN8ES2 through the Db2 SQL procedure processor, DSNTPSMP. See the job DSNTEJ67 prolog for information about adapting this job to convert other SQL procedures that are created through DSNTPSMP.

Table 109. DSNTEJ67 return codes

Step	PROCSTEP	Return code
PH067S00		0000
PH067S01		0000
PH067S02		0000

Table 109. DSNTSJ67 return codes (continued)

Step	PROCSTEP	Return code
PH067S03		0000
PH067S04		0000 or 0004

## Phase 7: Accessing LOB data

Phase 7 of the installation or migration verification process is an optional phase that demonstrates how to set up and use a Db2 LOB application. This phase creates an extension to the Employee sample database to manage employee resumes and photo images.

You run these jobs in this phase:

- DSNTSJ7: Creates and loads the employee resume and photo table.
- DSNTSJ71, DSNTSJ76: Uses LOB locators to populate the photo images, then validates that the resume and photo data is stored correctly.
- DSNTSJ73, DSNTSJ77: Prepares an ISPF application for viewing employee resume data.
- DSNTSJ75, DSNTSJ78: Prepares a GDDM application for viewing employee photo images.

Jobs DSNTSJ75 and DSNTSJ78 are not tailored by the installation CLIST unless you specify non-blank values for GDDM MACLIB and GDDM LOAD MODULES on panel DSNTIPW.

After you run these jobs, you can use ISPF and GDDM to view the sample employee resume and photo data.

### Job DSNTSJ7

Job DSNTSJ7 demonstrates how to create a LOB table with all the accompanying LOB table spaces, auxiliary tables, and indexes. DSNTSJ7 also demonstrates how to use the Db2 LOAD utility to load a LOB table.

Job DSNTSJ7 consists of the following steps:

Step	Function
1	Drops sample LOB objects
2	Creates sample Employee Resume and Photo LOB table
3	Creates aliases for the table, then grants access to it
4	Uses the Db2 LOAD utility to populate the table
5	Generates run time statistics on the table

If DSNTSJ7 runs successfully, it produces the return codes that are shown in the table below.

Table 110. DSNTSJ7 return codes

JOBSTEP	PROCSTEP	Return Code
PH07S01		0000
PH07S02		0000
PH07S03		0000 or 0004
PH07S04	DSNUPROC	0000
PH07S05	DSNUPROC	0000

Table 110. DSNTEJ7 return codes (continued)

JOBSTEP	PROCSTEP	Return Code
PH07S06		0000
PH07S07		0000

## Job DSNTEJ71 (optional)

Job DSNTEJ71 compiles, link-edits, and binds two sample applications that manipulate LOB data.

The DSN8DLPL sample application demonstrates how to use LOB locators to populate a LOB column. The DSN8DLTC sample application validates the contents of the LOB table, verifying that it was populated correctly.

In previous releases, you had to run job DSNTEJ71 to populate LOB columns that were greater than 32 KB. In Db2 12, the LOAD utility populates all columns of the sample LOB table, so job DSNTEJ71 is optional.

If DSNTEJ71 runs successfully, it produces the return codes that are shown in the table below.

Table 111. DSNTEJ71 return codes

JOBSTEP	PROCSTEP	Return Code
PH071S01	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 785	0004
	LKED	0000
PH071S02	PC	0000
	C	0000
	PLKED <sup>1</sup> on page 785	0004
	LKED	0000
PH071S03		0000
PH071S04		0000
PH071S05		0000

### Note:

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

You can compare the output from this job with the sample output for DSNTEJ71 found in member DSN8TJ71 in your *prefix.SDSNIVPD* data set.

## Job DSNTEJ73

Job DSNTEJ73 compiles the DSN8DLRV sample application. DSN8DLRV demonstrates how to use built-in functions like POSSTR and SUBSTR to traverse a CLOB column and extract data from it.

DSN8DLRV is written in C language and linked with ISPF and Db2 Call Attach Facility. The package name and plan name are both DSN8LRvr, where *vr* is the Db2 version and release.

If DSNTEJ73 runs successfully, it produces the return codes that are shown in the table below.

Table 112. DSNTEJ73 return codes

JOBSTEP	PROCSTEP	Return Code
PH073S01	PC	0004
	C	0000
	PLKED <sup>“1”</sup> on page 786	0004
	LKED	0000
PH073S02	PC	0000
	C	0000
	PLKED <sup>“1”</sup> on page 786	0004
	LKED	0000
PH073S03		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

**Related tasks**

Starting an application in an ISPF/TSO environment in phase 7

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

## Job DSNTEJ75

Job DSNTEJ75 runs sample program DSN8DLPV, which demonstrates how to manipulate BLOB data (employee photo images).

This job is not edited by the CLIST unless the GDDM MACLIB and GDDM LOAD MODULES fields on panel DSNTIPW are non-blank.

DSN8DLPV is a C language program that is linked with ISPF, GDDM and the Db2 Call Attach Facility. The package name and plan name are both DSN8LPvr, where vr is the Db2 version and release. To run DSN8DLPV you must include the GDDM load module library (SADMMOD) in the logon procedure or in the ISPLLIB concatenation.

If DSNTEJ75 runs successfully, it produces the return codes that are shown in the table below.

Table 113. DSNTEJ75 return codes

JOBSTEP	PROCSTEP	Return Code
PH075S01	PC	0000
	C	0000
	PLKED <sup>“1”</sup> on page 786	0004
	LKED	0000
PH075S02		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the C LE PRELINKER PHASE field is set to NO.

**Related tasks**

Starting an application in an ISPF/TSO environment in phase 7

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

## Job DSNTEJ76

Job DSNTEJ76 compiles, link-edits, and binds two sample COBOL applications that manipulate LOB data.

The DSN8CLPL sample application demonstrates how to use LOB locators to populate a LOB column that is larger than 32 KB. The DSN8CLTC sample application validates the contents of the LOB table, verifying that it was populated correctly.

If DSNTEJ76 runs successfully, it produces the return codes that are shown in the table below.

Table 114. DSNTEJ76 return codes

JOBSTEP	PROCSTEP	Return code
PH076S01	PC	0000
	COB	0000
	PLKED <sup>1</sup> on page 787	0004
	LKED	0000
PH076S02	PC	0000
	COB	0000
	PLKED <sup>1</sup> on page 787	0004
	LKED	0000
PH076S03		0000 or 0004
PH076S04		0000
PH076S05		0000

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

After running DSNTEJ76, you can compare the output with the sample output for DSNTEJ76 found in member DSN8TJ76 in your *prefix.SDSNIVPD* data set.

## Job DSNTEJ77

Job DSNTEJ77 compiles the DSN8CLRV sample COBOL application. DSN8CLRV demonstrates how to use built-in functions, such as POSSTR and SUBSTR, to traverse a CLOB column and extract data from it.

DSN8CLRV is written in the COBOL language and linked with ISPF and Db2 Call Attach Facility. The package name and plan name are both DSN8CRvr, where vr is the Db2 version and release.

To run DSN8CLRV, you must run the first step of job DSNTEJ73 to compile DSN8SDM.

If DSNTEJ77 runs successfully, it produces the return codes that are shown in the table below.

Table 115. DSNTEJ77 return codes

JOBSTEP	PROCSTEP	Return Code
PH077S01	PC	0000
	COB	0000
	PLKED <sup>1</sup> on page 788	0004
	LKED	0000

Table 115. DSNTEJ77 return codes (continued)

JOBSTEP	PROCSTEP	Return Code
PH077S02		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related tasks**

[Starting an application in an ISPF/TSO environment in phase 7](#)

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

## Job DSNTEJ78

Job DSNTEJ78 runs sample COBOL program DSN8CLPV, which demonstrates how to manipulate BLOB data (employee photo images).

This job is not edited by the CLIST unless the GDDM MACLIB and GDDM LOAD MODULES fields on panel DSNTIPW are non-blank.

DSN8CLPV is a COBOL language program linked with ISPF, GDDM and the Db2 Call Attach Facility. The package name and plan name are both DSN8CPvr, where vr is the Db2 version and release. To run DSN8CLPV you must include the GDDM load module library (SADMMOD) in the logon procedure or in the ISPLLIB concatenation.

If DSNTEJ78 runs successfully, it produces the return codes that are shown in the table below.

Table 116. DSNTEJ78 return codes

JOBSTEP	PROCSTEP	Return Code
PH078S01	PC	0000
	COB	0000
	PLKED <sup>1</sup> on page 788	0004
	LKED	0000
PH078S02		0000 or 0004

**Note:**

1. The PLKED step does not exist in the job if the value of the COBOL LE PRELINKER PHASE field is set to NO.

**Related tasks**

[Starting an application in an ISPF/TSO environment in phase 7](#)

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

## Starting an application in an ISPF/TSO environment in phase 7

You must have access to ISPF load module libraries to run the Employee Resume and Photo sample applications.

### Procedure

To start the application:

1. Enter a CALL command from option 6 of the ISPF primary option menu.

2. To start the Employee Resume and Photo sample applications, enter the following:

```
CALL 'prefix.RUNLIB.LOAD(DSN8SDM)'
```

After you enter this command, Db2 displays the sample applications panel.

Choosing option 4 or option 6 on the sample applications panel during Phase 7 invokes the "Employee Resume" sample application, which processes CLOB data. Choosing option 5 or option 7 on the sample applications panel during Phase 7 invokes the "Employee Photo" sample application, which processes BLOB data.

### **Related tasks**

[Working with the employee resume and photo scenarios](#)

The LOB sample application extends the existing Db2 sample employee database by adding a new table for storing employee resumes and photographs as CLOB and BLOB entries.

[Starting an application in an ISPF/TSO environment](#)

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

[Make DB2I panels, messages, and load modules available to ISPF and TSO](#)

During migration, to connect the Db2 Interactive facility (DB2I) to TSO, you must make panels, messages, and load modules available to ISPF and TSO.

## **The sample applications**

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After you run the installation verification jobs, you can use the sample applications to test and verify your new installation or migration.

The names of the sample applications have changed for Db2 12. Check to make sure you have the authority to run the Db2 12 sample programs.

Brief scenarios describe how to display, update, add, and delete information using the sample applications. Another scenario describes how to view or change information using a combination of organization and project applications. This scenario contains problem-solving exercises based upon creating and staffing a new department with new projects.

The output from the installation verification steps discussed here appears in your *prefix.SDSNIVPD* data set.

### **Related tasks**

[Managing explicit privileges \(Managing Security\)](#)

## **Printing options for the sample application listings**

The source statements that are contained in *prefix.SDSNSAMP* can be printed using ISPF facilities, IEBPTPCH, or local facilities.

Most of the Db2 sample applications are contained in *prefix.SDSNSAMP*. The modules making up the SQLCA formatter routine (DSNTIAR, DSNTIAC, DSNTIA1, and DSNTIAM) are not in the *prefix.SDSNSAMP* library. They are provided in object form in *prefix.SDSNLOAD*.

You might not want to print all members of *prefix.SDSNSAMP* because some of the members are large and contain unprintable data. An alternative is to precompile and compile the wanted program by specifying a cross-reference to the precompiler and compiler. This provides a cross-reference for program variables and is current.

## **The sample application panels**

When you run the interactive sample applications, the sample application panels require you to enter information such as the action you want to complete.

You are prompted for the following information when you run the interactive sample applications.

Sample Applications	Distributed Sample Applications
<ul style="list-style-type: none"> <li>• MAJOR SYSTEM</li> <li>• ACTION</li> <li>• OBJECT</li> <li>• SEARCH CRITERIA</li> <li>• DATA</li> </ul>	<ul style="list-style-type: none"> <li>• ACTION</li> <li>• OBJECT</li> <li>• SEARCH CRITERIA</li> <li>• LOCATION</li> <li>• DATA</li> </ul>

Regard these categories as a family of values that are used together to specify a task that is to be performed. For MAJOR SYSTEM, ACTION, OBJECT, and SEARCH CRITERIA, a character code of one or two characters is used as a form of shorthand to indicate the criteria that you want. The system provides a list of these codes with their meanings. A valid location name of 1 to 16 characters must be used for LOCATION. The value for DATA must be consistent with the data type and length of SEARCH CRITERIA.

### MAJOR SYSTEM

**MAJOR SYSTEM** specifies the major application area. In the sample application, there are two major systems: organization and project. These major systems are implemented in separate transactions to keep the plan sizes reasonable. If you are running the Db2 distributed sample program, organization is the only system; therefore, this criterion is not used.

### ACTION

**ACTION** specifies what you want to do with the object (specified on another line of the panel). You can display, update, add (insert), or erase (delete) information about the specified object.

### OBJECT

**OBJECT** specifies the object about which you want information. Normally, the action is associated with the object. Examples of objects are information about an employee (EM) or information about the relationship among departments (DS).

Objects can be specified with the following codes for the organization application:

#### DE

Department—general department and manager information for department specified

#### DS

Department structure—hierarchy information for department specified

#### EM

Employee—information concerning employee specified.

Objects can be specified with the following codes for the project application:

#### PS

Project structure—information on projects and subprojects

#### AL

Activity listing—information concerning the different activities that makes up a project

#### PR

Project—general project information

#### AS

Activity staffing—information about the employees staffed for activities of specified projects

#### AE

Activity estimate—information concerning the estimated staffing and time requirements of specified projects.

You are able only to add, update, or erase information about the selected object, although you can search and display based on other criteria. Items that are added or updated can be changed on the screen. Other fields are protected.

### SEARCH CRITERIA

**SEARCH CRITERIA** helps to locate the specific item of information upon which to act.



The following codes can be specified for the search criteria field for the organization application:

- DI** Department number
- DN** Department name
- EI** Employee number
- EN** Employee name
- MI** Manager number
- MN** Manager name.

The following codes can be specified for the search criteria for the project application:

- DI** Department number
- DN** Department name
- EI** Employee number
- EN** Employee name
- PI** Project number
- PN** Project name
- RI** Responsible person number
- RN** Responsible person name.

#### **LOCATION**

**LOCATION** is used only for the distributed application. It describes the location where the action is to take place. If this criterion is left blank, then the local location is assumed.

#### **DATA**

**DATA** further identifies the search criteria target. The data value specified must be consistent with the data type and length of the search criteria code. If the search criterion is an employee name (**EN**), manager name (**MN**), or responsible person name (**RN**), the value of data must be a person's last name.

Data values can be specified by using either primary selection or secondary selection. *Primary selection* is the data value itself. Only one set of data values fulfills the request. *Secondary selection* allows multiple sets of data values to fulfill the request. A brief summary of the sets of data values appear on the screen. Each summary has an associated line number. To display additional information about a certain line, enter the line number in the DATA field. Secondary selection allows the application to display a set of values and then provides a prompt to select a specific DATA value. For example, you can display information about a department (**DE**) (the OBJECT) with a department number (**DI**) (the SEARCH CRITERIA) with a **DATA** value of D11.

#### **Related concepts**

##### Connecting distributed database systems

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

##### DATA field values on the sample application panels

When you run the interactive sample applications, you must use the sample application panels to enter information about the task that you want to complete. Information that is entered in the DATA field on the sample application panels is used with the SEARCH CRITERIA field to define a search.

## Allowable combinations of values on the sample application panels

The codes on the sample application panels cannot be combined indiscriminately.

For instance, manager number (MI) is a valid search criterion for a department (DE), but employee number (EI) and project number (PI) cannot be used to locate a department.

You can retrieve data by having the panels prompt you for the proper values. It is not necessary to enter the values one line at a time. If you already know all the values you want, they can be entered at the same time. If the values are only partially entered, you must start with ACTION and enter each value in sequence, not skipping over any values. For example, if you know all the values except OBJECT, only ACTION can be entered. You are prompted for OBJECT. Then you can enter OBJECT, SEARCH CRITERIA, and DATA.

## DATA field values on the sample application panels

When you run the interactive sample applications, you must use the sample application panels to enter information about the task that you want to complete. Information that is entered in the DATA field on the sample application panels is used with the SEARCH CRITERIA field to define a search.

The values available for DATA are not limited to a select few as are the values for ACTION and OBJECT. There is a wider choice of DATA values and a variety of ways to express them.

If you know only part of a DATA value (for example, you know the department number begins with D), you can specify it as a *pattern*. The pattern can contain any character string with a special meaning, such as:

- The underscore character, `_`, represents any single character.
- The percent character, `%`, represents any string of zero or more characters.

These two special characters can be used in conjunction with other characters to specify a DATA value. The following table demonstrates three ways to use these characters to create a DATA value.

*Table 117. Searching for data values*

Data Value	Search Criteria	Description
%SMITH%	EN (Employee name)	Searches for any last name that contains the word SMITH; for example, BLACKSMITH, SMITHSONIAN, or NESMITHA
E_1	DI (Department number)	Searches for any department number with E in position 1 and 1 in position 3; for example, E71, E21, or EB1
%	Any	All values qualify

The values entered on the SEARCH CRITERIA and DATA fields can choose only one item to be displayed. However, the more usual case is that several items are displayed as a list. When this is the case, a secondary selection can be made by choosing the line number of the item of interest.

## Function keys on the sample application panels

The bottom line of each sample application panel displays the function keys that are active for that panel.

**Function key 2—Resend:** If the panel is blanked out (for example, you pressed the CLEAR key) or you want to refresh the panel, press function key 2 to return (resend) the display you were viewing to the terminal.

**Function key 3—End** To terminate the application, press function key 3 to clear the screen and continue with other transactions.

**Function key 8—Next:** Sometimes a display of information is too large to fit on one panel. Press function key 8 to scroll forward (the lines move upward).

**Function key 10—Left:** Press function key 10 to move the field of vision up one level in the department structure. For instance, in the organization application, Department E01 is shown on the left, and its subdepartments are shown on the right. When you press function key 10, the screen scrolls so that Department E01 is moved from the left side of the panel to the right side and the department to which it reports appears on the left. All other departments that report to the department now on the left also appear along with Department E01 on the right. Function key 10 performs this function only for IMS and CICS samples.

### **Related tasks**

Working with the organization application scenario

The organization application scenario shows how to display a list of departments within an organization and the structure of one of these departments.

## **Working with scenarios**

---

Work with the scenarios for using the sample applications. The method for invoking these applications depends on the environment that you are working in.

### **About this task**

When an application runs, many areas on the display panel might be highlighted. The data that you enter might not be highlighted, depending on the type of panel that is displayed.

### **Related tasks**

Starting an application in an ISPF/TSO environment in phase 6

You must have access to ISPF load module libraries in order to run the ISPF/CAF sample application.

Starting an application in a CICS environment

After logging on to CICS, you can start an organization application or project application in the CICS environment.

Starting an application in an IMS environment

After logging on to IMS, you can start the organization application or project application.

Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

## **Working with the project application scenario**

The project application scenario demonstrates how to view details of a project and update activities that are associated with a project.

### **About this task**

For example, you can find the person responsible for a project and list the activities that are assigned to one of its subprojects. Phase 4 (IMS) and Phase 5 (CICS) prepare the programs that you execute.

### **Procedure**

Enter the following values on the first panel of the project application:

- On the MAJOR SYSTEM line, enter P for project.
- On the ACTION line, enter D for display.
- On the OBJECT line, enter PS for project structure.
- On the SEARCH CRITERIA line, enter PI for project ID.

- On the DATA line, enter MA2100 as the project ID.

The following example panel shows the selected project and its corresponding subprojects.

```

                PROJECT STRUCTURE
MAJOR SYSTEM ...: P          PROJECTS
ACTION .....: D          DISPLAY (SHOW)
OBJECT .....: PS         PROJECT STRUCTURE
SEARCH CRITERIA.: PI      PROJECT ID
DATA .....: MA2100

PROJECT ID & NAME          SUBPROJECT ID & NAME
RESPONSIBLE ID & NAME      RESPONSIBLE ID & NAME

MA2100 WELD LINE AUTOMATION    MA2110 W L PROGRAMMING
000010 CHRISTINE I HAAS       000060 IRVING F STERN

                                PL2100 WELD LINE PLANNING
                                000020 MICHAEL L THOMPSON

PFK: 02=RESEND 03=END 08=NEXT 10=LEFT

```

Figure 94. Project application—viewing a project structure

## Updating an activity

You can use the project application to update an activity information for a project, such as the estimated start date.

### About this task

Suppose that you want to update activity information for a project with ID IF1000.

### Procedure

To update the activity:

1. Enter the following values:
  - On the MAJOR SYSTEM, enter P for project.
  - On the ACTION line, enter U for update.
  - On the OBJECT line, enter AE for activity estimate.
  - On the SEARCH CRITERIA line, enter PI for project ID.
  - On the DATA line, enter IF1000 as the project ID.
2. Press the ENTER key, and a list of project IF1000 activities appears on the panel.
3. Choose the activity to be updated. For instance, if you want to update the first activity listed, enter 1 as the DATA value and press the ENTER key. The next panel shows information about the estimated mean staffing requirements of this activity as well as the start and completion dates.
4. To change information about the estimated end date, enter data over the existing information displayed on that input line.
5. After you have verified the change, press ENTER.

The next panel displays the updated information, as shown in the following figure:

```

                UPDATING OF AN ACTIVITY ESTIMATE
MAJOR SYSTEM ...: P          PROJECTS
ACTION .....: U          UPDATE (CHANGE)
OBJECT .....: AE         ACTIVITY ESTIMATE
SEARCH CRITERIA : PI       PROJECT ID
DATA .....: 01
DSN8024I DSN8MPX - ACTIVITY SUCCESSFULLY UPDATED
  PROJECT ID          : IF1000
    NAME              : QUERY SERVICES

  ACTIVITY ID        :          90
    KEYWORD           : ADMQS
    DESCRIPTION       : ADM QUERY SYSTEM
    EST MEAN STAFFING :          2.00
    EST START DATE    : 1982-01-01
    EST END DATE      : 1983-04-15

PFK: 02=RESEND 03=END

```

Figure 95. Project application—changes accepted

- To terminate the project application, press the PF3 key.  
The APPLICATION TERMINATED message is displayed.

### What to do next

If you are using CICS, clear the screen and enter a new transaction code. If you are using IMS, clear the screen and enter a new transaction code or a /FORMAT command.

## Working with the organization application scenario

The organization application scenario shows how to display a list of departments within an organization and the structure of one of these departments.

### About this task

This application is executed in Phase 4 for IMS and Phase 5 for CICS.

### Procedure

To display a list of departments and the structure of one of the departments:

- After you enter the appropriate transaction code, you see the first panel of the project application. Enter the following values:
  - On the MAJOR SYSTEM, enter O for organization.
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter DS for department structure.
  - On the SEARCH CRITERIA line, enter DI for department number.
  - On the DATA line, enter %, which enables you to display a list of all the departments.

Each department entry is numbered on the far left side of the panel as shown in the figure below.

```

DEPARTMENT ADMINISTRATIVE STRUCTURE SELECTION
MAJOR SYSTEM ....: 0          ORGANIZATION
ACTION .....: D          DISPLAY (SHOW)
OBJECT .....: DS         DEPARTMENT STRUCTURE
SEARCH CRITERIA.: DI      DEPARTMENT ID
DATA .....: %
SELECT A DEPARTMENT FROM FOLLOWING LIST BY SPECIFYING THE LINE NUMBER
NO D/ID DEPARTMENT NAME M/ID MANAGER NAME
01 A00 SPIFFY COMPUTER SERVICES DIV. 000010 CI HAAS
02 B01 PLANNING 000020 ML THOMPSON
03 C01 INFORMATION CENTER 000030 SA KWAN
04 D01 DEVELOPMENT CENTER
05 D11 MANUFACTURING SYSTEMS 000060 IF STERN
06 D21 ADMINISTRATION SYSTEMS 000070 ED PULASKI
07 E01 SUPPORT SERVICES 000050 JB GEYER
08 E11 OPERATIONS 000090 EW HENDERSON
09 E21 SOFTWARE SUPPORT 000100 TQ SPENSER
PFK: 02=RESEND 03=END 08=NEXT

```

Figure 96. Organization application—viewing a list of departments

- To retrieve further information, specify a line number as a data value. This method is called secondary selection. Secondary selection provides prompts to aid in finding the information to be displayed, added, erased, or updated. If only one entry possibility exists, secondary selection is not offered. For example, to view the structure of Department E01, specify a data value of 7 on the DATA entry line (7 is the line number of the entry for Department E01). The result of entering the data value of 7 is a display of Department E01 and its departments as shown in the figure below. The department manager for E01 is listed on the left, and the departments of E01 are listed on the right. Employees of E01 are listed below the subdepartments of E01.

```

DEPARTMENT ADMINISTRATIVE STRUCTURE
MAJOR SYSTEM ....: 0          ORGANIZATION
ACTION .....: D          DISPLAY (SHOW)
OBJECT .....: DS         DEPARTMENT STRUCTURE
SEARCH CRITERIA.: DI      DEPARTMENT ID
DATA .....: 07

DEPARTMENT ID & NAME          SUBDEPARTMENT ID, NAME & MANAGER
MANAGER ID & NAME            EMPLOYEE ID & NAME
E01 SUPPORT SERVICES        E11 OPERATIONS
000050 JOHN B GEYER        000090 EILEEN W HENDERSON

                                E21 SOFTWARE SUPPORT
                                000100 THEODORE Q SPENSER

                                000050 JOHN B GEYER

PFK: 02=RESEND 03=END 08=NEXT 10=LEFT

```

Figure 97. Organization application—viewing a department structure

## Starting a new operation

You can use the organization application to start a new operation such as displaying or updating a department structure.

### Procedure

Choose one of the following actions:

- Move the cursor to the D on the ACTION line and retain the D or change it to a different action (add, erase, or update). Follow the displayed options to perform your selected action.
- Alternatively, you can leave the organization application by pressing the PF3 key. If you are using CICS, enter the transaction code. If you are using IMS, clear the screen and enter the /FORMAT command to select the project application. In either case, to proceed with a different operation, select a different ACTION, OBJECT, and so forth.

## Adding a new department

You can use the organization application to add a new department and specify information about the department.

### Procedure

To add a department to the organization:

1. Start the organization application and enter the following values:
  - On the MAJOR SYSTEM line, enter O for organization
  - On the ACTION line, enter A for add (insert)
  - On the OBJECT line, enter DE for the department that is to be added
  - On the SEARCH CRITERIA line, enter DI for department ID
  - On the DATA line, enter C11, the specific department number
2. Next, you can enter the details of the new department. The four department fields are department number, department name, manager number, and administration department number. Enter the following values:
  - INFORMATION SERVICES for department name
  - 000130 for manager number
  - C01 for the administration department number

Press ENTER to display the panel shown in the figure below. The panel shows the successful addition of the new department.

```
                ADDING A NEW DEPARTMENT
MAJOR SYSTEM ....: O           ORGANIZATION
ACTION .....: A           ADD (INSERT)
OBJECT .....: DE          DEPARTMENT
SEARCH CRITERIA.: DI       DEPARTMENT ID
DATA .....: C11
DSN8012I DSN8MPE - DEPARTMENT SUCCESSFULLY ADDED
  DEPARTMENT ID      : C11
    NAME             : INFORMATION SERVICES
  MANAGER ID        : 000130
  ADMIN DEP ID      : C01
MANAGER ID         : 000130
  FIRST NAME        : DOLORES
  MIDDLE INITIAL    : M
  LAST NAME         : QUINTANA
  WORK DEPT ID     : C01

PFK: 02=RESEND 03=END
```

Figure 98. Organization application—adding a department

### Related tasks

#### Starting a new operation

You can use the organization application to start a new operation such as displaying or updating a department structure.

### Deleting an entry

You can use the organization application to delete an entry from the department table.

### About this task

Deleting an entry from the department table is a function of the organization major system.

## Procedure

To delete an entry from the department table:

1. Replace the following values on the panel that is on your screen:

- On the MAJOR SYSTEM line, enter O for organization.
- On the ACTION line, enter E for erase.
- On the OBJECT line, enter DE for department.
- On the SEARCH CRITERIA line, enter DI for department ID.
- On the DATA line, enter C11 for department name.

2. Press ENTER to display the panel shown in the figure below.

```
          ERASING A DEPARTMENT
MAJOR SYSTEM ...: O          ORGANIZATION
ACTION .....: E          ERASE (REMOVE)
OBJECT .....: DE         DEPARTMENT
SEARCH CRITERIA.: DI      DEPARTMENT ID
DATA .....: C11
PRESS ENTER TO ERASE A DEPARTMENT
  DEPARTMENT ID      : C11
      NAME           : INFORMATION SERVICES
  MANAGER ID        : 000130
      ADMIN DEP ID   : C01
  MANAGER ID        : 000130
      FIRST NAME     : DOLORES
      MIDDLE INITIAL : M
      LAST NAME      : QUINTANA
      WORK DEPT ID   : C01

PFK: 02=RESEND 03=END
```

Figure 99. Organization application—deletion successful

3. Press ENTER again to verify the erase action. The following message appears on the panel:

```
DSN8013I      csect DEPARTMENT SUCCESSFULLY ERASED
```

## Related tasks

### [Starting a new operation](#)

You can use the organization application to start a new operation such as displaying or updating a department structure.

## Transferring an employee

The procedure for transferring one employee to another department and replacing that employee involves several steps.

## About this task

In this scenario, John B. Geyer (manager of the department for Support Services) is transferred to the staff of Spiffy Computer Service Division. Bruce Adamson is assigned as manager of Support Services.

To move Adamson into his new position as manager of Support Services, you must determine his employee number. Transferring an employee is a function of the organization major system.

## Procedure

To transfer an employee to another department:

1. Start the organization application and enter the following values:
  - On the MAJOR SYSTEM, enter O for organization.



- On the ACTION line, enter D for display.
  - On the OBJECT line, enter EM for employee.
  - On the SEARCH CRITERIA line, enter EN for employee name.
  - On the DATA line, enter ADAMSON as the specific employee name.
2. Press ENTER to display the panel showing that Adamson's employee number is 000150.
  3. The next step is for you to change the manager number for the Support Services department to Adamson's number, 000150. But first you must find the Support Services department. To do this, change ACTION to U (update), OBJECT to DE (department), and SEARCH CRITERIA to DN (department name). Change DATA to %SUPPORT% to specify any department with the word SUPPORT in it.
  4. Press ENTER, and a list of departments with support in their name is displayed. Support Services has line number 01. Enter this number at DATA. (The leading zero is not needed.)
  5. Press ENTER to display the next panel. The only values that can be changed are department name, manager ID, and administration department ID. Enter Adamson's employee number in the Support Services department after MANAGER ID. At this point, the data on the manager still pertains to Geyer.
  6. Press ENTER to display the panel that shows Adamson as manager of Support Services. The work department ID shown (D11) is still Adamson's old number. To change Adamson's work department ID, enter EM for OBJECT, enter EI for SEARCH CRITERIA, and change the employee number to 000150 for DATA.
  7. Press ENTER to display the employee information on Adamson. Now that information on Adamson can be updated. The fields that can be changed are employee first name, middle initial, last name, and work department ID. Enter the middle initial for Adamson, which was not in the database, and the department number E01. Press ENTER, and the information on Adamson is updated, including his new department number.
  8. The final step is to move Geyer to the correct department. Change the SEARCH CRITERIA and DATA to EN and GEYER, respectively. Press ENTER to obtain the next panel. The employee ID, name, and work department ID can be changed on this panel. However, the only change necessary in this case is to change Geyer's work department ID to his new one, A00. The panel in the figure below shows the completed entry.

```

                                UPDATING AN EMPLOYEE
MAJOR SYSTEM ....: 0           ORGANIZATION
ACTION .....: U             UPDATE (CHANGE)
OBJECT .....: EM           EMPLOYEE
SEARCH CRITERIA.: EN        EMPLOYEE NAME
DATA .....: GEYER
DSN8004I DSN8MPF - EMPLOYEE SUCCESSFULLY UPDATED
  DEPARTMENT ID      : A00
    NAME             : SPIFFY COMPUTER SERVICE DIV.
    MANAGER ID       : 000010
    ADMIN DEP ID     : A00
EMPLOYEE ID         : 000050
  FIRST NAME        : JOHN
  MIDDLE INITIAL    : B
  LAST NAME         : GEYER
  WORK DEPT ID      : A00

PFK: 02=RESEND 03=END

```

*Figure 100. Organization application—employee data update completed*

9. To terminate the application and return to the beginning of the operation, press the PF3 key.

## Related tasks

### Starting a new operation

You can use the organization application to start a new operation such as displaying or updating a department structure.

## Working with the phone application scenario

The phone application retrieves information from a phone directory and updates employee phone numbers.

### About this task

The phone application is used in phase 2 (batch mode), phase 3 (CAF), and interactively in phase 4 (IMS) and phase 5 (CICS).

The phone directory consists of data from a combination (join) of the employee table (DSN8C10.EMP) and the department table (DSN8C10.DEPT). This joined view is called VPHONE. The program also uses a second view called VEMPLP to update the employee table, which does not affect a view that joins tables.

The phone application is designed to operate in batch and interactively in ISPF/TSO, IMS, and CICS. The following table describes the environments in which each phone application operates and the language in which each is written.

*Table 118. Phone programs*

Environment	Language	Name
ISPF/TSO	COBOL	DSN8SC3
ISPF/TSO	PL/I	DSN8SP3
IMS	PL/I	DSN8IP3
CICS	PL/I	DSN8CP3
batch	COBOL	DSN8BC3
batch	Fortran	DSN8BF3
batch	PL/I	DSN8BP3
batch	C	DSN8BD3

### Related tasks

Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

## Viewing or changing an employee's telephone number

A couple of panels are used to view or change an employee's telephone number in the sample telephone application. These panels are the same, regardless of whether IMS or CICS is used.

### Procedure

To view or change an employee's telephone number:

1. On the first panel of the telephone application, enter the first and last name of the employee whose telephone number you want to view or change. To see an entire listing of employee numbers, put an \* next to the LAST NAME input line. If only part of a first or last name is known, use the percent character (%) to qualify the list of names to appear in the directory. For example, entering K% on the LAST NAME input line calls a list of the telephone numbers of all employees whose last name begins with a K. Similarly, the first name can be qualified.

To keep this sample program as simple as possible and to allow updating, scrolling is not used with the IMS and CICS versions. Scrolling is used with the ISPF/CAF version. Only the first panel of selected names and phone numbers can be displayed. The second panel is the Telephone Directory itself. The

employee telephone number is highlighted. To update an employee telephone number, type over the highlighted number and press ENTER. To update a phone number listed under the name Heather A Nicholls, specify NICHOL% when you are not sure if there are one or two ls in Nicholls.

```

----- TELEPHONE DIRECTORY -----

                LAST  NAME ==> _
                FIRST NAME ==>

LAST NAME          *  FOR LIST OF ENTIRE DIRECTORY
FIRST NAME(OPTIONAL) %  FOR GENERIC LIST (EX. K% = ALL  K - NAMES)
                    %  FOR GENERIC LIST

```

Figure 101. Telephone application—first display

2. Press ENTER to display the panel on which the phone number is highlighted.
3. If you want to change a phone number, type over the number to be changed. You can type over as many numbers as are listed in the display. For example, suppose that you want to change the phone number from 1793 to 1795. After you press ENTER, you get a message confirming the updated phone number. The panel in the following figure shows the updated panel.

```

----- TELEPHONE DIRECTORY -----

FIRST NAME MID  LAST NAME  PHONE  EMPL  WORK  WORKDEPT
          INIT                NO      NO    DEPT  NAME
HEATHER  A      NICHOLLS  1795 000140 C01  INFORMATION CENTER
.
.
.

```

Figure 102. Telephone application—updated display

## Using the phone application under batch

The sample batch phone applications are provided in Fortran (DSN8BF3), COBOL (DSN8BC3), C (DSN8BD3), and PL/I (DSN8BP3).

### Procedure

Create a data set that contains information about the phone number that is to be updated.

This data set works in combination with another data set that contains JCL for processing information. The first data set consists of card images in the format that is shown in the following table.

Table 119. Format of phone application data set

Column	Description
1	ACTION—U for update, L for list
2	Employee last name
17	Employee first name
29	Employee number
35	New phone number

The ACTION code in this card image indicates whether an employee number is to be updated (U) or listed (L). When updating an employee phone number, only the employee number and the new phone number are specified in the data set. When listing phone numbers, the last name must be specified. Specifying the first name is optional. The \* and % can be used with the ACTION code just as they are used with the panels.

### Example

The following figure shows an example of an update data set and a list data set. Each time a number is listed or updated, a new data set is created containing a card image like the one in the following figure. The first card in the data set shows the phone number of employee number 000140 being updated (U) to 6767. The second card shows a list (L) for Heather Nicholls. The last card shows a list (L) of all employees whose first names begin with the letters MAR. The example shows the letters MAR followed by a % in the first name column to indicate that only those employees whose first names begin with MAR are to be listed.

L	MAR%
LNICHOLLS	HEATHER
U	0001406767

Figure 103. Example of a card image data set

The data set that contains the JCL for processing information is supplied with Db2 and is contained in DSNTEJ2P, which is part of *prefix*.SDSNSAMP. The figure below shows the data set that contains the JCL with the card image data sets embedded.

```
//PH02PS05 EXEC PGM=IKJEFT01,DYNAMNBR=20
//SYSTSPRT DD SYSOUT=*
//SYSPRINT DD SYSOUT=*
//REPORT DD SYSOUT=*
//SYSUDUMP DD SYSOUT=*
//CARDIN DD *
U
LNICHOLLS HEATHER 0001406767
L
LNICHOLLS HEATHER
L MAR%
//SYSTSIN DD *
DSN SYSTEM(DSN)
RUN PROGRAM(DSN8BP3) PLAN(DSN8BP12) LIB('prefix.RUNLIB.LOAD')
END
```

Figure 104. The job control language data set

The complete data set can be submitted to the system either through a card reader or from a terminal through TSO. The figure below contains an example of the batch output.

```

----- TELEPHONE DIRECTORY -----
LAST NAME FIRST NAME INITIAL PHONE EMPLOYEE WORK WORK
      NUMBER      NUMBER      DEPT DEPT NAME
QUINTANA DOLORES          M   6767   000130   C01  INFORMATION CENTER
NICHOLLS HEATHER          A   1793   000140   C01  INFORMATION CENTER
SCOUTTEN MARILYN          S   1682   000180   D11  MANUFACTURING SYSTEMS
PEREZ    MARIA             L   9001   000270   D21  ADMINISTRATIVE SYSTEMS

```

Figure 105. Example of the phone application batch output

## Working with the distributed organization application scenario

The distributed organization application scenario shows how to work with department and employee data in a distributed environment.

### About this task

The scenario shows how to display a department structure, display department information, and update a department at a local location. It also shows how to erase and add an employee at a remote location. This application is executed in Phase 6. The application accesses distributed data with DRDA access.

The department information (DEPT table) is shared by all locations. If you make changes to DEPT table at one location, the DEPT tables at the other locations are updated at the same time. The employee information (EMP table) is unique to each location, containing only the employees that work at that particular location.

After you enter the appropriate transaction code, you see the first panel of the organization application.

### Displaying department structure at the local location

You can use the distributed organization sample application to display department structure at the local location.

### Procedure

To display a department structure:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter DS for department structure.
  - On the SEARCH CRITERIA line, enter DI for department number.
  - On the LOCATION line, leave blank, indicating local location.
  - On the DATA line, enter A00 for department number.

```

====>_
                                DB2 ORGANIZATION APPLICATION

ACTION .....:d                A (ADD)                E (ERASE)
                                D (DISPLAY)            U (UPDATE)

OBJECT .....:ds                DE (DEPARTMENT)        EM (EMPLOYEE)
                                DS (DEPT STRUCTURE)

SEARCH CRITERIA :di            DI (DEPARTMENT ID)   MN (MANAGER NAME)
                                DN (DEPARTMENT NAME)   EI (EMPLOYEE ID)
                                MI (MANAGER ID)        EN (EMPLOYEE NAME)

LOCATION .....:                  (Blank implies local location)

DATA .....:a00

PRESS: ENTER to process      END to exit

```

Figure 106. Starting the distributed organization application

2. Press the ENTER key.

The panel below shows the structure of the department requested.

```

====>_                                DB2 ORGANIZATION APPLICATION                                ROW 1 of 5
PRESS:  ENTER TO PROCESS      END TO EXIT

DEPARTMENT STRUCTURE FOR:

----- DEPARTMENT ID AND NAME----- ----- MANAGER ID AND NAME-----
A00 SPIFFY COMPUTER SERVICE DIV.  000010 CHRISTINE      I  HAAS

SUBDEPARTMENTS:

A00 SPIFFY COMPUTER SERVICE DIV.  000010 CHRISTINE      I  HAAS
B01 PLANNING                       000020 MICHAEL        L  THOMPSON
C01 INFORMATION CENTER              000030 SALLY           A  KWAN
D01 DEVELOPMENT CENTER              000050 JOHN            B  GEYER
E01 SUPPORT SERVICES                000050 JOHN            B  GEYER

```

Figure 107. Displaying department structure

3. Press ENTER or END to exit.

## Displaying department information at the local location

You can use the distributed organization sample application to display department structure at the local location.

### Procedure

To display department information:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter D for display.
  - On the OBJECT line, enter DE for department.
  - On the SEARCH CRITERIA line, enter DI for department number.
  - On the LOCATION line, leave blank, indicating local location.
  - On the DATA line, enter A00 for department number.

```

DB2 ORGANIZATION APPLICATION

===>_

ACTION .....:d      A (ADD)           E (ERASE)
                   D (DISPLAY)        U (UPDATE)

OBJECT .....:de     DE (DEPARTMENT)   EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :di  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)     EN (EMPLOYEE NAME)

LOCATION .....:      (Blank implies local location)

DATA .....:a00

PRESS: ENTER to process   END to exit

```

Figure 108. Starting the distributed organization application

2. Press the ENTER key.  
The panel below shows the department information that was requested.

```

DB2 ORGANIZATION APPLICATION

===>_

                DISPLAY A DEPARTMENT

DEPARTMENT ID      : A00
NAME               : SPIFFY COMPUTER SERVICE DIV.
MANAGER ID        : 000010
ADMIN DEP ID      : A00
LOCATION           :

MANAGER ID        : 000010
FIRST NAME       : CHRISTINE
MIDDLE INITIAL   : I
LAST NAME        : HAAS
WORK DEPT ID     : A00

PRESS: ENTER TO PROCESS   END TO EXIT

```

Figure 109. Displaying department information

3. Press ENTER or END to exit.

### Updating a department at the local location

You can use the distributed organization sample application to update department information at the local location.

#### Procedure

To update department information:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter u for update.
  - On the OBJECT line, enter de for department.
  - On the SEARCH CRITERIA line, enter di for department number.
  - Leave the LOCATION line blank, indicating local location.
  - On the DATA line, enter %, which displays a list of all the departments.

```

DB2 ORGANIZATION APPLICATION

===>_

ACTION .....:u      A (ADD)           E (ERASE)
                   D (DISPLAY)        U (UPDATE)

OBJECT .....:de     DE (DEPARTMENT)   EM (EMPLOYEE)
                   DS (DEPT STRUCTURE)

SEARCH CRITERIA :di  DI (DEPARTMENT ID)  MN (MANAGER NAME)
                   DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                   MI (MANAGER ID)    EN (EMPLOYEE NAME)

LOCATION .....:      (Blank implies local location)

DATA .....:%

PRESS: ENTER to process   END to exit

```

Figure 110. Starting the distributed organization application

2. Press the ENTER key.

The panel below lists the departments that can be updated. Select the department to be updated by inserting an S in the left margin by the department number.

```

DB2 ORGANIZATION APPLICATION          ROW 1 to 14 of 14

===>
ACTION:  UPDATE A DEPARTMENT

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE DEPARTMENT
PRESS ENTER TO PROCESS OR END TO EXIT

D/ID  DEPARTMENT NAME                M/ID  MANAGER NAME
-----
A00   SPIFFY COMPUTER SERVICE DIV.    000010  CI HAAS
B01   PLANNING                        000020  ML THOMPSON
C01   INFORMATION CENTER              000030  SA KWAN
D01   DEVELOPMENT CENTER
D11   MANUFACTURING SYSTEMS          000060  IF STERN
D21   ADMINISTRATION SYSTEMS        000070  ED PULASKI
S E01  SUPPORT SERVICES                000050  JB GEYER
E11   OPERATIONS                     000090  EW HENDERSON
E21   SOFTWARE SUPPORT               000100  TQ SPENSER
F22   BRANCH OFFICE F2
G22   BRANCH OFFICE G2
H22   BRANCH OFFICE H2
I22   BRANCH OFFICE I2
J22   BRANCH OFFICE J2

```

Figure 111. Selecting a department to be updated

3. Press the ENTER key.

The panel below displays the information relevant to the selected department. Enter the information you want to update on this panel; in this case, enter the name of the department.



```

====>_
                                DB2 ORGANIZATION APPLICATION

                                UPDATE A DEPARTMENT

DEPARTMENT ID                   : E01
NAME                            : hardware support service
MANAGER ID                      : 000050
ADMIN DEP ID                   : A00
LOCATION                          :

MANAGER ID                      : 000050
FIRST NAME                     : JOHN
MIDDLE INITIAL                 : B
LAST NAME                      : GEYER
WORK DEPT ID                   : E01

PRESS: ENTER TO PROCESS      END TO EXIT

```

*Figure 112. Updating a department*

4. Press the ENTER key to process the updated information.  
A message appears on this panel that states the update was successful.

```

====>_
                                DB2 ORGANIZATION APPLICATION
DSN8014I  DSN8HC3-DEPARTMENT SUCCESSFULLY UPDATED
                                UPDATE A DEPARTMENT

DEPARTMENT ID                   : E01
NAME                            : HARDWARE SUPPORT SERVICE
MANAGER ID                      : 000050
ADMIN DEP ID                   : A00
LOCATION                          :

MANAGER ID                      : 000050
FIRST NAME                     : JOHN
MIDDLE INITIAL                 : B
LAST NAME                      : GEYER
WORK DEPT ID                   : E01

PRESS: ENTER TO PROCESS      END TO EXIT

```

*Figure 113. Update successfully processed*

5. Press ENTER to return to the previous panel or END to exit.  
If you return to the previous panel, you can now select another department to update, or press ENTER or END to exit. The same message appears on this panel, indicating the update was successful.

```

====>_
                                DB2 ORGANIZATION APPLICATION          ROW 1 to 14 of 14
DSN8014I  DSN8HC3-DEPARTMENT SUCCESSFULLY UPDATED
ACTION:  UPDATE A DEPARTMENT

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE DEPARTMENT
PRESS ENTER TO PROCESS OR END TO EXIT

D/ID  DEPARTMENT NAME                                M/ID    MANAGER NAME
A00   SPIFFY COMPUTER SERVICE DIV.                  000010  CI HAAS
B01   PLANNING                                       000020  ML THOMPSON
C01   INFORMATION CENTER                            000030  SA KWAN
D01   DEVELOPMENT CENTER
D11   MANUFACTURING SYSTEMS                        000060  IF STERN
D21   ADMINISTRATION SYSTEMS                       000070  ED PULASKI
E01   HARDWARE SUPPORT SERVICE                     000050  JB GEYER
E11   OPERATIONS                                    000090  EW HENDERSON
E21   SOFTWARE SUPPORT                              000100  TQ SPENSER
F22   BRANCH OFFICE F2
G22   BRANCH OFFICE G2
H22   BRANCH OFFICE H2
I22   BRANCH OFFICE I2
J22   BRANCH OFFICE J2

```

Figure 114. Department successfully updated

## Adding an employee at a remote location

You can use the distributed organization sample application to add information for employees at remote locations.

### Procedure

To add an employee at a remote location:

1. Enter the following values:
  - On the ACTION line, enter a for add.
  - On the OBJECT line, enter em for employee.
  - On the SEARCH CRITERIA line, enter ei for employee number.
  - On the LOCATION line, enter your server location for the remote location.
  - On the DATA line, enter the employee ID of the employee to be added (sj0100 in the example below).

```

====>_
                                DB2 ORGANIZATION APPLICATION
ACTION .....:a          A (ADD)          E (ERASE)
                        D (DISPLAY)       U (UPDATE)
OBJECT .....:em        DE (DEPARTMENT)   EM (EMPLOYEE)
                        DS (DEPT STRUCTURE)
SEARCH CRITERIA :ei    DI (DEPARTMENT ID) MN (MANAGER NAME)
                        DN (DEPARTMENT NAME) EI (EMPLOYEE ID)
                        MI (MANAGER ID)    EN (EMPLOYEE NAME)
LOCATION .....:your server location (Blank implies local location)
DATA .....:sj0100
PRESS: ENTER to process   END to exit

```

Figure 115. Starting the distributed organization application

2. Press the ENTER key.

The panel below allows you to enter information only about the employee. The department information on the panel is protected. Enter the necessary information about the employee.

```

====>_
                                DB2 ORGANIZATION APPLICATION

                                ADD      AN EMPLOYEE

DEPARTMENT ID                   :
      NAME                       :
      MANAGER ID                 :
      ADMIN DEP ID              :
      LOCATION                   :

EMPLOYEE  ID                     : SJ0100
      FIRST NAME                  : W
      MIDDLE INITIAL              :
      LAST NAME                   : WALTERS
      WORK DEPT ID                : F22

PRESS: ENTER TO PROCESS      END TO EXIT

```

Figure 116. Employee to be added

3. Press the ENTER key to process or END to exit. If you press the ENTER key, a message appears on the panel indicating that the employee has been added.

```

====>_
                                DB2 ORGANIZATION APPLICATION
DSN8002I   DSN8HC3-EMPLOYEE SUCCESSFULLY ADDED
                                ADD      AN EMPLOYEE

DEPARTMENT ID                   : F22
      NAME                       : SPIFFY COMPUTER SERVICE DIV.
      MANAGER ID                 :
      ADMIN DEP ID              : E01
      LOCATION                   : SAN_JOSE

EMPLOYEE  ID                     : SJ0100
      FIRST NAME                  : W
      MIDDLE INITIAL              :
      LAST NAME                   : WALTERS
      WORK DEPT ID                : F22

PRESS: ENTER TO PROCESS      END TO EXIT

```

Figure 117. Employee successfully added

4. Press the ENTER key to return to the selection panel or END to exit.

## Erasing an employee at a remote location

You can use the distributed organization sample application to erase information for employees at remote locations.

### Procedure

To erase an employee at a remote location:

1. Enter the following values in the distributed organization sample application:
  - On the ACTION line, enter e for erase.
  - On the OBJECT line, enter em for employee.
  - On the SEARCH CRITERIA line, enter ei for employee number.
  - On the LOCATION line, enter your server location for the remote location.
  - On the DATA line, enter %, which displays a list of all the employees.

```

====>_
                                DB2 ORGANIZATION APPLICATION

ACTION .....:e                A (ADD)                E (ERASE)
                                D (DISPLAY)             U (UPDATE)

OBJECT .....:em               DE (DEPARTMENT)          EM (EMPLOYEE)
                                DS (DEPT STRUCTURE)

SEARCH CRITERIA :ei           DI (DEPARTMENT ID)       MN (MANAGER NAME)
                                DN (DEPARTMENT NAME)    EI (EMPLOYEE ID)
                                MI (MANAGER ID)         EN (EMPLOYEE NAME)

LOCATION .....:your server location (Blank implies local location)

DATA .....:%

PRESS: ENTER to process      END to exit

```

Figure 118. Starting the distributed organization application

2. Press the ENTER key.

The panel below lists the employees that can be erased. Select the employee to be erased by inserting an S in the left margin by the employee ID.

```

====>_                                DB2 ORGANIZATION APPLICATION                                ROW 1 OF 4

ACTION: ERASE   AN EMPLOYEE                                LOCATION: SAN_JOSE

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE EMPLOYEE
PRESS ENTER TO PROCESS OR END TO EXIT

E/ID    EMPLOYEE NAME                                D/ID    DEPARTMENT NAME
S SJ0100  W WALTERS                                    F22     BRANCH OFFICE F22
SJ0020  S O'SHEA                                       F22     BRANCH OFFICE F22
SJ0030  D COOPER                                       F22     BRANCH OFFICE F22
SJ0040  A HAYES                                       F22     BRANCH OFFICE F22
SJ0050  L ASHER                                       F22     BRANCH OFFICE F22

```

Figure 119. Selecting an employee at a remote location

3. Press the ENTER key.

The panel below displays the information relevant to the selected employee that is to be erased.

```

====>_                                DB2 ORGANIZATION APPLICATION

                                ERASE   AN EMPLOYEE

DEPARTMENT ID                : F22
NAME                         : BRANCH OFFICE F22
MANAGER ID                   :
ADMIN DEP ID                  : E01
LOCATION                       : SAN_JOSE

EMPLOYEE ID                  : SJ0100
FIRST NAME                   : W
MIDDLE INITIAL                :
LAST NAME                     : WALTERS
WORK DEPT ID                 : F22

PRESS: ENTER TO PROCESS      END TO EXIT

```

Figure 120. Employee to be erased

4. Press the ENTER key to erase the employee information.

A message appears on the panel stating the employee has been successfully erased. You can now erase another employee or press ENTER or END to exit.

```
====>_
DB2 ORGANIZATION APPLICATION          ROW 1 OF 3
DSN8003I  DSN8HC3-EMPLOYEE SUCCESSFULLY ERASED
ACTION:   ERASE AN EMPLOYEE          LOCATION: SAN_JOSE

TO SELECT FROM THE LIST PLACE AN S NEXT TO THE EMPLOYEE
PRESS ENTER TO PROCESS OR END TO EXIT

E/ID      EMPLOYEE NAME                D/ID      DEPARTMENT NAME
SJ0020    S  O'SHEA                      F22       BRANCH OFFICE F22
SJ0030    D  COOPER                       F22       BRANCH OFFICE F22
SJ0050    L  ASHER                        F22       BRANCH OFFICE F22
```

Figure 121. Employee at a remote location erased

## Working with the employee resume and photo scenarios

The LOB sample application extends the existing Db2 sample employee database by adding a new table for storing employee resumes and photographs as CLOB and BLOB entries.

### About this task

The supporting JCL, application objects, and input data for this table are provided.

The purpose of the LOB sample application is to:

- Provide an IVP for LOB functions.
- Demonstrate how to:
  - Use DDL to create LOB objects.
  - Use the Db2 LOAD utility to populate LOB columns of 32K bytes or less.
  - Create an application program to populate LOB columns of greater than 32K bytes.
  - Use LOB locators and related functions to manipulate LOBs without materializing the data.

The LOB sample application consists of a batch portion and an optional online portion. The batch portion verifies that LOB objects can be created, populated, and successfully read by using locators and supporting functions. The online portion demonstrates further techniques for using and manipulating LOB data.

The batch portion of the LOB sample application consists of the following jobs: DSNTSJ7, DSNTSJ71, DSNTSJ73, DSNTSJ75, DSNTSJ76, DSNTSJ77, and DSNTSJ78.

The optional online portion of the LOB sample application adds two additional scenarios to the existing three scenarios that are provided in IVP phase 3. These scenarios include the following user activities:

1. Invoking the Db2 sample connection manager to display the Db2 ISPF sample application menu, DSN8SSM.
2. Selecting and viewing sample employee resumes by using option 4 of DSN8SSM.
3. Selecting and viewing sample employee photo images by using option 5 of DSN8SSM.

Application programs for the LOB sample are written in the C and COBOL languages. The resume viewer requires ISPF. The photo viewer requires ISPF and GDDM.

## Related concepts

### Phase 7: Accessing LOB data

Phase 7 of the installation or migration verification process is an optional phase that demonstrates how to set up and use a Db2 LOB application. This phase creates an extension to the Employee sample database to manage employee resumes and photo images.

## Using the resume application in the LOB application scenario

You can view employee resumes with the resume application in the LOB application scenario.

## About this task

The LOB application begins with the initial panel of the ISPF/CAF application.

## Procedure

To view employee resumes:

1. From the Db2 Sample Application Menu, DSN8SSM, select one of the following options:

- If you ran job DSNTEJ73, select option 4.
- If you ran job DSNTEJ77, select option 6.

DSN8DLRV and DSN8CLRV show the following panels for selecting and viewing sample employee resumes until you press the END key to exit ISPF.

```
DSN8SSE                                DB2 EMPLOYEE SELECTION PANEL
===>_

SELECT ONE OF THE EMPLOYEES AND PRESS ENTER.

    1. 000130 - DELORES M. QUINTANA
    2. 000130 - HEATHER A. NICHOLLS
    3. 000130 - BRUCE ADAMSON
    4. 000130 - JAMES H. WALKER

PRESS:      END TO EXIT
```

*Figure 122. Db2 Employee Selection Panel*

2. Select from the list of available resumes that are displayed on ISPF panel DSN8SSE.

The employee serial numbers and names are hard-coded into the panel because the data for this sample is predetermined. The formatted resume is displayed on ISPF panel DSN8SSR:

```

DSN8SSR                      DB2 EMPLOYEE RESUME APPLICATION
===>_

PERSONAL INFORMATION:          DEPARTMENT INFORMATION:
- NAME: DELORES M. QUINTANA    - EMPLOYEE NO. : 000130
- HOME: 1150 EGLINTON AVE      - DEPARTMENT NO.: C01
      MELLONVILLE, IDAHO 83757 - MANAGER       : SALLY KWAN
      (208) 555-9933           - POSITION        : ANALYST
- BORN: SEPTEMBER 15, 1925     - PHONE         : (208) 555-4578
- SEX: FEMALE HT:5'2" WT:120 LBS. - HIRE DATE      : 1971-07-28
- MARITAL STATUS: MARRIED

EDUCATION:
1965 MATH AND ENGLISH B.A.     1960 DENTAL TECHNICIAN
      ADELPHI UNIVERSITY        FLORIDA INSTITUTE OF TECHNOLOGY

WORK HISTORY:
10/91 - PRESENT ADVISORY SYSTEMS ANALYST
      PRODUCING DOCUMENTATION TOOLS FOR ENGINEERING DEPARTMENT
12/85 - 9/91    TECHNICAL WRITER
      WRITER, TEXT PROGRAMMER, AND PLANNER
1/79 - 11/85   COBOL PAYROLL PROGRAMMER
      WRITING PAYROLL PROGRAMS FOR A DIESEL FUEL COMPANY

```

*Figure 123. Db2 Employee Resume Application*

This panel is designed around the sample data. It is assumed that all resume information for an employee will fit predictably and no handling for special cases is provided. The "Interests" section of the resume is not presented because of space constraints on the panel.

### Related tasks

Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

## Using the photo application in the LOB application scenario

You can view employee photos with the photo application in the LOB application scenario.

### About this task

The LOB application begins with the initial panel of the ISPF/CAF application. This LOB application requires that you include the GDDM load module library (SADMMOD) in your logon procedure or in the ISPLLIB concatenation.

### Procedure

1. From the Db2 Sample Application Menu, DSN8SSM, select one of the following options to look at employee photos through GDDM:
  - If you ran job DSNTEJ75, select option 5.
  - If you ran job DSNTEJ78, select option 8.

DSN8DLPV and DSN8CLPV show the following panel for selecting and viewing sample employee photos until you press the END key to exit ISPF.

```

DSN8SSE                DB2 EMPLOYEE SELECTION PANEL
===>_

SELECT ONE OF THE EMPLOYEES AND PRESS ENTER.

    1. 000130 - DELORES M. QUINTANA
    2. 000130 - HEATHER A. NICHOLLS
    3. 000130 - BRUCE ADAMSON
    4. 000130 - JAMES H. WALKER

PRESS:   END TO EXIT

```

Figure 124. Db2 Employee Selection Panel

2. Select from the list of available photos by that are displayed on ISPF panel DSN8SSE.

### Related tasks

Starting an application in an ISPF/TSO environment

You must have access to ISPF load module libraries to run the ISPF/CAF sample application.

## Sample LOB table: EMP\_PHOTO\_RESUME

The LOB sample application uses the EMP\_PHOTO\_RESUME table. The sample jobs create, load, and manipulate the table.

Table 120. EMP\_PHOTO\_RESUME table

Column Name:	EMPNO	EMP_ROWID	PSEG_PHOTO	BMP_PHOTO	RESUME
Type:	CHAR(6) NOT NULL	ROWID	BLOB(500K)	BLOB(100K)	CLOB(5K)
Description:	Employee number	Row identifier	Employee photo (PSEG)	Employee photo (BMP)	Employee resume
Values:	000130	#####	Delores M. Quintana	Delores M. Quintana	Delores M. Quintana
Values:	000140	#####	Heather A Nicholls	Heather A Nicholls	Heather A Nicholls
Values:	000150	#####	Bruce Adamson	Bruce Adamson	Bruce Adamson
Values:	000190	#####	James H. Walker	James H. Walker	James H. Walker

## Edit exit routine

The edit exit routine encodes the salary column to protect the confidentiality of the employee's salary.

The edit exit routine is prepared in Phase 1. It works with the employee table (DSN8C10.EMP) and is written in assembler language.

The name of the edit exit routine is DSN8EAE1. When the employee table (DSN8C10.EMP) is changed by either an update or an add, the edit exit routine encodes the salary amount that goes into the SALARY column. When the SALARY column is read from the employee table, the amount is decoded. The encoding and decoding of the salary column protects the confidentiality of the employee's salary.



## Huffman compression exit routine

---

IBM supplies a sample edit routine that compresses data using the Huffman algorithm.

Before using any data compression routine, understand its limitations and consider tailoring it to your particular table. For the restrictions and concerns that apply to the IBM sample, see the comments provided with the code. The routine is called DSN8HUFF and resides in library *prefix*.SDSNSAMP. IBM supplies a sample edit routine that compresses data using the Huffman algorithm.

## Sample field procedure

---

A sample field procedure is prepared in Phase 1 of the installation or migration verification process. This procedure causes values in a CHAR(6) column to be ordered in the ASCII sorting sequence.

## Dynamic SQL statements: DSNTESA, DSNTESQ

---

*prefix*.SDSNSAMP library members DSNTESA and DSNTESQ contain dynamic SQL statements to help verify the success of an installation or migration.

### DSNTESA

The SQL statements in DSNTESA are run dynamically by SPUFI. DSNTESA is used in Phase 3 of the verification process.

The first group of statements in DSNTESA create a temporary work file table space and defines a created temporary table. The INSERT statements fill the table with names, midterm scores, and final examination results, and the SELECT statement then does a check of the averages. The UPDATE statements assign a grade according to the formula in the first UPDATE statement: 60% for the final and 40% for the midterm. The next SELECT statement produces the entire table. The ROLLBACK statement removes the table space and the table within it.

#### GUI

The following statements make some administrative queries on the system tables:

- The following SELECT statements find all the plans and packages that are owned by the current user, and the date they were bound.

```
SELECT NAME, BINDDATE
FROM SYSIBM.SYSPLAN
WHERE CREATOR = USER;
```

```
SELECT COLLID, NAME, VERSION, BINDTIME
FROM SYSIBM.SYSPACKAGE
WHERE OWNER = USER;
```

- The following SELECT statements find the plans and packages that require a bind or rebind before they can be run, and the plans and packages that are automatically rebound the next time they are run.

```
SELECT NAME, CREATOR, BINDDATE, VALID, OPERATIVE
FROM SYSIBM.SYSPLAN
WHERE OPERATIVE = 'N' OR VALID = 'N';
```

```
SELECT COLLID, NAME, VERSION, BINDTIME, VALID
FROM SYSIBM.SYSPACKAGE
WHERE OPERATIVE = 'N' OR VALID = 'N';
```

- The following SELECT statements find all objects required for the current user's programs.

```
SELECT DNAME, BTYPE, BCREATOR, BNAME
FROM SYSIBM.SYSPLANDEP
WHERE BCREATOR = USER
ORDER BY DNAME, BTYPE, BCREATOR, BNAME;
```

```
SELECT DCOLLID, DNAME, BTYPE, BQUALIFIER, BNAME
FROM SYSIBM.SYSPACKDEP
WHERE BQUALIFIER = USER
ORDER BY DCOLLID, DNAME, BTYPE, BQUALIFIER, BNAME;
```

- The second SELECT from SYSTABLES provides information about all the DEPT tables regardless of the owner.

```
SELECT *
FROM SYSIBM.SYSTABLES
WHERE NAME = 'DEPT';
```

- The SELECT from SYSCOLUMNS supplies a description of the fields of the DSN8C10.DEPT table. This information can also be provided by DCLGEN, and, within a program, the DESCRIBE statement gives this same information.

```
SELECT NAME, COLTYPE, LENGTH, SCALE, NULLS, REMARKS, COLNO
FROM SYSIBM.SYSCOLUMNS
WHERE TBNAME= 'DEPT' AND TBCREATOR = 'DSN8610'
ORDER BY COLNO;
```

- The following SELECT statements find the kinds of authority a user can have. Determining which tables a specific user can access is relatively complicated because of the various authorities. If the user has SYSADM authority, any table can be accessed.

```
SELECT * FROM SYSIBM.SYSPLANAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSPACKAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSUSERAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSDBAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSTABAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSCOLAUTH WHERE GRANTEE = USER;
SELECT * FROM SYSIBM.SYSRESAUTH WHERE GRANTEE = USER;
```

- The final four SELECT statements show the tables and views that can be accessed directly by the current user, those that can be accessed using a plan, and those that are accessed using the database authority.

```
SELECT TCREATOR, TTNAME, STNAME, GRANTOR
FROM SYSIBM.SYSTABAUTH
WHERE GRANTEE = USER;
SELECT BNAME, BTYPE, GRANTOR, NAME
FROM SYSIBM.SYSPLANAUTH, SYSIBM.SYSPLANDEP
WHERE GRANTEE = USER
AND NAME = DNAME
AND EXECUTEAUTH != ' ';
AND (BTYPE = 'T' OR BTYPE = 'V');
SELECT DCOLLID, BNAME, BTYPE, BQUALIFIER, BNAME
FROM SYSIBM.SYSPACKAUTH, SYSIBM.SYSPACKDEP
WHERE GRANTEE = USER
AND COLLID = DCOLLID
AND NAME = DNAME
AND EXECUTEAUTH != ' ';
AND (BTYPE = 'T' OR BTYPE = 'V');
SELECT NAME, CREATOR, TYPE, DBNAME, TSNAME
FROM SYSIBM.SYSTABLES
WHERE DBNAME IN
(SELECT NAME FROM SYSIBM.SYSDBAUTH
WHERE GRANTEE = USER
AND DBADMAUTH != ' ');
```



## DSNTESQ

DSNTESQ contains a set of queries to check consistency between catalog tables.

The SQL statements are in a format available for input to SPUFI and DSNTDP2. If SPUFI is not bound when you want to execute these queries, you can use DSNTDP2 from your previous Db2 version.

Before running these queries, you should run the CHECK DATA and CHECK INDEX utilities.

DSNTESQ contains SQL that creates copies of the catalog using segmented table spaces. In some cases, the queries in DSNTESQ run faster when run on copies of the catalog instead of the actual catalog because the copies have additional indexes. If you plan to use the copies of the catalog, use the comment lines in DSNTESQ for guidance.

## Dynamic SQL programs: DSNTIAD, DSNTEP2, DSNTIAUL

---

DSNTIAD, DSNTEP2, and DSNTIAUL are sample dynamic SQL programs and must be compiled, link-edited, and bound as usual.

SPUFI is a part of the distributed product. An installation job is used to bind it. It can be used only with ISPF.

### **Related concepts**

[Sample applications supplied with Db2 for z/OS \(Db2 Application programming and SQL\)](#)

[Db2 productivity-aid sample programs \(Db2 Application programming and SQL\)](#)

### **Related tasks**

[Executing SQL by using SPUFI \(Db2 Application programming and SQL\)](#)



# Chapter 10. Configuring additional capabilities for Db2 for z/OS

After you complete the installation or migration process, you can work with additional capabilities of Db2 such as stored procedures and remote communication.

## Installation information for procedures and functions that are supplied with Db2

Db2 supplies a number of stored procedures and user defined functions that job DSNTIJRT defines and binds during installation or migration.

For supplied routines, job DSNTIJRW creates the core WLM environments that are listed in the following table. If you decide to set up your own WLM application environments, use the following table to help you group the supplied routines into the appropriate environments. If your system resources are constrained, you might need to choose a lower NUMTCB value than the recommended one.

For more information about each of the stored procedures that are provided with Db2, see [Procedures that are supplied with Db2 \(Db2 SQL\)](#).

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
ADMIN_COMMAND_DB2	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_COMMAND_DSN	SYSPROC	1	DSNWLM_REXX	No	No
ADMIN_COMMAND_MVS	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_COMMAND_UNIX	SYSPROC	40–60	DSNWLM_PGM_CONTROL	No	Yes
ADMIN_DS_BROWSE	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_DELETE	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_LIST	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_RENAME	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_SEARCH	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_DS_WRITE	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_EXPLAIN_MAINT	SYSPROC	40–60	DSNWLM_GENERAL	No	
ADMIN_INFO_HOST	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_INFO_IFCID	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SMS	SYSPROC	40–60	DSNWLM_GENERAL	Yes	No
ADMIN_INFO_SQL	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SSID	SYSPROC	40–60	DSNWLM_GENERAL	No	No
ADMIN_INFO_SYSLOG	SYSPROC	1	DSNWLM_REXX	No	No
ADMIN_INFO_SYSPARM	SYSPROC	1	DSNWLM_NUMTCB1	No	No
ADMIN_JOB_CANCEL	SYSPROC	40–60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_FETCH	SYSPROC	40–60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_QUERY	SYSPROC	40–60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_JOB_SUBMIT	SYSPROC	40–60	DSNWLM_PGM_CONTROL	No	Yes
ADMIN_TASK_ADD	SYSPROC	40–60	DSNWLM_GENERAL	No	No

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
ADMIN_TASK_CANCEL	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ADMIN_TASK_LIST	DSNADM	40-60	DSNWLM_GENERAL	No	No
ADMIN_TASK_OUTPUT	DSNADM	40-60	DSNWLM_GENERAL	No	No
ADMIN_TASK_REMOVE	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ADMIN_TASK_STATUS	DSNADM	40-60	DSNWLM_GENERAL	No	No
ADMIN_TASK_UPDATE	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ADMIN_UPDATE_SYSPARM	SYSPROC	1	DSNWLM_REXX	No <sup>"1" on page 822</sup>	No
ADMIN_UTL_EXECUTE	SYSPROC	40-60	DSNWLM_GENERAL	Yes	Yes
ADMIN_UTL_MODIFY	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ADMIN_UTL_MONITOR	SYSPROC	40-60	DSNWLM_PGM_CONTROL	Yes	Yes
ADMIN_UTL_SCHEDULE	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ADMIN_UTL_SORT	SYSPROC	40-60	DSNWLM_GENERAL	No	No
ALTER_JAVA_PATH	SQLJ	40-60	DSNWLM_GENERAL	No	No
BSON2JSON	SYSTOOLS	20	DSNWLM_GENERAL <sup>"2" on page 822</sup>	No	No
CREATE_SESSION	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
DB2_INSTALL_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
DB2_REMOVE_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
DB2_REPLACE_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
DB2_UPDATEJARINFO	SQLJ	40-60	DSNWLM_GENERAL	No	No
DBG_ENDSESSIONMANAGER	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_INITIALIZECLIENT	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_LOOKUPESSIONMANAGER	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_PINGSESSIONMANAGER	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_RECCLIENTREPORTS	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_RUNSESSIONMANAGER	SYSPROC	40-60	DSNWLM_GENERAL	No	No
DBG_SENDCIENTCOMMANDS	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_SENDCIENTREQUESTS	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DBG_TERMINATECLIENT	SYSPROC	5-20	DSNWLM_DEBUGGER	No	No
DEBUGGERLEVEL	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
DESTROY_SESSION	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
DSN_WLM_APPLENV	SYSPROC	40-60	DSNWLM_GENERAL	No	No
DSNACCOX	SYSPROC	40-60	DSNWLM_GENERAL	No	No
DSNACICS	SYSPROC	40	DSNWLM_CICS	Yes	No
DSNAHVPM	SYSPROC	40-60	DSNWLM_GENERAL	No	No
DSNAIMS	SYSPROC	40	DSNWLM_GENERAL	Yes	No
DSNAIMS2	SYSPROC	40	DSNWLM_GENERAL	Yes	No
DSNTBIND	SYSPROC	1	DSNWLM_REXX	No	No
DSNLEUSR	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
DSNTPSMP	SYSPROC	1	DSNWLM_REXX	No <sup>"1" on page 822</sup>	No

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
DSNUTILS	SYSPROC	1	DSNWLM_UTILS	Yes	No
DSNUTILU	SYSPROC	1	DSNWLM_UTILS	Yes	No
DSNUTILV	SYSPROC	1	DSNWLM_UTILS	Yes	No
DSNWSPM	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
DSNWZP	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
GET_CONFIG	SYSPROC	40-60	DSNWLM_GENERAL	No	No
GET_MESSAGE	SYSPROC	40-60	DSNWLM_GENERAL	No	No
GET_REPORT	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
GET_SYSTEM_INFO	SYSPROC	1	DSNWLM_NUMTCB1	Yes	No
INSTALL_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
JSON2BSON	SYSTOOLS	20	DSNWLM_GENERAL <sup>"2"</sup> on page 822	No	No
JSON_LEN	SYSTOOLS	40-60	DSNWLM_GENERAL	No	No
JSON_TABLE	SYSTOOLS	40-60	DSNWLM_GENERAL	No	No
JSON_TYPE	SYSTOOLS	40-60	DSNWLM_GENERAL	No	No
JSONVAL	SYSIBM	40-60		No	No
LIST_SESSION	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
MQREAD	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQREADALL	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQREADALLCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQREADCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVE	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVEALL	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVEALLCLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQRECEIVECLOB	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
MQSEND	DB2MQ	≥ 10	DSNWLM_MQSERIES	No	No
PUT_COMMAND	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
QUERY_SESSION	DB2DEBUG	5-20	DSNWLM_DEBUGGER	No	No
REMOVE_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
REPLACE_JAR	SQLJ	40-60	DSNWLM_GENERAL	No	No
SET_PLAN_HINT	SYSPROC	40-60	DSNWLM_GENERAL	No	No
SOAPHTTPC	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPNC	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPNV	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SOAPHTTPV	DB2XML	≥ 10	DSNWLM_WEBSERVICES	No	No
SQLCAMESSAGE	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLCOLPRIVILEGES	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLCOLUMNS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLFOREIGNKEYS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLFUNCTIONCOLS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLFUNCTIONS	SYSIBM	40-60	DSNWLM_GENERAL	No	No

Supplied routine	Schema name	Recommended value of NUMTCB	Core WLM environment	Does the routine have to run in an APF-authorized environment?	Does the routine have to be program-controlled?
SQLGETTYPEINFO	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLPRIMARYKEYS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLPROCEDURECOLS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLPROCEDURES	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLPSEUDOCOLUMNS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLSPECIALCOLUMNS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLSTATISTICS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLTABLEPRIVILEGES	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLTABLES	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SQLUDTS	SYSIBM	40-60	DSNWLM_GENERAL	No	No
SYSTS_ALTER	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_CREATE	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_DROP	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_ENCRYPT	SYSFUN	<a href="#">2-8<sup>3</sup> on page 822</a>	DSNWLM_JAVA	No	No
SYSTS_RESTORE	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_START	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_STOP	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_TAKEOVER	SYSPROC	10-40	DSNWLM_GENERAL	No	No
SYSTS_UPDATE	SYSPROC	10-40	DSNWLM_GENERAL	No	No
WLM_REFRESH	SYSPROC	40-60	DSNWLM_GENERAL	Yes	No
WLM_SET_CLIENT_INFO	SYSPROC	> 1	DSNWLM_GENERAL	No	No
XSLTRANSFORM	SYSFUN	<a href="#">2-8<sup>3</sup> on page 822</a>	DSNWLM_JAVA	No	No
XSR_ADDSCHEMADOC	SYSPROC	40-60	DSNWLM_XML	Yes	No
XSR_COMPLETE	SYSPROC	<a href="#">2-8<sup>3</sup> on page 822</a>	DSNWLM_JAVA	No	No
XSR_REGISTER	SYSPROC	40-60	DSNWLM_XML	Yes	No
XSR_REMOVE	SYSPROC	40-60	DSNWLM_XML	Yes	No

**Notes:**

1. This routine cannot run in an APF-authorized environment.
2. If you encounter storage-consumption issues for this routine, consider isolating it in a separate WLM environment. For more information, see [Tuning routines with storage-consuming parameter lists \(Db2 Performance\)](#).
3. If you are running your Java stored procedures in 64-bit JVMs, the recommended NUMTCB is 25. You cannot run XSR\_COMPLETE in a 64-bit Java virtual machine (JVM).

## Routine setup information in DSNTIDxx

To install the Db2-supplied routines, job DSNTIJRT uses setup information that is stored in the CLIST defaults input member (DSNTIDxx). Each Db2-supplied routine is represented by a different name in DSNTIDxx. The following table shows the mapping between each DSNTIDxx name and Db2-supplied routine. The left column contains the DSNTIDxx name and the right column contains the routine name. The xxx in the DSNTIDxx names represent the letters that specify the WLM environment name, the grant execute list, and the package owner. For example, RTB01xxx represents RTB01WLM, RTB01ACL, and RTB01PKO.



Table 121. Mapping between DSNTIDxx variables and Db2-supplied routines

<b>DSNTIDxx variable</b>	<b>Stored procedure name</b>
RTB01xxx	DSNWSPM
RTB02xxx	DSNWZP
RTC01xxx	DSNUTILS
RTC02xxx	DSNUTILU
RTC03xxx	DSNUTILV
RTD01xxx	DSNACCOR
RTD02xxx	DSNACCOX
RTE01xxx	DSNLEUSR
RTF01xxx	DSNTBIND
RTF02xxx	DSNTPSMP
RTF03xxx	WLM_REFRESH
RTG01xxx	ALTER_JAVA_PATH
RTG02xxx	DB2_INSTALL_JAR
RTG03xxx	DB2_REMOVE_JAR
RTG04xxx	DB2_REPLACE_JAR
RTG05xxx	DB2_UPDATEJARINFO
RTG06xxx	INSTALL_JAR
RTG07xxx	REMOVE_JAR
RTG08xxx	REPLACE_JAR
RTH01xxx	CREATE_SESSION
RTH02xxx	DEBUGGERLEVEL
RTH03xxx	DESTROY_SESSION
RTH04xxx	GET_REPORT
RTH05xxx	LIST_SESSION
RTH06xxx	PUT_COMMAND
RTH07xxx	QUERY_SESSION
RTH08xxx	DBG_ENDSESSIONMANAGER
RTH09xxx	DBG_INITIALIZECLIENT
RTH10xxx	DBG_LOOKUPSESSIONMANAGER
RTH11xxx	DBG_PINGSESSIONMANAGER
RTH12xxx	DBG_RECVCLIENTREPORTS
RTH13xxx	DBG_RUNSESSIONMANAGER
RTH14xxx	DBG_SENDCLIENTCOMMANDS
RTH15xxx	DBG_SENDCLIENTREQUESTS

Table 121. Mapping between DSNTIDxx variables and Db2-supplied routines (continued)

<b>DSNTIDxx variable</b>	<b>Stored procedure name</b>
RTH16xxx	DBG_TERMINATECLIENT
RTI03xxx	XSLTRANSFORM
RTI04xxx	XSR_ADDSCHEMADOC
RTI05xxx	XSR_COMPLETE
RTI06xxx	XSR_REGISTER
RTI07xxx	XSR_REMOVE
RTJ01xxx	SYSTS_CREATE
RTJ02xxx	SYSTS_DROP
RTJ03xxx	SYSTS_ENCRYPT
RTJ04xxx	SYSTS_RESTORE
RTJ05xxx	SYSTS_START
RTJ06xxx	SYSTS_STOP
RTJ07xxx	SYSTS_TAKEOVER
RTJ08xxx	SYSTS_UPDATE
RTJ09xxx	SYSTS_ALTER
RTK01xxx	SQLCAMESSAGE
RTK02xxx	SQLCOLPRIVILEGES
RTK03xxx	SQLCOLUMNS
RTK04xxx	SQLFOREIGNKEYS
RTK05xxx	SQLFUNCTIONCOLS
RTK06xxx	SQLFUNCTIONS
RTK07xxx	SQLGETTYPEINFO
RTK08xxx	SQLPRIMARYKEYS
RTK09xxx	SQLPROCEDURECOLS
RTK10xxx	SQLPROCEDURES
RTK11xxx	SQLSPECIALCOLUMNS
RTK12xxx	SQLSTATISTICS
RTK13xxx	SQLTABLEPRIVILEGES
RTK14xxx	SQLTABLES
RTK15xxx	SQLUDTS
RTL01xxx	ADMIN_COMMAND_DB2
RTL02xxx	ADMIN_COMMAND_DSN
RTL03xxx	ADMIN_COMMAND_UNIX
RTL04xxx	ADMIN_DS_BROWSE

Table 121. Mapping between DSNTIDxx variables and Db2-supplied routines (continued)

<b>DSNTIDxx variable</b>	<b>Stored procedure name</b>
RTL05xxx	ADMIN_DS_DELETE
RTL06xxx	ADMIN_DS_LIST
RTL07xxx	ADMIN_DS_RENAME
RTL08xxx	ADMIN_DS_SEARCH
RTL09xxx	ADMIN_DS_WRITE
RTL10xxx	ADMIN_INFO_HOST
RTL11xxx	ADMIN_INFO_SSID
RTL12xxx	ADMIN_JOB_CANCEL
RTL13xxx	ADMIN_JOB_FETCH
RTL14xxx	ADMIN_JOB_QUERY
RTL15xxx	ADMIN_JOB_SUBMIT
RTL17xxx	ADMIN_TASK_ADD
RTL18xxx	ADMIN_TASK_LIST
RTL19xxx	ADMIN_TASK_REMOVE
RTL20xxx	ADMIN_TASK_STATUS
RTL21xxx	ADMIN_UTL_SCHEDULE
RTL22xxx	ADMIN_UTL_SORT
RTL23xxx	ADMIN_TASK_CANCEL
RTL24xxx	ADMIN_TASK_OUTPUT
RTL25xxx	GET_CONFIG
RTL26xxx	GET_MESSAGE
RTL27xxx	GET_SYSTEM_INFO
RTL28xxx	ADMIN_INFO_SYSPARM
RTL29xxx	WLM_SET_CLIENT_INFO
RTL30xxx	ADMIN_UTL_EXECUTE
RTL31xxx	ADMIN_UTL_MODIFY
RTL32xxx	ADMIN_UTL_MONITOR
RTL33xxx	DSN_WLM_APPLENV
RTL34xxx	ADMIN_TASK_UPDATE
RTL35xxx	ADMIN_INFO_SMS
RTL36xxx	ADMIN_INFO_SQL
RTL37xxx	ADMIN_INFO_SYSLOG
RTL38xxx	ADMIN_UPDATE_SYSPARM
RTL40xxx	SET_PLAN_HINT

Table 121. Mapping between DSNTIDxx variables and Db2-supplied routines (continued)

DSNTIDxx variable	Stored procedure name
RTL41xxx	ADMIN_COMMAND_MVS
RTL42xxx	ADMIN_EXPLAIN_MAINT
RTM05xxx	DSNAHVPM
RTN01xxx	DSNACICS
RTN02xxx	DSNAIMS
RTN03xxx	DSNAIMS2
RTO02xxx	MQREAD
RTO03xxx	MQREADALL
RTO04xxx	MQREADALLCLOB
RTO05xxx	MQREADCLOB
RTO06xxx	MQRECEIVE
RTO07xxx	MQRECEIVEALL
RTO08xxx	MQRECEIVEALLCLOB
RTO09xxx	MQRECEIVECLOB
RTO10xxx	MQSEND
RTP01xxx	SOAPHTTPC
RTP02xxx	SOAPHTTPNC
RTP03xxx	SOAPHTTPNV
RTP04xxx	SOAPHTTPV

### Related tasks

[Migration step 24: Set up Db2-supplied routines](#)

Installation jobs are provided for the setup of all Db2-supplied routines and supporting objects that are provided with the Db2 base product.

[Installing Db2-supplied routines during installation](#)

The DSNTIJRT and DSNTIJRV jobs install and validate the installation of Db2-supplied routines. These jobs are configured with the options that you specified on installation panel DSNTIPR1 and panels DSNTIPRA through DSNTIPRP.

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[Procedures that are supplied with Db2 \(Db2 SQL\)](#)

## WLM management of stored procedures

*Workload Manager* (WLM) is a component of z/OS that manages incoming work requests for the operating system and allocates available system resources to meet these requests. Db2 for z/OS uses WLM to allocate workload requests for Db2 stored procedures.

When Db2 receives a request to run a stored procedure, WLM determines whether additional resources are needed to process the request. For example, WLM might determine that a new WLM-managed

address space is needed. WLM makes this determination by evaluating whether the work for a service class is meeting the goals that you set. WLM also evaluates whether the work queues are becoming too large. WLM then examines the system resource utilization as part of the algorithm to decide if another address space should be started. In many cases, a sudden increase in incoming work is handled by existing WLM address spaces, and task control blocks (TCBs) remove work from the queues. Consequently, an address space can handle more concurrent stored procedures or user-defined functions than the number that is specified by NUMTCB in the application environment definition.

**Requirement:** All Db2 stored procedures (except native SQL procedures) must run in WLM-managed address spaces.

A *WLM application environment* starts and manages WLM address spaces that are to be used by stored procedures. You can either create your own WLM application environments or use existing ones, and each stored procedure must be assigned to a WLM application environment. You can assign more than one stored procedure to each WLM application environment, but you might want to separate them for various resource management reasons. The stored procedures that are assigned to a WLM application environment do not need to be written in the same high-level language. However, for different performance reasons, you might decide to separate stored procedures into different application environments by language.

You define application environments for stored procedures as part of your WLM service policy. You also need to define a JCL procedure that WLM is to use to start the address spaces. You store this procedure in PROCLIB. The application environment definition in your policy contains the name of this startup procedure in PROCLIB. If too few address spaces are available to meet the policy goal, WLM starts another server address space if the service policy definition allows it.

#### **Related concepts**

[MVS Planning: Workload Management](#)

#### **Related tasks**

[Setting up a WLM application environment for stored procedures during installation](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

[Setting up a WLM application environment for stored procedures during migration](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

[Setting the priority of stored procedures \(Db2 Administration Guide\)](#)

#### **Related information**

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

## **Core WLM environments for Db2-supplied routines**

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

Use job DSNTIJRW to define each of these environments with the parameters below, including any changes that are applicable to your site. Alternatively, you can use the provided IWMARINO ISPF tool to define these environments. These Db2 core WLM environments are intended as a starting point, not as the optimal environments in which to run the Db2-supplied routines. Over time, you will identify routines for your site that function best in a separate WLM environment.

Installation job DSNTIJMV creates an address space procedure for each of the core WLM environments. The WLM environment address space names have the form *ssnmWLMsuffix*, where *ssnm* is the Db2 subsystem name specified on panel DSNTIPM in the SUBSYSTEM NAME field, and *suffix* is a character that differentiates the various WLM environments. Running DSNTIJMV adds these procedures to the system PROCLIB that you specified on panel DSNTIPW in the SYSTEM PROCEDURES field.

In the description of each environment below, the following terms are used:

## NUMTCB

The maximum number of procedures or functions that can run concurrently in the WLM-established stored procedure address space. The NUMTCB setting for the environment is the maximum appropriate setting for at least one of the routines that should be run in that environment. Other routines that run in the environment may tolerate a higher NUMTCB setting.

## APF-authorized

Whether the external module for one or more routines that are recommended to run in the environment must run under control of the z/OS authorized program facility (APF). "Yes" means that all libraries allocated by the STEPLIB DD must be APF-authorized. "No" means that at least one library allocated by the STEPLIB DD is not APF-authorized. Not all routines that are recommended to run in an APF-authorized environment necessarily require APF authorization. ADMIN\_UPDATE\_SYSPARM and DSNTPSMP must run in an environment that is not APF-authorized.

## Special DDs

Any special data sets, libraries, or work files that are required by at least one of the routines that are recommended to run in the environment. These are in addition to the standard requirement of STEPLIB DD.

## WLM environments

### DSNWLM\_DEBUGGER

This environment is appropriate for stored procedures that are provided for the Unified Debugger tool. Job DSNTIJMV creates an address space procedure for DSNWLM\_DEBUGGER that is called DSNWLMD. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMD.

DSNWLM\_DEBUGGER has the following characteristics:

<b>NUMTCB</b>	10
<b>APF-authorized</b>	No
<b>Special DDs:</b>	This DD is optional: <ul style="list-style-type: none"><li>• PSMDEBUG which is commented out in normal use. Uncomment it to activate debug tracing.</li></ul>
<b>Other considerations:</b>	<ul style="list-style-type: none"><li>• This environment might have a high refresh rate when debug diagnostics are activated.</li><li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li></ul>

### DSNWLM\_DSNACICS

This environment is appropriate for DSNACICS, the Db2 CICS transaction invocation stored procedure. Job DSNTIJMV creates an address space procedure for DSNWLM\_DSNACICS that is called DSNWLMD. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMD.

DSNWLM\_DSNACICS has the following characteristics:

<b>NUMTCB</b>	40
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	This DD is optional: <ul style="list-style-type: none"><li>• DSNDUMP, which is commented out in normal use. Uncomment it to cause DSNACICS to generate an SVC dump when DSNACICS will generate an error message. When this DD is used, allocate it to output class for system dumps.</li></ul>

<b>Other considerations:</b>	<ul style="list-style-type: none"> <li>• The CICS SDFHEXCI library must be allocated by the STEPLIB DD.</li> <li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li> </ul>
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### DSNWLM\_GENERAL

This environment is appropriate for most Db2-supplied routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_GENERAL that is called DSNWLMG. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMG.

DSNWLM\_GENERAL has the following characteristics:

<b>NUMTCB</b>	40
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	None
<b>Other considerations:</b>	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_JAVA

This environment is appropriate for most Db2-supplied Java routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_JAVA that is called DSNWLMJ. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMJ.

DSNWLM\_JAVA has the following characteristics:

<b>NUMTCB</b>	5
<b>APF-authorized</b>	No
<b>Special DDs:</b>	<p>These DDs are required:</p> <ul style="list-style-type: none"> <li>• JAVAENV allocates a data set that contains Language Environment run time options for Java stored procedures. The presence of this DD statement indicates to Db2 that the WLM environment is for Java routines. For an interpreted Java routine, this data set must contain the environment variable JAVA_HOME. This environment variable indicates to Db2 that the WLM environment is for interpreted Java routines. JAVA_HOME also specifies the highest-level directory in the set of directories that contain the Java SDK.</li> <li>• JSPDEBUG allocates a data set in which Language Environment puts run time diagnostics.</li> </ul> <p>Example:</p> <pre>//JAVAENV DD DISP=SHR,DSN=WLMIJAV.JSPENV //JSPDEBUG DD SYSOUT=*</pre>
<b>Other considerations:</b>	<p>By default, the DSNWLMJ startup procedure for DSNWLM_JAVA runs program DSNX9WLM, which is the WLM address space initialization program for a 31-bit JVM. If your JAVA_HOME variable specifies a path to a 64-bit JVM, such as /usr/lpp/java/8.0_64, you need to change DSNX9WLM in the EXEC statement to DSNX9WJM. For more information, see <a href="#">WLM address space startup procedure for Java routines (Db2 Application Programming for Java)</a>.</p> <p>The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside. If you are running your Java stored procedures in 64-bit JVMs, the recommended NUMTCB is 25.</p>

## DSNWLM\_MQSERIES

This environment is appropriate for running Db2 IBM MQ functions. Job DSNTIJMV creates an address space procedure for DSNWLM\_MQSERIES that is called DSNWLMM. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMM.

DSNWLM\_MQSERIES has the following characteristics:

<b>NUMTCB</b>	10
<b>APF-authorized</b>	No
<b>Special DDs:</b>	None
<b>Other considerations:</b>	<ul style="list-style-type: none"><li>IBM MQ run time libraries must be allocated by the STEPLIB DD if they are not included in the system link list. Example:<pre>//STEPLIB DD DISP=SHR,DSN=<i>prefix</i>.RUNLIB.LOAD //          DD DISP=SHR,DSN=<i>prefix</i>.SCEERUN //          DD DISP=SHR,DSN=<i>prefix</i>.SDSNEXIT //          DD DISP=SHR,DSN=<i>prefix</i>.SDSNLOAD //* Uncomment the following if not included in the LINKLIST //*          DD DISP=SHR,DSN=<i>prefix</i>.SCSQLOAD //*          DD DISP=SHR,DSN=<i>prefix</i>.SCSQAUTH //*          DD DISP=SHR,DSN=<i>prefix</i>.SCSQANL</pre></li><li>The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li></ul>

## DSNWLM\_NUMTCB1

This environment is for Db2-supplied routines that must run serially. If a routine must run serially, it cannot share a task control block (TCB) with another routine. Routines that should run in this environment require a maximum TCB setting of 1 but have no other special DD requirements. Job DSNTIJMV creates an address space procedure for DSNWLM\_NUMTCB1 that is called DSNWLM1. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLM1.

DSNWLM\_NUMTCB1 has the following characteristics:

<b>NUMTCB</b>	1
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	None
<b>Other considerations:</b>	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

## DSNWLM\_PGM\_CONTROL

This environment is appropriate for Db2-supplied routines that are registered to RACF program control or an equivalent and can therefore be loaded only with other similar routines. Job DSNTIJMV creates an address space procedure for DSNWLM\_PGM\_CONTROL that is called DSNWLMP. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMP.

DSNWLM\_PGM\_CONTROL has the following characteristics:

<b>NUMTCB</b>	40
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	None



<b>Other considerations:</b>	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.
------------------------------	--

### DSNWLM\_REXX

This environment is primarily appropriate for the ADMIN\_UPDATE\_SYSPARM and DSNTPSMP stored procedures. However, it can be shared with the other Db2-supplied REXX stored procedures: DSNTBIND, ADMIN\_COMMAND\_DSN, and ADMIN\_INFO\_SYSLOG. Job DSNTIJMV creates an address space procedure for DSNWLM\_REXX that is called DSNWLMR. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMR.

DSNWLM\_REXX has the following characteristics:

<b>NUMTCB</b>	1
<b>APF-authorized</b>	No
<b>Special DDs:</b>	See “Special DDs for DSNWLM_REXX” on page 831.
<b>Other considerations:</b>	<ul style="list-style-type: none"> <li>• The TSO/E DYNAMNBR parameter must indicate the number of system resources the system should hold for possible reuse.</li> <li>• The STEPLIB DD must allocate at least one library that is not APF-authorized.</li> <li>• The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li> </ul>

### Special DDs for DSNWLM\_REXX

### DSNWLM\_UTILS

This environment is appropriate for Db2 utilities stored procedures, which require special DD allocations. These routines require a maximum NUMTCB setting of 1. Job DSNTIJMV creates an address space procedure for DSNWLM\_UTILS that is called DSNWLMU. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMU.

DSNWLM\_UTILS has the following characteristics:

<b>NUMTCB</b>	1
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	<p>These DDs are required:</p> <ul style="list-style-type: none"> <li>• UTPRINT allocates a data set for messages from the sort program.</li> <li>• RNPRIN01 allocates a data set for messages from the sort program. This DD is required only if you plan to invoke RUNSTATS and collect distribution statistics.</li> <li>• STPRIN01 allocates a data set for messages from the sort program. This DD is required when a utility is directed to collect frequency statistics on at least one data-partitioned secondary index or when TABLESPACE TABLE COLGROUP FREQVAL is specified.</li> <li>• DSSPRINT allocates a data set for messages when making concurrent copies.</li> <li>• SYSIN allocates a work file for temporarily storing utility input statements</li> <li>• SYSPRINT allocates a work file for temporarily storing utility output messages.</li> </ul> <p>Example:</p> <pre>//UTPRINT DD SYSOUT=* //RNPRIN01 DD SYSOUT=* //STPRIN01 DD SYSOUT=* //DSSPRINT DD SYSOUT=*</pre>

	<pre>//SYSIN DD UNIT=SYSDA,SPACE=(4000,(20,20),,,ROUND) //          DCB=(RECFM=V,LRECL=32708) //SYSPRINT DD UNIT=SYSDA,SPACE=(4000,(20,20),,,ROUND)</pre>
<b>Other considerations:</b>	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

### DSNWLM\_WEBSERVICES

This environment is appropriate for running Db2 web services and SOAP functions. Job DSNTIJMV creates an address space procedure for DSNWLM\_WEBSERVICES that is called DSNWLMW. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMW.

DSNWLM\_WEBSERVICES has the following characteristics:

<b>NUMTCB</b>	10
<b>APF-authorized</b>	No
<b>Special DDs:</b>	<p>This DD is required:</p> <ul style="list-style-type: none"> <li>WSERROR allocates an HFS file for diagnostic output from the Db2 web services functions.</li> </ul> <p>Example:</p> <pre>//WSERROR DD PATH='/tmp/wsc.err', //          PATHOPTS=(ORDWR,OCREAT,OAPPEND), //          PATHMODE=(SIRUSR,SIWUSR,SIRGRP, //          SIWGRP,SIROTH,SIWOTH)</pre> <p>Ensure that "PATH" specifies a valid path name and that the specified directory structure exists.</p>
<b>Other considerations:</b>	<ul style="list-style-type: none"> <li>The STEPLIB DD must include DSN=<i>prefix</i>.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li> <li>The default timeout to read data from WS provider is 2 seconds. If you need to increase the timeout value, redefine the UDFs with the following run time options:</li> </ul> <pre>RUN OPTIONS 'POSIX(ON),XPLINK(ON),ENVAR("DB2SOAP_TIMEOUT=X")'</pre> <p>where X is a number that specifies the timeout value in seconds.</p>

### DSNWLM\_XML

This environment is appropriate for Db2-supplied XML processing routines that require large amounts of memory. Job DSNTIJMV creates an address space procedure for DSNWLM\_XML that is called DSNWLMX. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMX.

DSNWLM\_XML has the following characteristics:

<b>NUMTCB</b>	40
<b>APF-authorized</b>	Yes
<b>Special DDs:</b>	None
<b>Other considerations:</b>	The STEPLIB DD must include DSN= <i>prefix</i> .SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.

## Related concepts

[Configuration control statements for Db2-supplied routines](#)

Configuration control statements supply the basic input for the DSNTRIN program, which installs and configures all routines that Db2 supplies.

## Related tasks

[Setting up a WLM application environment for stored procedures during installation](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

[Setting up a WLM application environment for stored procedures during migration](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

## DSNTWLMB tool

The DSNTWLMB tool provides a batch interface for defining, installing, and activating WLM environments. You can also use DSNTWLMB to remove WLM application environments. This tool is invoked by job DSNTIJRW to create the core Db2 WLM environments.

## Authorization

If the RACF facility class is active and a profile has been defined for the MVSADMIN.WLM.POLICY facility class, the user of this tool needs the following access:

- ACCESS(READ) for action WLMINFO

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(READ)
```

- ACCESS(UPDATE) for action ADD, ADD\_ACTIVATE, ACTIVATE

```
PERMIT MVSADMIN.WLM.POLICY CLASS(FACILITY) ID(user) ACCESS(UPDATE)
```

## Parameter descriptions

The batch program accepts the following parameters:

### **ACTION**(*action-type*)

Identifies the type of action that is to be performed. This parameter is required and it supports the following values:

#### **ACTIVATE**

The batch program activates a WLM service policy.

#### **ADD**

The batch program installs a new WLM application environment to an existing WLM service definition without activating a service policy. The new WLM application environment becomes available on the next activation of a WLM policy.

#### **ADD\_ACTIVATE**

The batch program installs a new WLM application environment to an existing WLM service definition and activates a WLM service policy to enable the new WLM application environment.

#### **REMOVE**

The batch program removes a WLM application environment from an existing WLM service definition, and installs the modified service definition without activating it.

#### **REMOVE\_ACTIVATE**

The batch program removes a WLM application environment from an existing WLM service definition, installs the modified service definition, and activates it.

**REMOVE\_IF\_EXISTS**

The same as REMOVE, except that if the WLM application environment to be removed does not exist, the return code is 4 (warning), instead of 8 (error).

**REMIFEXISTS\_ACTIVATE**

The same as REMOVE\_ACTIVATE, except that if the WLM application environment to be removed does not exist, the return code is 4 (warning), instead of 8 (error).

**WLMINFO**

The batch program queries the existing WLM service definition and returns basic information.

**POLICY(policy-ID)**

Identifies the WLM service policy that is to be activated. This parameter is required if any of the following actions are specified:

- ACTIVATE
- ADD\_ACTIVATE
- REMOVE\_ACTIVATE
- REMIFEXISTS\_ACTIVATE

The service policy ID can be 1–8 characters or "ACTIVE". If "ACTIVE" is specified as the policy ID, the current active service policy is used.

**SYSIN parameters**

If the specified action is ADD or ADD\_ACTIVATE, additional input is required from SYSIN to provide details about the WLM environment that is to be installed. The additional information can be entered from the SYSIN DD statement. The parameters can be entered on one line (up to 72 characters per line) or multiple lines, and they should be separated by one or more spaces.

If *action-type* is REMOVE, REMOVE\_ACTIVATE, REMOVE\_IF\_EXISTS, or REMIFEXISTS\_ACTIVATE, the WLMNAME parameter is required. Other SYSIN parameters are not valid with these action types.

The following parameters are supported under SYSIN DD:

**WLMNAME(name)**

The defined name for an application environment. The name can be 1–32 characters and cannot begin with "SYS". This is a required parameter.

**DESCRIPTION(description)**

A 32 character area that describes the application environment. This parameter can be set to an empty value. For example:

```
DESCRIPTION()
```

**PROCNAME(procedure-name)**

Defines the JCL procedure that WLM uses to start server address spaces for the application environment. This is a required parameter.

**STARTPARM(start-up-parameters)**

Contains the parameters that WLM uses to start the JCL procedure. The parameters can be up to 115 characters, or it can be set to an empty value. If the parameters include the subsystem name, you can use the symbol &IWMSSNM to cause WLM to substitute the subsystem name instead of directly typing the subsystem name. This is useful because multiple instances of the subsystem with different names can use the application environment. For example:

```
STARTPARM(DB2SSN=&IWMSSNM,APPLENV=WLMENV1,NUMTCB=1)
```

**WLMOPT(WLM\_MANAGED|SINGLE\_SERVER)**

Tells WLM whether it should limit the number of server address spaces that are created. For a single system, the WLM\_MANAGED option means that any number of servers can be created for the subsystem on the system where it is connected to Workload Manager. In a sysplex, WLM\_MANAGED means that servers can be created for the subsystem on any number of systems in the sysplex. If

multiple Db2 subsystems are on a system, WLM will create one server for each Db2 subsystem that calls the routines.

The `SINGLE_SERVER` option means that only one address space can exist per system. For Db2-supplied routines, you can set a limit of one address space per system if this limit is required by the routine. For example, if a server address space requires exclusive use of a resource, only a single address space can exist. Use this option if a stored procedure cannot execute concurrently in multiple address spaces. This option should be used if a stored procedure is to be run in debug mode and writes to a trace. A limit of one address space per sysplex does not apply to Db2-supplied routines.

This parameter can be set to an empty value and will default to `WLM_MANAGED`.

### Related tasks

#### Setting up a WLM application environment for stored procedures during migration

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

#### Setting up a WLM application environment for stored procedures during installation

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

## Sample SQL statements for installing Db2-supplied routines

Sample member `DSNTESR` contains the data definition language that is used by job `DSNTIJRT`.

Run job `DSNTIJRT` to create Db2-supplied routines. Sample member `DSNTESR` contains a full set of the data definition language that is processed by `DSNTIJRT`. `DSNTESR` contains statements to create and grant access to Db2-supplied routines, related objects, and the commands for binding packages.

## Configuration control statements for Db2-supplied routines

Configuration control statements supply the basic input for the `DSNTRIN` program, which installs and configures all routines that Db2 supplies.

Configuration control statements consist of a routine's schema and name (for stored procedures) or specific name (for user-defined functions), followed by customizable parameters. You can manually customize these parameters, but to save your settings and facilitate future migrations, specify changes using the Db2 routines: Advanced configuration options installation panels, which are accessed from the `DSNTIPR1` panel.

### Parameters

The following parameters are used in configuration control statements:

#### **WLMENV**

The name of the WLM environment for running the routine. The default environment depends on the routine.

#### **GRANTTO**

The authorization IDs allowed to execute the routine and use any associated tables or created global temporary tables. Separate multiple IDs with commas. Do not use blanks. The default is `PUBLIC`, which allows everyone to execute the routine.

#### **PKGOWNER**

The authorization ID to own the routine's package. The specified owner must have the privileges required to execute the SQL statements contained in the routine. If this parameter is specified for a routine that does not have a package, the parameter is ignored. If this optional parameter is not specified, the default package owner is the primary ID used to run `DSNTRIN`.

## Statement format

The general form of a configuration control statement is:

```
schema.routine-name  
WLMENV(wlm-environment-name)  
GRANTTO(auth-ID1, . . . , auth-IDn)  
PKGOWNER(package-owner)
```

## Statement rules

The following rules apply to configuration control statements:

- Statements must reside in records having a fixed-block record format with a logical record length of 80 (same as JCL).
- Only columns 1–72 of each record are inspected. Columns 73 - 80 are ignored.
- Statement elements are delimited by one or more blank characters.
- Statement elements cannot contain embedded blanks.
- Statements are delimited by one or more blank lines.
- A statement can be continued on multiple input records. A statement element can be continued by breaking it at column 72 of one record and resuming it at column 1 of the next record.
- An asterisk in column 1 of a record indicates a comment line and the content is ignored.
- Comment lines cannot begin after column 1.
- Comments and statement elements cannot be on the same line.
- Comment lines can be embedded within a statement.
- The routine must be specified as the schema name followed by a period and the routine name.
- The WLMENV parameter is required and must directly follow the *schema.routine name*.
- The GRANTTO parameter is required and must directly follow the WLMENV parameter.
- The PKGOWNER parameter is optional. If specified, it must follow the GRANTTO parameter.

## Examples

The following examples are valid configuration control statements:

```
* Configuration statements for the Utilities stored procedures follow:  
SYSPROC.DSNUTILS  
WLMENV(WLMENV_DSNUTIL)  
*  
* A comment line within the statement is legal  
*  
  GRANTTO(PUBLIC)  
  PKGOWNER(ALFA)  
  
* Notice the all-blank line above to delineate the two statements  
SYSPROC.DSNUTILU  
WLMENV(WLMENV_DSNUTIL)  
*  
* Here is an example of wrapping an element to the next line  
GRANTTO(ALFA, BRAVO, CHARLIE, DELTA, ECHO, FOXROT, GOLF, HOTEL, INDIA, JULIETT  
E, KILO, LIMA)  
*  
* PKGOWNER is commented-out below so the OWNER parm will be excluded  
*   from the BIND PACKAGE statement  
* PKGOWNER(ALFA)
```

The following examples are invalid configuration control statements that violate the statement rules:

```
* Configuration statement for the WLM refresh stored procedure follows:  
* - Error 1: The statement must start with schema.routine-name  
WLM_REFRESH  
* - Error 2: Comments can't start after column 1  
* This is not a valid comment  
* - Error 3: Comments and elements can't be in the same line
```

```

WLMENV(WLMENV_APFAUTH) * This is an invalid place to put a comment
* - Error 4: GRANTTO argument contains blanks
GRANTTO( ALFA, BRAVO, CHARLIE, DELTA, ECHO, FOXTROT )
* - Error 5: PKGOWNER is present but has no argument
PKGOWNER()
*
* - Error 6: The statements are not separated by a blank line
SYSPROC.DSNTPSMP
* - Error 7: The statement does not have a WLMENV parm
* - Error 8: The statement contains a blank line

GRANTTO(HOTEL)

```

### Related reference

Core WLM environments for Db2-supplied routines

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Disabling Db2-supplied routines for validation

Job DSNTIJRT installs all Db2-supplied routines on your subsystem. After installation or migration, you can disable any routines that are unnecessary or unusable so the validation program can exclude it from processing.

### Procedure

Assign DSNWLM\_NOT\_ENABLED as the WLM environment of the routine.

The DSNTRVFY validation program does not validate routines that are defined with DSNWLM\_NOT\_ENABLED as the WLM environment name.

### Example

For example, if CICS is not installed, assign DSNWLM\_NOT\_ENABLED as the WLM environment of SYSPROC.DSNACICS by using the following statement:

**GUI**

```
ALTER PROCEDURE SYSPROC.DSNACICS WLM ENVIRONMENT DSNWLM_NOT_ENABLED
```

**GUI**

## Setting up support for external SQL procedures

If you plan to create external SQL procedures by using DSNTPSMP or IBM Data Studio, you need to complete some additional setup. Alternatively, you can write your own JCL to create external SQL procedures, in which case you do not need to complete this setup.

### Before you begin

**Deprecated function:** External SQL procedures are deprecated and not as fully supported as native SQL procedures. For best results, create native SQL procedures instead. For more information, see [Creating native SQL procedures \(Db2 Application programming and SQL\)](#) and [Migrating an external SQL procedure to a native SQL procedure \(Db2 Application programming and SQL\)](#).

### About this task

DSNTPSMP is a REXX stored procedure that you can use to create and prepare external SQL procedures. DSNTPSMP is also used by IBM Data Studio to create external SQL procedures. When DSNTPSMP is invoked, Db2 uses the DSNTPSMP REXX EXEC, which is in the *prefix.SDSNCLST* data set.

## Procedure

To set up support for external SQL procedures:

1. If DSNTPSMP does not already exist, run job DSNTIJRT to create this stored procedure.
2. Install Db2 REXX Language Support.
3. Set up a WLM environment in which to run DSNTPSMP and create a WLM startup procedure.

**Recommendation:** If you do not have a WLM environment defined to run DSNTPSMP, use the core WLM environment DSNWLM\_REXX.

## Related concepts

Job DSNTIJRT

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

## Related tasks

[Installation step 18: Create default storage group, define temporary work files, and bind Db2 REXX Language Support: DSNTIJTM](#)

You must create the default storage group that is for user-defined Db2 tables that are not specifically assigned to a storage group. You must also define the database that is for temporary work files, and bind Db2 REXX Language Support.

[Setting up a WLM application environment for stored procedures during installation](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

[Setting up a WLM application environment for stored procedures during migration](#)

All stored procedures and user-defined functions (except native SQL procedures) must run in WLM-managed stored procedure address spaces. You must assign each stored procedure to a WLM application environment, which routes the stored procedure work to the appropriate WLM-managed address space.

[Creating external SQL procedures \(deprecated\) \(Db2 Application programming and SQL\)](#)

## Related reference


[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Additional steps for enabling the stored procedures and objects for XML schema support

Db2 for z/OS provides several stored procedures that you can call in your application programs to perform XML schema registration and removal.

## Before you begin

 Before you complete this step, [set up WLM application environments for the stored procedures for XML support](#), and either [install the Db2-supplied routines during migration](#) or [install the Db2-supplied routines during installation](#).

## About this task

Db2 provides the following stored procedures for XML schema support:

- SYSPROC.XSR\_REGISTER
- SYSPROC.XSR\_ADDSCHEMADOC
- SYSPROC.XSR\_COMPLETE
- SYSPROC.XSR\_REMOVE

Db2 provides the following tables for XML schema support:



- SYSIBM.XSRANNOTATIONINFO
- SYSIBM.XSRCOMPONENT
- SYSIBM.XSROBJECTCOMPONENTS
- SYSIBM.XSROBJECTHIERARCHIES
- SYSIBM.XSROBJECTGRAMMAR
- SYSIBM.XSROBJECTPROPERTY
- SYSIBM.XSROBJECTS
- SYSIBM.XSRPROPERTY

## Procedure

Install Java support.

The XSR\_COMPLETE stored procedure is a Java stored procedure and therefore requires Java support.

## Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

## Related tasks

[Installing the IBM Data Server Driver for JDBC and SQLJ on Db2 for z/OS \(Db2 Application Programming for Java\)](#)

## Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[XML processing routines panel: DSNTIPRI](#)

The DSNTIPRI panel allows you to modify configuration options for XSL transform and XML schema processing routines.


## Related information

[Procedures for XML schema registration and removal that are supplied with Db2 \(Db2 Programming for XML\)](#)

## Additional steps for enabling the function for XSLTRANSFORM routines support

Db2 for z/OS provides a function that you can call in your application programs to transform XML documents with XSL transformation processing.

## Before you begin

 Before you complete this step, set up WLM application environments for Java routines, and either [install the Db2-supplied routines during migration](#) or [install the Db2-supplied routines during installation](#).

## About this task

Db2 provides the following function for XSL transform support:

- SYSFUN.XSLTRANSFORM

## Procedure

Install Java support.

The XSLTRANSFORM function is a Java stored procedure and therefore requires Java support.

## Related concepts

[Job DSNTIJRT](#)

[Job DSNTIJRT](#) installs and configures Db2-supplied routines by executing the DSNTTRIN program.

## Related tasks

[Installing the IBM Data Server Driver for JDBC and SQLJ on Db2 for z/OS \(Db2 Application Programming for Java\)](#)

## Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[XML processing routines panel: DSNTIPRI](#)

The DSNTIPRI panel allows you to modify configuration options for XSL transform and XML schema processing routines.

## Additional steps for enabling the administrative task scheduler and administrative enablement routines

The administrative task scheduler routines are Db2-supplied routines that enable you to schedule work. The administrative enablement routines are Db2-supplied routines that enable you to execute administrative work immediately.

### Before you begin

Before you complete these steps, [set up WLM application environments](#) for the administrative task scheduler and administrative enablement routines, and either [install the Db2-supplied routines during migration](#) or [install the Db2-supplied routines during installation](#).

**Recommendation:** If you do not have a WLM environment defined to run these routines, use Db2 core WLM environment DSNWLM\_GENERAL, except as follows:

- ADMIN\_COMMAND\_DSN - Use DSNWLM\_REXX
- ADMIN\_COMMAND\_UNIX - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_INFO\_SYSLOG - Use DSNWLM\_REXX
- ADMIN\_INFO\_SYSPARM - Use DSNWLM\_NUMTCB1
- ADMIN\_JOB\_CANCEL - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_FETCH - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_QUERY - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_JOB\_SUBMIT - Use DSNWLM\_PGM\_CONTROL
- ADMIN\_UPDATE\_SYSPARM - Use DSNWLM\_REXX
- ADMIN\_UTL\_MONITOR - Use DSNWLM\_PGM\_CONTROL

### About this task

The following routines are administrative task scheduler routines:

- ADMIN\_TASK\_ADD
- ADMIN\_TASK\_CANCEL
- ADMIN\_TASK\_LIST
- ADMIN\_TASK\_OUTPUT
- ADMIN\_TASK\_REMOVE
- ADMIN\_TASK\_STATUS
- ADMIN\_TASK\_UPDATE

The following routines are administrative enablement routines:

- ADMIN\_COMMAND\_DB2
- ADMIN\_COMMAND\_DSN
- ADMIN\_COMMAND\_MVS
- ADMIN\_COMMAND\_UNIX
- ADMIN\_DS\_BROWSE
- ADMIN\_DS\_DELETE
- ADMIN\_DS\_LIST
- ADMIN\_DS\_RENAME
- ADMIN\_DS\_SEARCH
- ADMIN\_DS\_WRITE
- ADMIN\_EXPLAIN\_MAINT
- ADMIN\_INFO\_HOST
- ADMIN\_INFO\_SMS
- ADMIN\_INFO\_SQL
- ADMIN\_INFO\_SSID
- ADMIN\_INFO\_SYSLOG
- ADMIN\_INFO\_SYSPARM
- ADMIN\_JOB\_CANCEL
- ADMIN\_JOB\_FETCH
- ADMIN\_JOB\_QUERY
- ADMIN\_JOB\_SUBMIT
- ADMIN\_UPDATE\_SYSPARM
- ADMIN\_UTL\_EXECUTE
- ADMIN\_UTL\_MODIFY
- ADMIN\_UTL\_MONITOR
- ADMIN\_UTL\_SCHEDULE
- ADMIN\_UTL\_SORT

## Procedure

To enable the administrative task scheduler and administrative enablement routines:

1. In the JCL for starting the WLM-established address space for running the stored procedures whose load module must reside in an APF-authorized library, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.
2. Take the following steps, which are required because the started task module, DSNADMT0, of the administrative task scheduler switches users by using the `pthread_security_np()` function of z/OS UNIX System Services:
  - a) Ensure that the started task user (STARTUID) has READ access to the BPX.SERVER FACILITY class profile by taking the action that is recommended in the following table.  
The action that you take depends on whether the BPX.SERVER is defined and whether the STARTUID is a superuser.

<i>Table 122. Ensuring that the STARTUID has READ access to the BPX.SERVER FACILITY class profile</i>		
<b>Is the BPX.SERVER in FACILITY class defined?</b>	<b>Is the STARTUID a superuser?</b>	<b>Actions to take</b>
No	No	1. Define the BPX.SERVER class profile in the FACILITY class. 2. Permit STARTUID READ access to this profile.
No	Yes	No action required
Yes	n/a	Permit STARTUID READ access to resource profile BPX.SERVER in the FACILITY class.

- b) Ensure that the scheduler program is program controlled by taking one of the following actions:
- Define the scheduler program to RACF program control, by customizing and running job step DSNADSR in job DSNTIJRA.
  - Define the BPX.DAEMON.HFSCTL class profile in the FACILITY class, and permit STARTUID READ access to this profile.
3. If the BPX.DAEMON facility class is active and the BPX.DAEMON.HFSCTL facility class is not defined, perform the following actions for the stored procedures that must be registered to RACF program control.

The stored procedures that require RACF program control are:

- ADMIN\_COMMAND\_UNIX
- ADMIN\_JOB\_CANCEL
- ADMIN\_JOB\_FETCH
- ADMIN\_JOB\_QUERY
- ADMIN\_JOB\_SUBMIT

- a) Customize and run job step DSNADER in job DSNTIJRA to define the security environment for these stored procedures. You need to uncomment job step DSNADER before you run job DSNTIJRA. You do not need to run any other job steps in job DSNTIJRA.
- b) Ensure that you have a WLM environment for these stored procedures that meets the following requirements:
- The WLM-established stored procedure address space loads only controlled programs.
  - In the JCL for starting the WLM-established address space for running these stored procedures, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.
  - The name of this environment must match the WLMENV parameter value in the configuration control statement for each stored procedure in job DSNTIJRT.

### **Related reference**

[Procedures that are supplied with Db2 \(Db2 SQL\)](#)

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[Db2 administration routines panel: DSNTIPRL](#)

The DSNTIPRL panel allows you to modify configuration options for routines that are to be used for administration.

## Additional steps for enabling the CICS transaction invocation procedure

The CICS transaction invocation stored procedure, DSNACICS, invokes CICS server programs.

### Before you begin

Before you complete these steps, either [install the Db2-supplied routines during migration](#) or [install the Db2-supplied routines during installation](#).

### Procedure

To enable the CICS transaction invocation procedure:

1. Optional: Set up a WLM application environment specifically for running DSNACICS.

Although DSNACICS can run in a WLM address space with other stored procedures, DSNACICS performs better if it runs in its own address space.

**Recommendation:** If you do not have a WLM environment defined to run this routine, use Db2 core WLM environment DSNWLM\_CICS.

2. Create or modify the JCL startup procedure for the stored procedure address space for running DSNACICS.

If you ran installation job DSNTIJMV, such a sample startup procedure has been created in your SYS1.PROCLIB data set. The generic name of the procedure is DSNWLMC. The CICS data set names in the procedure are based on the values that you specified on panel DSNTIPW. If needed, you can modify this startup procedure.

If you did not run installation job DSNTIJMV or the part of it that creates this startup procedure, run the job now. You can also use the sample startup procedure in the job as a model to create your own startup procedure.

### Related concepts

[Job DSNTIJRT](#)

Job DSNTIJRT installs and configures Db2-supplied routines by executing the DSNTRIN program.

### Related tasks

[Assigning stored procedures and functions to WLM application environments \(Db2 Performance\)](#)

### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

[DSNTIPW: Other data set names panel](#)

The entries on the DSNTIPW panel establish data set names for the libraries of other products in your system. The values that are entered on this panel are edited into all pertinent sample and installation jobs.

[DSNACICS stored procedure \(Db2 SQL\)](#)

## Additional steps for enabling the common SQL API stored procedures

You can use the common SQL API stored procedures to retrieve information about the data server configuration, the short message text for an SQL code, and system information. These stored procedures are used primarily by tools.

### Before you begin

Before you complete these steps, either [install the Db2-supplied routines during migration](#) or [install the Db2-supplied routines during installation](#). To create the GET\_CONFIG stored procedure with the correct security attributes, job DSNTIJRT must be run by a user ID with SYSOPR and MONITOR1 privileges.

Job DSNTIJRT installs and configures these stored procedures, but you must complete additional steps before you use them.

If GET\_SYSTEM\_INFO will be called to return the ICF catalog information about Db2 data sets, the user who defines the stored procedure must have MONITOR1 and DISPLAY privileges. If GET\_SYSTEM\_INFO will be called to return catalog attributes or ICF catalog information about Db2 data sets, the user who defines the stored procedure must have READ access to the OPERCMDS resource MVS.MCSOPER.DSNADMGS. If MVS.MCSOPER.DSNADMGS does not exist, the user must have READ access to the OPERCMDS resource MVS.MCSOPER.\*. Otherwise, catalog attributes information will not be returned from GET\_SYSTEM\_INFO. To give the user that defines the procedures access to the RACF OPERCMDS class, the RACF security administrator must:

1. If the OPERCMDS class is not active, issue the following SETROPTS command to activate the OPERCMDS class:

```
SETROPTS CLASSACT(OPERCMDS)
```

2. If the generic profile for OPERCMDS is not active, issue the following SETROPTS command to activate it:

```
SETROPTS GENERIC(OPERCMDS)
```

3. Issue the RDEFINE command to establish a profile for MVS.MCSOPER.*console-name*. In this example, *console-name*=DSNADMGS:

```
RDEFINE OPERCMDS MVS.MCSOPER.DSNADMGS UACC(NONE)
```

4. Give the user ID access to the class. In this example, the user ID is USER001:

```
PERMIT MVS.MCSOPER.DSNADMGS CLASS(OPERCMDS) ID(USER001) ACCESS(READ)
```

5. Issue the SETROPTS RACLIST command to refresh the OPERCMDS reserve class:

```
SETROPTS RACLIST(OPERCMDS) REFRESH
```

Before you complete the additional steps to enable the common SQL API stored procedures, [set up WLM application environments](#) for them to run in. These stored procedures run in WLM-established stored procedures address spaces.

The common SQL API stored procedures are:

- SYSPROC.GET\_CONFIG
- SYSPROC.GET\_MESSAGE
- SYSPROC.GET\_SYSTEM\_INFO
- SYSPROC.SET\_PLAN\_HINT

GET\_SYSTEM\_INFO must run in a separate WLM environment from DSNUTILS or DSNUTILU.

## Procedure

In the JCL for starting the WLM-established address space for running the GET\_SYSTEM\_INFO stored procedure, ensure that all libraries in the STEPLIB DD concatenation are APF-authorized.

### Related concepts

[Common SQL API stored procedures \(Db2 Administration Guide\)](#)

### Related reference

[GET\\_CONFIG stored procedure \(Db2 SQL\)](#)

[GET\\_MESSAGE stored procedure \(Db2 SQL\)](#)

[GET\\_SYSTEM\\_INFO stored procedure \(Db2 SQL\)](#)

[SET\\_PLAN\\_HINT stored procedure \(Db2 SQL\)](#)

## Additional steps for enabling IBM MQ user-defined functions

Before applications can call the IBM MQ user-defined functions, you must enable the user-defined functions.

### Before you begin

If you want to use the MQI-based MQ functions, you must install IBM MQ Version 6 or later.

### About this task

#### Related reference

[Systems Programmer's Guide to Resource Recovery Services \(RRS\) \(IBM Redbooks\)](#)

[Systems Programmer's Guide to: Workload Manager \(IBM Redbooks\)](#)

[IBM MQ library](#)

## Moving from previous versions of the IBM MQ user-defined functions

During installation or migration, the current versions of some IBM MQ user-defined functions are installed under schema DB2MQ by job DSNTIJRT.

### About this task

The following user-defined functions have new versions:

- MQREAD
- MQREADALL
- MQREADALLCLOB
- MQREADCLOB
- MQRECEIVE
- MQRECEIVEALL
- MQRECEIVEALLCLOB
- MQRECEIVECLOB
- MQSEND

**Recommendation:** Code new applications to use the functions in schema DB2MQ. The functions in schemas DB2MQ1C, DB2MQ2C, DB2MQ1N, and DB2MQ2N are no longer supported.

## Converting from the AMI-based MQ functions to the MQI-based MQ functions

The MQI-based MQ functions use two tables, SYSIBM.MQSERVICE\_TABLE and SYSIBM.MQPOLICY\_TABLE, instead of Application Messaging Interface (AMI) configuration files. You need

to bind the new functions, create the tables, and convert the contents of the AMI configuration files to rows in the MQ tables.

## About this task

Job DSNTIJRT binds the new functions and creates the tables. You need to manually convert the contents of the AMI configuration files.

## Procedure

To manually move the AMI configuration file data to the MQ tables:

1. Map sub-elements and attributes under the <ServicePoint> element to columns in SYSIBM.MQSERVICE\_TABLE as indicated in the following table.

Table 123. How elements and attributes under the <ServicePoint> element map to columns in the SYSIBM.MQSERVICE\_TABLE table

Element	Attribute of element	Column	Example
<ServicePoint>	longDescription	DESC_LONG	<ServicePoint longDescription="" shortDescription="" ..xmi.label="DB2.DEFAULT.SERVICE">
	shortDescription	DESC_SHORT	
	xmi.label	SERVICENAME	
<ServicePoint_queueName>	value	INPUTQUEUE	<ServicePoint_queueName .. value="DB2MQ_DEFAULT_Q"/>
<ServicePoint_queueMgrName>	value	QUEUEMANAGER	<ServicePoint_queueMgrName .. value="MQND"/>

2. Map sub-elements and attributes under the <Policy> element to columns in SYSIBM.MQPOLICY\_TABLE as indicated in the following table.

Table 124. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<Policy>	long Description	value	DESC_LONG	value	<Policy longDescription="" shortDescription="" .. xmi.label="DB2.DEFAULT.POLICY">
	short Description		DESC_SHORT		
	xmi.label		POLICYNAME		
<GeneralAttributes_syncpoint>	value	Yes	SYNCPOINT	Y	<GeneralAttributes_syncpoint .. value="Yes"/>
		No		N	
<SendAttributes_priority>	value	AsTransport	SEND_PRIORITY	-1	<SendAttributes_priority .. value="AsTransport"/>
<SendAttributes_persistence>	value	AsTransport	SEND_PERSISTENCE	Q	<SendAttributes_persistence .. value="AsTransport"/>
		Yes		Y	
		No		N	



Table 124. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table (continued)

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<SendAttributes_expiry>	value	Unlimited	SEND_EXPIRY	-1	<SendAttributes_expiry .. value="Unlimited"/>
<SendAttributes_retryCount>	value	n	SEND_RETRY_COUNT	n	<SendAttributes_retryCount .. value="0"/>
<SendAttributes_retryInterval>	value	n	SEND_RETRY_INTERVAL	n	<SendAttributes_retryInterval .. value="1000"/>
<SendAttributes_newCorrelId>	value	Yes	SEND_NEW_CORRELID	Y	<SendAttributes_newCorrelId .. value="No"/>
		No		N	
<SendAttributes_responseCorrelId>	value	MessageID	SEND_RESPONSE_CORRELID	C	<SendAttributes_responseCorrelId .. value="MessageID"/>
		CorrelID		P	
<SendAttributes_exceptionAction>	value	DLQ	SEND_EXCEPTION_ACTION	Q	<SendAttributes_exceptionAction .. value="DLQ"/>
		Discard		D	
<SendAttributes_reportTypeException>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_EXCEPTIONDESC_LONG	N	<SendAttributes_reportTypeException .. value="No"/>
		Yes, Report		E	<SendAttributes_reportData .. value="Report"/>
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	
<SendAttributes_reportTypeCOA>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_COA	N	<SendAttributes_reportTypeCOA .. value="No"/>
		Yes, Report		C	<SendAttributes_reportData .. value="Report"/>
		Yes, Report_With_Data		D	
		Yes, Report_With_Full_Data		F	

Table 124. How elements and attributes under the <Policy> element map to columns in the SYSIBM.MQPOLICY\_TABLE table (continued)

Element	Attribute of element	Value of attribute	Column	Value of column	Example
<SendAttributes_reportTypeCOD>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_COD	N	<SendAttributes_reportTypeCOD .. value="No"/>
		Yes, Report		C	
		Yes, Report_With_Data		D	<SendAttributes_reportData .. value="Report"/>
		Yes, Report_With_Full_Data		F	
<SendAttributes_reportTypeExpiry>, <SendAttributes_reportData>	value, value <sup>1</sup>	No	SEND_REPORT_EXPIRY	N	<SendAttributes_reportTypeExpiry .. value="No"/>
		Yes, Report		E	
		Yes, Report_With_Data		D	<SendAttributes_reportData .. value="Report"/>
		Yes, Report_With_Full_Data		F	
<ReceiveAttributes_waitInterval>	value	n	RCV_WAIT_INTERVAL	n	<ReceiveAttributes_waitInterval .. value="60"/>
<ReceiveAttributes_convert>	value	Yes	RCV_CONVERT	Y	<ReceiveAttributes_convert .. value="Yes"/>
		No		N	
<ReceiveAttributes_acceptTruncatedMessages>	value	Yes	RCV_ACCEPT_TRUNC_MSG	Y	<ReceiveAttributes_acceptTruncatedMessages .. value="Yes"/>
		No		N	
<ReceiveAttributes_openShared>	value	Yes	RCV_OPEN_SHARED	S	<ReceiveAttributes_openShared .. value="Yes"/>
		No		E	

**Note:**

1. The two values are used in conjunction to determine the column value.

## Starting the queue manager

To enable IBM MQ user-defined functions, start the queue manager after you create and configure the broker domain.

### Procedure

To start the queue manager:

1. Issue the following command from the z/OS console, where <command-prefix-string> is the command prefix string for the IBM MQ subsystem:

```
<command-prefix-string> START QMGR
```

For example, if the command prefix string for your IBM MQ subsystem is –MQND, issue this command:

```
–MQND START QMGR
```

2. To check whether the queue manager is available, issue the following command from the TSO Command Processor panel, which is option 6 of the ISPF/PDF primary options menu:

```
CSQOREXX
```

## Customizing the WLM application environment for running IBM MQ user-defined function support

To run the Db2 MQ user-defined functions, you must configure a WLM environment and the corresponding WLM startup procedure.

### Procedure

Configure the following WLM environment.

#### DSNWLM\_MQSERIES

This environment is appropriate for running Db2 IBM MQ functions. Job DSNTIJMV creates an address space procedure for DSNWLM\_MQSERIES that is called DSNWLMM. The name and library name of this procedure change according to the Db2 subsystem name that is specified on panel DSNTIPM. For example, if the subsystem name is VA1A, the procedure is named VA1AWLMM.

DSNWLM\_MQSERIES has the following characteristics:

<b>NUMTCB</b>	10
<b>APF-authorized</b>	No
<b>Special DDs:</b>	None
<b>Other considerations:</b>	<ul style="list-style-type: none"><li>• IBM MQ run time libraries must be allocated by the STEPLIB DD if they are not included in the system link list. Example:<pre>//STEPLIB DD DISP=SHR,DSN=prefix.RUNLIB.LOAD //          DD DISP=SHR,DSN=prefix.SCEERUN //          DD DISP=SHR,DSN=prefix.SDSNEXIT //          DD DISP=SHR,DSN=prefix.SDSNLOAD //* Uncomment the following if not included in the LINKLIST //*          DD DISP=SHR,DSN=prefix.SCSQLOAD //*          DD DISP=SHR,DSN=prefix.SCSQAUTH //*          DD DISP=SHR,DSN=prefix.SCSQANL</pre></li><li>• The STEPLIB DD must include DSN=prefix.SDSNEXIT or other library where the authorization exit modules (DSN3@ATH and DSN3@SGN) reside.</li></ul>

#### Related concepts

[Db2 MQ functions and Db2 MQ XML stored procedures \(Db2 Application programming and SQL\)](#)

#### Related reference

[Core WLM environments for Db2-supplied routines](#)

Definitions for core WLM environments are provided as recommended initial environments for running Db2-supplied routines. You can use Db2 core WLM environments to model additional WLM environments as you tune your subsystem for maximum performance of the Db2-supplied routines that you use.

## Verifying the Db2 and IBM MQ setup

After you set up the IBM MQ environment, you can verify that it is set up correctly by running Db2 jobs.

### Procedure

Customize and run job DSNTEJMQ to verify that your IBM MQ environment is set up correctly for invoking Db2 IBM MQ user-defined functions. Instructions for customizing this job are in the job prolog. Job DSNTEJMQ defines a local queue and invokes each of the IBM MQ functions through DSNTEP2.

## Enabling Db2 web services

*Web services* are sets of business functions that applications or other web servers invoke over the Internet by using standard HTTP or HTTPS requests.

### Additional steps for enabling web service user-defined functions

Enabling the web service user-defined functions allows you to specify a complete SOAP message as input, so you receive the complete SOAP messages from the web service provider's response.

### Before you begin

Before you complete these steps, [set up WLM application environments](#) for web service user-defined functions.

**Recommendation:** For web service functions, use the DSNWLM\_WEBSERVICES core WLM environment.

### About this task

During installation or migration, the following web service user-defined functions were installed by job DSNTIJRT:

- DSNWSCVV
- DSNWSCVC
- DSNWSCCV
- DSNWSCCC

### Procedure

To set up the web service user-defined functions:

1. The default timeout to read data from a web service provider is two seconds. Increase the timeout value by redefining the web service user-defined functions with the key and value pair DB2SOAP\_TIMEOUT=X in the ENVAR parameter values, where X is a number that specifies the timeout value in seconds.
2. If you want to use SOAP Version 1.2, include the key and value pair DB2SOAP\_VERSION=SOAP\_12 in the ENVAR parameter values. By default, Db2 uses SOAP Version 1.1. If you specify any other value for DB2SOAP\_VERSION besides SOAP\_12, SOAP Version 1.1 is assumed.

If your subsystem uses SOAP Version 1.1 and SOAP Version 1.2, you must define two sets of SOAP user-defined functions: one without ENVAR("DB2SOAP\_VERSION=SOAP\_12"), and one with ENVAR("DB2SOAP\_VERSION=SOAP\_12").

3. If you want to receive SOAP error messages, specify the ENVAR option RETURN\_ERROR=YES.

If RETURN\_ERROR=NO or the option is not specified and an error occurs, the web service provider returns a SOAP response to the client with an HTTP return code set other than 200. In this case, the

user-defined functions end with SQLCODE=-443 and the complete HTTP response that was sent by web service provider is stored in the WSERROR DD file, as specified in the WLM startup procedure. The file contains the actual bytes that are sent by the web service provider.

If you specify RETURN\_ERROR=YES, the SOAPHTTP user-defined function writes the HTTP content to the WSERROR DD file when the HTTP status code is not 200. It also builds a new XML document with an error element node that contains an "httprc" attribute around the SOAP response, as follows:

```
<error httprc="{HTTP status code}">
  {SOAP response}
</error>
```

The XML document is returned without issuing SQLCODE -443. Your applications must check for a root element node of error to determine if an HTTP error is returned. If an HTTP error is returned, the applications must process the SOAP response to handle the error.

4. If you do not use the DSNWLM\_WEBSERVICES core WLM environment, add the following DD card to the WLM startup procedure where the user-defined functions are defined.

```
// WSERROR DD PATH='<HFS filename>',
// PATHOPTS=(ORDWR,OCREAT,OAPPEND),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIWGRP,SIROTH,SIWOTH)
```

where *<HFS filename>* is the name of an HFS, such as /tmp/wsc.err.

If the response is in Unicode, you can browse the file on an MVS system by issuing the following command:

```
iconv -f UTF-8 -t IBM-1047 < tmp/wsc.err
```

You can store the contents in EBCDIC by saving it to another file by issuing the following command:

```
iconv -f UTF-8 -t IBM-1047 < wsc.txt > wsc_ebcdic.txt
```

You can also FTP the file in BINARY mode to a workstation and open it using a text editor.

### Related concepts

[The SOAPHTTPNV and SOAPHTTPNC user-defined functions \(Db2 Application programming and SQL\)](#)

### Related reference

[AT-TLS policy statements \(z/OS Communications Server: IP Configuration Reference\)](#)

## Supported web service calls

The web service user-defined functions support unsecured web services, HTTP Basic Authorized web services, and HTTPS Secured web services.

1. Unsecured web services

For unsecured web services, the HTTP request that contains SOAP is sent in clear text to the web service provider, where no authentication is performed. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
http://[hostname[:port]}/[path]
```

2. HTTP Basic Authorized web services

For HTTP Basic Authorized web services, the specified user and password is encoded in Base64 and sent as part of an HTTP Header. The HTTP request that contains SOAP is sent in clear text to the web service provider, where it authenticates the supplied user and password before processing the request. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
http://[user[:password]@]hostname[:port]}/[path]
```

3. HTTPS Secured web services

For HTTPS Secured web services, as part of the HTTPS protocol, the complete HTTP request that contains SOAP is encrypted and sent to the web service provider. The endpoint URL that is specified during invocation of the web service user-defined functions has the following form:

```
https://[hostname[:port] ]/[path]
```

### **Enabling the web service user-defined function support for HTTPS**

Support for HTTPS in the web service user-defined functions uses Application Transparent Transport Layer Security (AT-TLS). AT-TLS is based on z/OS System SSL, and it transparently implements Transport Layer Security (TLS) protocols in the TCP layer of the stack.

#### **About this task**

SSL connections make use of public/private key mechanisms (PKI) for authenticating each side of the SSL session and agreeing on bulk encryption keys to be used for the SSL session. To use PKI, public/private key pairs must be generated. In addition, X.509 certificates (which contain public keys) might need to be created, or certificates must be requested, received, and managed.

System SSL supports the following two methods for managing PKI private keys and certificates:

- A z/OS shell-based program called `gskkyman`. `gskkyman` creates, fills in, and manages a z/OS file that contains PKI private keys, certificate requests, and certificates. This z/OS file is called a key database and, by convention, has a file extension of `.kdb`.
- The z/OS Security Server (RACF) `RACDCERT` command. `RACDCERT` installs and maintains PKI private keys and certificates in RACF.

#### **Procedure**

To enable support for HTTPS and AT-TLS:

1. Specify the `TTLS` parameter on the `TCPCONFIG` statement in `PROFILE`.
2. To protect TCP/IP connections, you can configure the RACF `EZB.INITSTACK.sysname.tcpname` resource in the `SERVAUTH` class to block all stack access except for the user IDs that are permitted to use the resource.  
Refer to member `EZARACF` in sample data set `hlq.SEZAINST` where `hlq` is the high level qualifier data set name for `TCPIP` data sets.
3. Configure AT-TLS policy rules.  
The policy agent provides AT-TLS policy rules to the TCP/IP stack. Each rule defines a set of security conditions that the policy agent compares to the conditions at the connection that it is checking. When the policy agent finds a match, it assigns the connection to the actions that are associated with the rule.
4. Create a client keyring for each client with necessary certification authority certificates.  
The name of the client keyring should match the name that is provided for the keyring in the policy configuration file.  
If the web service user-defined functions are defined with Db2 security, the authorization ID that is associated with the WLM-established address space where the user-defined functions are defined must have all the necessary permissions to access the keyring.
5. Stop and start TCP/IP stacks.
6. Start the policy agent. Verify that message `EZZ4248E` is released from the console.

#### **Results**

Setup is complete and you can run the web service user-defined functions with HTTPS.

## Enabling Db2 as a web service provider

Enabling Db2 as a web service provider allows you to create web services on z/OS with your Db2 data and applications.

### About this task

Db2 for z/OS as a web service provider has the following prerequisites:

- Enable JDBC (legacy or universal) in Db2.
- Install WebSphere Application Server Version 5 or later on z/OS.
- Ensure that the WebSphere Application Server library contains the following two files:
  - mail.jar
  - activation.jar

If mail.jar is not present, download JavaMail Version 1.2 or later. If activation.jar is not present, download JavaBeans Activation Framework Version 1.0.1 or later.

To use Db2 Web Services Object Runtime Framework (WORF), you need to make the run time services available to WebSphere Application Server (WAS). By default, WORF is installed in the HFS directory:

```
/usr/lpp/db2c10_worf/
```

The base installation directory contains the lib/ subdirectory that contains the run time JAR file worf.jar. To begin using WORF, copy worf.jar, mail.jar, and activation.jar to a WAS shared library directory that you have already set up and restart WAS.

WORF provides a sample web application in the following directory:

```
lib/services.war
```

The application contains sample Document Access Definition Extension (DADX) files that define sample Db2 web services.

### Procedure

To set up this application with sample DADX files:

1. Follow the instructions in the job prolog to customize and run job DSNTEJWS, which is located in the *prefix.SDSNSAMP* directory. DSNTEJWS creates the Db2 tables that are used by the sample application.
2. The sample application is set up to use universal JDBC driver connectivity to connect to a z/OS Db2 server. Configure WAS with JDBC providers that make use of universal JDBC driver and perform the following steps:
  - a) Copy services.war to a temporary directory.
  - b) Extract services.war by issuing the following command:

```
jar -xvf services.war
```

- c) Open the group.properties files, which are located in the following directories:

```
WEB-INF/classes/groups/dxx_sample  
WEB-INF/classes/groups/dxx_travel
```

Modify the dbDriver, dbURL, userID, and password fields to have the following values:

```
dbDriver=com.ibm.db2.jcc.DB2Driver  
dbURL=jdbc:db2://server:port/database  
userID=DB2 userid  
password=DB2 userid password
```

- d) Compress the files by issuing the following command:

```
jar -cvf services.war *
```

3. Use a web browser to connect to your WAS Administrative Console.
4. Under "Applications", select "Install New Application".
5. Select the "Server Path" option, and type the location of the `services.war` file in the text box.  
If you installed WORF in the default location, the server path is:

```
/usr/lpp/db2c10_worf/lib/services.war
```

6. Enter a context root for the application (for example, `services`). Click "Next".
7. On the following screens, respond as necessary for your local setup. You can accept the default settings.
8. On the last screen, click "Finish". Click "Save to Master Configuration" to apply your changes.

## What to do next

To load the application:

1. On the WAS Administrative Console's main page, under "Applications", select "Enterprise Applications". Select the application and click "Start" to load the application.
2. After the application loads, point a browser to your server with the context root that you chose (for example, `http://server:port/services/`). The welcome page lists the sample DADX files that are provided in `services.war`. To test the services, click on the links.

## Enabling Db2 as a web service consumer

Enabling Db2 as a web service consumer allows you to receive web service data in your Db2 applications.

### Before you begin

Db2 for z/OS as a web service consumer has the following prerequisites:

- Install IBM XML Toolkit for z/OS 1.10
- Configure TCP/IP

### About this task

Installation job DSNTIJMV contains sample startup procedure DSNWLM, which you can use as a model for your startup procedures. You must modify the startup procedure only if the web services routines are not defined to the DSNWLM\_WEBSERVICES core WLM environment.

### Procedure

To enable Db2 as a web service consumer:

1. Change the following items in each startup procedure:
  - a) Change the procedure name from DSNWLM to the procedure name that you specified when you set up the WLM application environment.
  - b) Change the value of APPLENV to the name of the WLM application environment that you set up for the web services consumer user-defined functions. The name of this environment must match the WLMENV parameter value in the configuration control statement for each stored procedure in job DSNTIJRT.
  - c) Change the value of DB2SSN to your Db2 subsystem name.
  - d) Add the data set name of the XML Toolkit load library (XPLINKed version) to the STEPLIB concatenation. If you used the default data set names when you installed the XML Toolkit, the load library data set name is `userid.SIXMLOD1`.
  - e) Ensure that the Db2 SDSNLOD2 library is added to the STEPLIB.



2. After you set up the WLM application environment, create a JCL startup procedure for the stored procedure address space.

## Creating REST user-defined functions

A set of sample user-defined functions can be installed with Db2 to allow applications to access REST-based services through SQL. The basic REST scalar functions provide access to web-hosted content. Additional helper functions are available to provide URL encoding and decoding and Base64 encoding and decoding

### Before you begin

Ensure that you have the following prerequisites before you create the sample REST user-defined functions:

- Java JDK 5.0 or later

The REST user-defined functions are implemented in Java and require this minimum JDK level.

- TCP/IP

The REST user-defined functions require a functioning TCP/IP setup and access to the Internet.

- A Java WLM environment

You can use the WLM environment that is supplied with Db2 for Java routines, DSNWLM\_JAVA, or any existing Java WLM environment. By default, the jar file for the Db2 REST functions, db2restudf.jar, is installed in the same class path as other Java routines that are supplied with Db2: /usr/lpp/db2b10/base. If you installed db2restudf.jar in a different path, verify that this path is specified in the Language Environment variable file that is used by the WLM environment.

### About this task

This task describes how to create the basic REST user-defined functions that are provided with Db2. It also describes how to optionally set up the REST user-defined functions to use SSL and how to enable HTTP proxy support for the REST user-defined functions.

**Tip:** The sample HTTP user-defined functions are intended to be used within Db2 SQL applications to access remote non-Db2 REST-based services through SQL statements. Do not confuse them with Db2 native REST services, which supports using a REST-based interface to interact with Db2 data from web, mobile, and cloud applications.

### Procedure

To create and configure connections for the sample REST user-defined functions:

1. Modify job DSNTIJRF or the createUDFzOS.sql script in the db2restudf.jar file to specify the name of the WLM environment that you set up for the REST user-defined functions.
2. Run job DSNTIJRF or the createUDFzOS.sql script.
3. Optional: Enable SSL connections to use a key database or to use a RACF keyring.
  - To enable SSL connections to use a key database, specify the following settings in the file that you specified for JVMPROPS in the Language Environment options data set:
    - -Djavax.net.ssl.keyStore=/wlmjvm/keystore.jks
    - -Djavax.net.ssl.trustStore=/wlmjvm/keystore.jks
    - -Djavax.net.ssl.trustStorePassword=*password*
    - -Djavax.net.ssl.keyStorePassword=*password*
  - To enable SSL connections to use a RACF key ring, follow these steps:
    - a. Create a key ring for the RACF user ID that is associated with the stored procedure address space in which the REST user-defined functions run.

To create a key ring named RESTKEYRING for user ID RESTUSR, issue this command:

```
RACDCERT ADDRING(RESTKEYRING) ID(RESTUSR)
```

b. Add certificates to the key ring.

To add a certificate to RESTKEYRING, issue this command:

```
RACDCERT ID(RESTUSR) CONNECT(ID(RESTUSR) LABEL('RESTCERT') RING(RESTKEYRING))
```

c. In the file that you specified for JVMPROPS in the Language Environment options data set, specify the following settings:

Property	Value
javax.net.ssl.trustStore	Path to the key ring, in the format <pre>safkeyring://racf-id/ring-id</pre> <p><i>racf-id</i> is the RACF user ID that is associated with the stored procedure address space. <i>ring-id</i> is the name of the RACF key ring.</p>
java.protocol.handler.pkgs	com.ibm.crypto.provider
javax.net.ssl.trustStoreType	JCERACFKS

To set up SSL connections that use the RESTKEYRING key ring, set these properties:

- Djavax.net.ssl.trustStore=safkeyring://RESTUSR/RESTKEYRING
- Djava.protocol.handler.pkgs=com.ibm.crypto.provider
- Djavax.net.ssl.trustStoreType=JCERACFKS

4. Optional: Enable HTTP proxy support.

Set the following properties in the file that you specified for JVMPROPS in the Language Environment options data set:

- http.proxyHost
- http.proxyPort
- http.proxyUser
- http.proxyPassword
- http.nonProxyHosts

In this properties file, specify *-Dproperty=value* for each configuration property.

For example, the following settings can be used:

- -Dhttp.proxyHost=myProxyHost.com
- -Dhttp.proxyPort=8090
- -Dhttp.proxyUser=user
- -Dhttp.proxyPassword=secret
- -Dhttp.nonProxyHosts=\*.ibm.com|wikipedia.org|...

### Related concepts

[Runtime environment for Java routines \(Db2 Application Programming for Java\)](#)

[IBM Data Server Driver for JDBC and SQLJ support for SSL \(Db2 Application Programming for Java\)](#)

### Related reference

[IBMJCECCA \(IBM SDK, Java Technology Edition\)](#)

## Sample SQL procedures for tracing native SQL routines

---

A set of sample SQL procedures that trace native SQL routines can be installed with Db2.

The trace SQL procedures and supporting objects are:

### **DSN8.CREATE\_DGTT**

An SQL procedure that creates declared temporary table SESSION.DBMS\_BUFFER, which contains the trace message buffer.

### **DSN8.DISABLE**

An SQL procedure that disables the SQL routine trace message buffer.

### **DSN8.ENABLE**

An SQL procedure that enables the SQL routine trace message buffer.

### **DSN8.GET\_LINE**

An SQL procedure that returns a single line from the SQL routine trace message buffer. The returned data does not include an end-of-line character sequence.

### **DSN8.GET\_LINES**

An SQL procedure that returns one or more lines from the SQL routine trace message buffer, and stores the lines in an array. The returned data does not include end-of-line character sequences.

### **DSN8.NEW\_LINE**

An SQL procedure that writes an end-of-line character sequence to the SQL routine trace message buffer.

### **DSN8.PUT**

An SQL procedure that writes a line to the SQL routine trace message buffer, without an end-of-line character sequence.

### **DSN8.PUT\_LINE**

An SQL procedure that writes a line to the SQL routine trace message buffer, with an end-of-line character sequence.

### **DSN8.DBMS\_ENABLE**

A global variable that is used to test whether the SQL routine trace message buffer is enabled.

### **DSN8.GRPHICARR**

A user-defined array type that can be used to define the array into which the output from DSN8.GET\_LINES is written.

Run the provided installation job DSNTEJTR to create the SQL procedures for tracing native SQL routines. See the DSNTEJTR job prolog for instructions on how to customize the job for your site.

### **Related reference**

[DSN8.DISABLE stored procedure \(Db2 SQL\)](#)

[DSN8.ENABLE stored procedure \(Db2 SQL\)](#)

[DSN8.GET\\_LINE stored procedure \(Db2 SQL\)](#)

[DSN8.GET\\_LINES stored procedure \(Db2 SQL\)](#)

[DSN8.NEW\\_LINE stored procedure \(Db2 SQL\)](#)

[DSN8.PUT stored procedure \(Db2 SQL\)](#)

[DSN8.PUT\\_LINE stored procedure \(Db2 SQL\)](#)

[Objects that are used by the sample trace stored procedures \(Db2 SQL\)](#)

## Sample IBM InfoSphere BigInsights user-defined functions

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A set of sample user-defined functions can be installed with Db2 to allow applications to access IBM InfoSphere® BigInsights® data through SQL.

The IBM InfoSphere BigInsights user-defined functions read data in the Hadoop Distributed File System (HDFS), and submit Jaql queries.

## Related reference

[HDFS\\_READ \(Db2 SQL\)](#)

[JAQL\\_SUBMIT \(Db2 SQL\)](#)

## Creating sample IBM BigInsights user-defined functions

You can customize and run job DSNTJBI to create the sample IBM BigInsights user-defined functions.

### Before you begin

Ensure that you have the following prerequisites before you create the sample IBM BigInsights user-defined functions:

- IBM BigInsights 3.0, with HDFS
- A supported z/OS C++ compiler
- A WLM environment for web services

You can use the WLM environment that is supplied for web service user-defined functions, DSNWLM\_WEBSERVICES, or any WLM environment with similar attributes. DSNWLM\_WEBSERVICES is the default WLM environment for the IBM BigInsights user-defined functions. If you use another WLM environment, you need to update the WLM environment name in the CREATE FUNCTION statements for those user-defined functions.

### Procedure

To create the sample IBM BigInsights user-defined functions:

1. Modify job DSNTJBI to as indicated in the job prolog.
2. Run job DSNTJBI.

### Related concepts

[Job DSNTJBI](#)

DSNTJBI defines and prepares the IBM InfoSphere BigInsights sample user-defined functions..

## Job DSNTJBI

DSNTJBI defines and prepares the IBM InfoSphere BigInsights sample user-defined functions..

The installation CLIST does not customize job DSNTJBI. Follow the instructions in the DSNTJBI prolog to manually customize the job.

The IBM InfoSphere BigInsights sample user-defined functions are:

Function	Description
HDFS_READ	Reads data from a delimiter-separated file in the Hadoop Distributed File System (HDFS).
JAQL_SUBMIT	Invokes an IBM InfoSphere BigInsights Jaql query.

Job DSNTJBI contains the steps that are listed in the table below.

*Table 125. Steps in job DSNTJBI*

Step	Function
1	Drops the SYSFUN.HDFS_READ and SYSFUN.JAQL_SUBMIT user-defined functions. <a href="#">"1" on page 859</a>
2	Drops the SYSFUN.HDFS_READ and SYSFUN.JAQL_SUBMIT user-defined functions.

Table 125. Steps in job DSNTEJBI (continued)

Step	Function
3	Grants access to the SYSFUN.HDFS_READ and SYSFUN.JAQL_SUBMIT user-defined functions.
4	Prepares program DSN8GLIB, which contains functions for accessing generic table functions. <a href="#">“1” on page 859</a>
5	Prepares program DSN8HLIB, which contains functions for HTTP access. <a href="#">“2” on page 859</a>
6	Prepares program DSN8HDFS, the external module for user-defined function SYSFUN.HDFS_READ. <a href="#">“1” on page 859</a>
7	Prepares program DSN8JAQL, the external module for user-defined function SYSFUN.JAQL_SUBMIT. <a href="#">“1” on page 859</a>

**Note:**

1. This is an optional step. You need to uncomment this step before you can run it.
2. This is an optional step that is required only if you run either of the steps that follow it. You need to uncomment this step before you can run it.

If DSNTEJBI runs successfully, it produces the return codes that are shown in the table below.

Table 126. DSNTEJBI return codes

Step	PROCSTEP	Return code
TEJBIS01		0000
TEJBIS02		0000 or 0004
TEJBIS03		0000 or 0004
TEJBIS04	PC	0004
	CP	0000
	PLKED <a href="#">“1” on page 860</a>	0004
	LKED	0000
TEJBIS05	PC	0004
	CP	0000
	PLKED <a href="#">“1” on page 860</a>	0004
	LKED	0000
TEJBIS06	PC	0004
	CP	0000
	PLKED <a href="#">“1” on page 860</a>	0004
	LKED	0000
TEJBIS07	PC	0004
	CP	0000
	PLKED <a href="#">“1” on page 860</a>	0004
	LKED	0000

---

Table 126. DSNTEJBI return codes (continued)

---

Step	PROCSTEP	Return code
------	----------	-------------

---

**Notes:**

1. The PLKED step does not exist in the job if the value of the CPP LE PRELINKER PHASE field is set to NO.
- 

**Related concepts**

[Sample user-defined functions \(Db2 SQL\)](#)

[Steps to creating and using a user-defined function \(Db2 Application programming and SQL\)](#)

---

## The IBM Data Server Driver for JDBC and SQLJ

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If you plan to run JDBC or SQLJ applications in z/OS UNIX System Services that access Db2 for z/OS data servers, you need to install the current version of the IBM Data Server Driver for JDBC and SQLJ.

Java stored procedures and user-defined functions are examples of Java programs that run in z/OS UNIX System Services and access Db2 for z/OS data servers.

You must install Db2 for z/OS or migrate to the current version of Db2 for z/OS before you install the IBM Data Server Driver for JDBC and SQLJ.

See [Installing the IBM Data Server Driver for JDBC and SQLJ on Db2 for z/OS \(Db2 Application Programming for Java\)](#) and its subtopics for details.

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## Connecting the IMS attachment facility

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Connecting Db2 to IMS requires coordination with your company's group that supports IMS systems.

**Procedure**

To connect the IMS attachment facility:

- [Make Db2 load modules available to IMS.](#)
- [Define Db2 to IMS.](#)
- [Define new programs and transactions to IMS.](#)
- Depending on your site, you might also need to:
  - [Define Db2 plans for IMS applications.](#)
  - [Generate a user language interface.](#)

**What to do next**

An IMS system definition might be required to complete the steps to connect Db2 to IMS. If RACF is installed, you also need to define the IMS-to-Db2 connection to RACF.

**Related tasks**

[Defining Db2 resources to RACF \(Managing Security\)](#)

---

## Making Db2 load modules available to IMS

---

As part of connecting Db2 to IMS, you must make the Db2 load modules available to IMS.

**About this task**

If you have already included the *prefix*.SDSNLOAD library in your LNKSTxx, you can skip this step. Db2 11 modules will be available through normal z/OS module search.

## Procedure

To make Db2 load modules available to IMS:

- If Db2 load libraries are not included in your LNKSTxx, add STEPLIB statements to your startup procedures.
- Add *prefix*.SDSNLOAD to the DFSESL DD statement.
- If any IMS region connects to more than one release of Db2, then you must ensure that the Db2 load library that is used for that region is compatible with each release. The IMS attachment facility is upward compatible, but not downward compatible. This means that you should use the oldest release of the Db2 load library for the IMS region.
  - If all the data sets referred to in the JOBLIB or STEPLIB statement for an IMS region are APF-authorized, then add the DD statement for *prefix*.SDSNLOAD to the JOBLIB or STEPLIB statement. If the DYNAM option of COBOL is being used, the IMS RESLIB DD statement must precede the reference to *prefix*.SDSNLOAD in the JOBLIB or STEPLIB statement.
  - Add the ddname DFSESL DD statement for *prefix*.SDSNLOAD. All libraries specified on the DFSESL DD statement must be APF-authorized. The DFSESL DD statement is not required by Db2 DL/I batch support. IMS requires that an IMS RESLIB DD statement also be referenced by the DFSESL DD statement, as in the following:

```
//DFSESL    DD      DSN=ims_reslib,DISP=SHR
//          DD      DSN=prefix.SDSNLOAD,DISP=SHR
```

## Defining Db2 to IMS

To define Db2 to IMS, the Db2 identification must be defined to the control region and the DL/I batch region. Optionally, you can also define the Db2 identification to each dependent region that accesses the Db2 subsystem.

### Procedure

To define Db2 to IMS:

1. Name an SSM member in IMS.PROCLIB by concatenating the value of the IMSID field of the IMS IMSCtrl macro (one to four alphanumeric characters) with any name (one to four alphanumeric characters) defined by your site.

Each SSM entry in IMS.PROCLIB defines at least one connection from an IMS region to at least one different z/OS subsystem. One SSM member can be shared by all of the IMS regions, or a specific member can be defined for each region. This record contains as many entries as there are connections to external subsystems. Each entry is an 80-character blocked or deblocked record. Fields are keyword or positional and are delimited by commas. The fields in this record are:

SST=,SSN=,LIT=,ESMT=,RTT=,REO=,CRC=,RLA=

SST=,SSN=,LIT=,ESMT=,RTT=,REO=,CRC=

where:

#### **SST=DB2**

Identifies a required one-to eight-character name that defines the external subsystem type. It must be set to DB2 for IMS to connect to Db2.

#### **SSN=**

Identifies a required one-to four-character Db2 subsystem name. This name must be the name you specified for SUBSYSTEM NAME on installation panel DSNTIPM. The default is DSN1.

#### **LIT=**

Identifies a required four-character alphanumeric option, specifying the language interface token (LIT) supplied to IMS. The IMS-supplied language interface module (DFSLI000) requires a value of **SYS1** for this option.

**ESMT=**

Identifies a required one-to eight-character alphanumeric option specifying the external subsystem module table. This module specifies which attachment modules must be loaded by IMS. **DSNMIN10** is the required value for this field.

**RTT=**

Identifies an optional one to eight character alphanumeric name of the user-generated resource translation table (RTT). This table maps the IMS application names into Db2 plan names. If this entry is omitted, the Db2 plan name is the IMS application load module name.

**REO=**

Identifies the optional one-character region error option to be used if an IMS application attempts to reference a non-operational external subsystem or if resources are unavailable at create thread time. If Db2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.

**R**

Passes a SQL return code to the application, indicating that the request for Db2 services failed (default). The most commonly returned SQL codes are -922, -923, and -924. However, there might be other SQL codes returned to the application.

When the first connection to Db2 cannot be established, a SQL return code is not returned. Instead, the application is terminated with an abend code U3047.

**Q**

Abends the application with an abend code U3051, backs out activity to the last commit point, does a PSTOP of the transaction, and re-queues the input message. This option only applies when an IMS application attempts to reference a non-operational external subsystem or if the resources are unavailable at create thread time. If Db2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.

**A**

Abends the application with an abend code of U3047 and discards the input message. This option only applies when an IMS application attempts to reference a non-operational external subsystem or if the resources are unavailable at create thread time. If Db2 detects the unavailable resource condition during normal SQL processing, a -904 SQLCODE is returned to the application.

If Db2 is not active or the connection cannot be established when the first SQL call is made from the application program (such as Db2 unavailable, Db2 quiescing, or Db2 terminating), the action you take depends on the region error option specified. SQL codes of -922, -923, or -924 might be returned to the application if option R is specified.

You can change the default for an application if a resource translation table entry is generated for that application.

**CRC=**

Identifies a command recognition character used by IMS to identify Db2 commands entered from an IMS terminal with the /SSR command. Any character is valid for the CRC except the period (.), slash (/), or comma (,). The default CRC is the hyphen (-).

**RLA=**

Identifies whether the Region Level ACEE (RLA) must be passed to Db2 for the following operations when no ESAF\_SIGNON\_ACEE is present and no TCB level ACEE is present:

- External subsystem (ESS) signon
- ESS create thread exit processing
- ESS associate thread exit processing

Using RLA=Y for all IMS dependent region types reduces accessor environment element (ACEE) creation and management overhead because the region level ACEE is created only once and then is available for future use. Specifying RLA=Y is similar to using ESAF\_SIGNON\_ACEE, which applies only to IMS JVM dependent regions. By default, the region-level ACEE is not passed to Db2. The RLA= parameter accepts the following values:



**N**

Do not pass the dependent region address space level ACEE to Db2.

**Y**

Pass the dependent region address space level ACEE to Db2 if no ESAF\_SIGNON\_ACEE is present and no TCB level ACEE is present.

These options apply to DL/I batch only:

**CONNECTION\_NAME=**

Represents the name of the job step that is the coordinator for Db2 activity. The connection name is optional. The connection name defaults are:

*Table 127. Default connection names for DL/I batch*

Type of Application	Default Connection Name
Batch job	Job name
Started task	Started task name
TSO user	TSO authorization ID

If a batch job fails, you must use a separate job to restart the batch job. The connection name used in the restart job must be the same as the name used in the batch job that failed. Or, if the default connection name is used, the restart job must have the same job name as the batch update job that failed.

Db2 requires unique connection names for Db2 DL/I batch support. If two applications try to connect with the same connection name, then the second application is not allowed to connect to Db2. CONNECTION\_NAME can be 1 to 8 characters long.

**PLAN=**

Identifies a Db2 plan name. If you do not specify a plan name, the application program module name is checked against the optional resource translation table. If a match is found, the translated name is used as the Db2 plan name. If no match is found, the application program module name is used as the plan name. PLAN can be 1-8 characters long.

**Important:** If you use the External Subsystem Attach Facility (ESAF) and the IBM Data Server Driver for JDBC and SQLJ to connect to a Db2 subsystem, a set of JDBC driver packages with a collection name that matches the application program module name (PSB name) must exist. If no packages with a matching collection name exist, you need to bind a set of driver packages with the -collection parameter value set to the application program module name. See [DB2Binder utility \(Db2 Application Programming for Java\)](#) for information on binding JDBC driver packages.

**PROG=**

Identifies the name of the application program that is to be loaded and to receive control. PROG is required and can be 1-8 characters long.

2. Provide support for entering Db2 commands through IMS by defining the command recognition character (CRC) in the SSM member of the IMS control region. If the /SSR command is entered through the z/OS console, the AUTHID WTOR needs to be granted the appropriate authority. If the /SSR command is entered through an IMS terminal, the IMS LTERM name or the signon ID (if active) needs to be granted the appropriate authority.

The /SSR command format is:

```
/SSR crc DB2 command
```

as in

```
/SSR -DISPLAY THREAD (*)
```

3. Specify the SSM EXEC parameter in the startup procedure of the IMS control, MPP, BMP, or DL/I batch region. The SSM is concatenated with the IMSID to form a member name in IMS.PROCLIB. The IMSID

comes from the IMSID option of the IMSCTRL generation macro or the IMSID option in the control region startup procedure.

For DL/I batch regions, you can specify the Db2 connection parameters in the DDITV02 data set instead of an SSM member. The DDITV02 data set and an SSM member have the same format.

If you specify the SSM for the IMS control region, any dependent region running under the control region can attach to the Db2 subsystem named in the IMS.PROCLIB member specified by the SSM parameter. The IMS.PROCLIB member name is the IMS ID (IMSID=xxxx) concatenated with the one to four characters specified in the SSM EXEC parameter. The IMS ID is the IMSID parameter of the IMSCTRL generation macro.

IMS allows you to define as many external subsystem connections as are required. More than one connection can be defined for different Db2 subsystems. All Db2 connections must be within the same z/OS system. For a dependent region, you can specify a dependent region SSM or use the one specified for the control region. You can specify different region error options (REOs) in the dependent region SSM member and the control region SSM member. The following table shows the different possibilities of SSM specifications.

*Table 128. SSM specifications options*

<b>SSM for Control Region</b>	<b>SSM for Dependent Region</b>	<b>Action</b>	<b>Comments</b>
No	No	None	No external subsystem can be connected
No	Yes	None	No external subsystem can be connected.
Yes	No	Use the control region SSM	Applications scheduled in the region can access external subsystems identified in the control region SSM. Exits and control blocks for each attachment are loaded into the control region address space.
Yes	Yes (NULL entry)	No SSM is used for the dependent region	Applications scheduled in this region can access DL/I databases only. Exits and control blocks for each attachment are loaded into the control region address space and each dependent region address space.
Yes	Yes	Check the dependent region SSM with the control region SSM.	Applications scheduled in this region can access only external subsystems identified in both SSMs. Exits and control blocks for each attachment are loaded into the control region and the dependent region address space.

No specific parameter exists to control the maximum number of SSM specification possibilities.

### **Related concepts**

[Input and output data sets for DL/I batch jobs \(Db2 Application programming and SQL\)](#)

[Items to include in a batch DL/I program \(Db2 Application programming and SQL\)](#)

[System definition](#)

### **Related tasks**

[Defining Db2 plans for IMS applications \(optional\)](#)

The application plan defines the Db2 resources that an application accesses.

## Defining new programs and transactions to IMS

You can define new programs and transactions that access Db2 resources to your IMS system.

### About this task

Coordinate with your IMS support group to install the programs and transactions for Phase 4 of the verification process.

Programs and transactions already defined to IMS can use SQL without any additional definition to IMS.

### Related tasks

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## Defining Db2 plans for IMS applications (optional)

The application plan defines the Db2 resources that an application accesses.

### About this task

The application plan is identified by its plan name. Each IMS application is associated with a plan name.

The default is to have the Db2 plan name the same as the IMS application program load module name. If you assigned a different name to the plan, you need a resource translation table (RTT). If you chose an error option different from the REO default, you also need an RTT. Db2 provides the DSNMAPN macro in *prefix.SDSNMACS* to generate an RTT. After it is assembled, the table must be link-edited as REENTRANT with RMODE=24 into any authorized library that is concatenated with the library from which IMS loads the Db2 IMS attach modules.

The format of DSNMAPN macro is shown in the following table.

Table 129. DSNMAPN macro format

Macro	Option	Meaning
DSNMAPN	APN=	IMS application name
	,PLAN=	Associated Db2 plan name
	[,OPTION=]	Specific entry error option R, Q, or A. See REO in the SSM entry.
	[,END=]	Indicates last entry (YES/NO). NO is the default.

### Related concepts

[IMS attachment facility macro \(DSNMAPN\)](#)

The DSNMAPN macro is required when the IMS application load module name is different than the name of its related IBM Db2 application plan. The macro is also required if the error option is different than the ERR value that is specified on the IMS SSM entry.

[Items to include in a batch DL/I program \(Db2 Application programming and SQL\)](#)

## IMS language interface module

You must generate a user language interface only if you intend to access two Db2 subsystems from the same dependent region.

To provide this access, the subsystem member (SSM) must contain one entry for each subsystem. Each entry contains a different subsystem ID and its associated language interface token (LIT). IMS provides

the DFSLI macro to generate additional language interface modules with unique LITs. The general format of the macro is shown in the table below.

Table 130. DFSLI macro format and meaning

Macro	Option	Meaning
DFSLI	TYPE	Specifies the type of subsystem that can be accessed through this language interface module. Db2 is the only value supported by this option
	LIT	Defines a name (called LIT) to relate a language interface module with an entry in the SSM for the dependent region

When an IMS application issues a Db2 request, IMS knows the target subsystem by the LIT used in the request. For example, consider the case of a dependent region accessing two Db2 subsystems (DSN1 and DSN2):

- You generate a language interface with LIT=SYS2 (DFSLI001).
- You define two entries in the SSM member. The first entry points to DSN1 with LIT=SYS1; the second points to DSN2 with LIT=SYS2.
- You link-edit applications accessing the DSN1 subsystem with the IMS-provided language interface (DFSLI000).
- You link-edit applications accessing the DSN2 subsystem with the user-generated language interface (DFSLI001).

Even though a region can communicate with two or more Db2 subsystems, an IMS application can access only one—the Db2 subsystem referred to in the language interface that is link-edited. You can alter the SSM to route application requests to a different Db2 subsystem.

## IMS attachment facility macro (DSNMAPN)

The DSNMAPN macro is required when the IMS application load module name is different than the name of its related IBM Db2 application plan. The macro is also required if the error option is different than the ERR value that is specified on the IMS SSM entry.

Macro statements are assembled in *prefix.SDSNMACS* and must be link-edited as REENTRANT with RMODE=24 into the Db2 library *prefix.SDSNLOAD*. The module name must be specified on the IMS SSM entry for the Db2 subsystem. The name must be specified as in the RTT entry for the SSM member defining the connection of this region. IMS loads the RTT module into the dependent region address space.

### Note:

1. The macro name must be followed by one or more blanks before options are coded.
2. Multiple options must be separated by commas (with no blanks).

### label DSNMAPN

DSNMAPN is the name of the macro. It must be coded exactly as it appears here, and it must be separated from any optional options by one or more blanks.

For *label*, substitute the CSECT name of your module. This name must match the name of the module specified to the linkage editor. *Label* is optional except for the first invocation of the DSNMAPN macro. The last invocation requires END=YES.

### APN=*program-name*

Specifies the name of an application load module scheduled by IMS. For *program-name*, substitute an application name of up to eight characters.

**PLAN=plan-name**

Specifies an application plan name that is used (instead of the default application name) when a thread is created. For *plan-name*, substitute an application plan name of up to eight characters.

**OPTION=R|Q|A**

Specifies the action taken when an application program call cannot be performed because there is some problem in communication between the application program and the Db2 subsystem or if resources are unavailable. The value can be R, Q, or A.

If OPTION is not specified, the region error option (REO) is used.

**R**

Specifies that a return code is returned to the application to indicate that the request for Db2 services failed.

**Q**

Specifies that the transaction is abnormally terminated with an abend code U3051, activity is backed out to the last commit point, and the input message is re-queued.

**A**

Specifies that the transaction is abended with an abend code of U3047, and the input message is deleted.

**Default:** R

**END=NO|YES**

Specifies whether this is the last DSNMAPN macro invocation. The value can be NO or YES.

**NO**

Specifies that this is not the last DSNMAPN macro invocation.

**YES**

Specifies that this is the last DSNMAPN macro invocation.

**Default:** NO

The last DSNMAPN macro invocation must be followed by the specification END=YES.

**Usage notes**

- To enter more than one application name (with its corresponding plan name and OPTION specification), you must use multiple invocations of the DSNMAPN macro. The first invocation requires the label; the last invocation requires END=YES.
- Invocations must be in ascending order by application name. If they are not, an MNOTE macro error is generated.

**Related tasks**

[Defining Db2 plans for IMS applications \(optional\)](#)

The application plan defines the Db2 resources that an application accesses.

## Connecting distributed database systems

---

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

After you install Db2, you can install support for a communications network.

If you plan to use the distributed data facility (DDF), become familiar with the DDF function and the kind of network communications that you want to use to communicate with this Db2 subsystem.

Depending on the network communications that you use, you must install z/OS UNIX System Services TCP/IP support, Virtual Telecommunications Access Method (VTAM), or both.

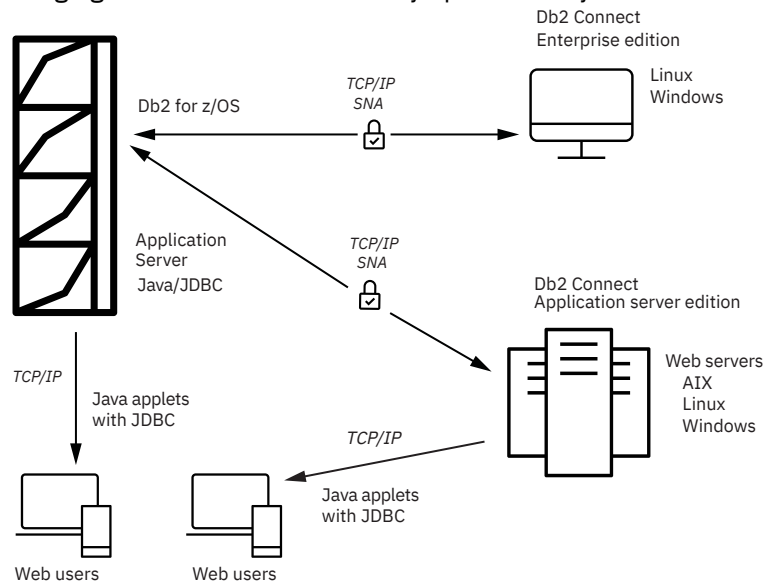
**Tip:** TCP/IP is the recommended communication protocol for communication with Db2. Although SNA communication remains supported in Db2 12, SNA communication (including the VTAM interface) is deprecated, and support might be removed in the future. You can disable SNA communication by setting the value of the DB2 TCP/IP IPNAME setting. See [“DB2 TCP/IP IPNAME field” on page 304](#).

In Db2 12, you can set up DDF not to activate SNA/APPC support. Therefore, in Db2 12, DDF does not require VTAM to be installed. However, you might need to install VTAM for other reasons.

## Communications protocols for DDF

DDF uses TCP/IP or SNA to communicate with other systems.

The following figure shows the connectivity options that you have with DDF in Db2.



## Role of the communications database (CDB)

When sending a request, Db2 uses the LINKNAME column of the SYSIBM.LOCATIONS catalog table of the communications database (CDB) to determine which protocol to use.

To receive TCP/IP requests, you must select a DRDA port and a resynchronization port on installation panel DSNTIP5. TCP/IP uses the server's port number to pass network requests to the correct Db2 subsystem.

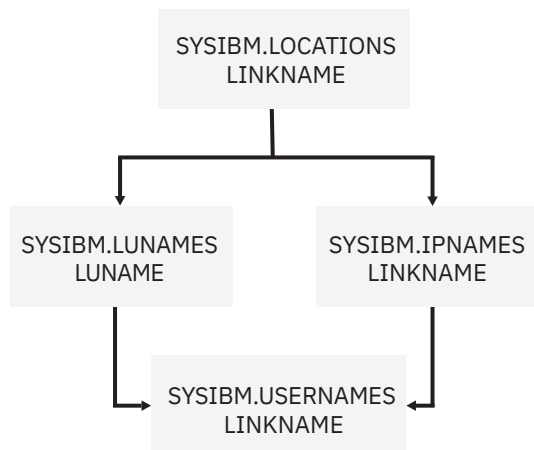


Figure 125. The LINKNAME column of SYSIBM.LOCATIONS determines protocol

To receive VTAM requests, you must specify an LUNAME on installation panel DSNTIPR.

If the value in the LINKNAME column is found in the SYSIBM.IPNames table, TCP/IP is used for DRDA connections. If the value is found in SYSIBM.LUNAMES table, SNA is used. If the same name is in both SYSIBM.LUNAMES and SYSIBM.IPNames, TCP/IP communication is used.



**Attention:** A requester cannot connect to a given location using both SNA and TCP/IP protocols. For example, if your SYSIBM.LOCATIONS table specifies a LINKNAME of LU1, and LU1 is defined in both the SYSIBM.IPNAMES and SYSIBM.LUNAMES table, TCP/IP is the only protocol used to connect to LU1 from this requester for DRDA connections.

## DDF installation options

The installation options for DDF are described on these installation panels:

- [“DSNTIPR: Distributed data facility panel 1” on page 301](#)
- [“DSNTIP5: Distributed data facility panel 2” on page 307](#)

Use these options to define, among other things:

- Whether you want DDF to start automatically when Db2 starts
- Important names for this Db2 subsystem, including the IPNAME and the LOCATION name, which must be the same for all data sharing members.

If you plan to use SNA communication with VTAM, you must define an LU name and NETID. Db2 as a requester generates the unit of work using NETID and LUNAME.

- Thread management options
- Security options
- TCP/IP port numbers
- Control of the number of DRDA query blocks that can flow on a network request that was specified with OPTIMIZED FOR n ROWS where *n* exceeds the number of rows that fit in a single query block.

If you do not plan on using SNA/APPC communications, you can set up DDF to not activate its SNA/APPC support. To set up DDF to not activate its SNA/APPC support, give the Db2 subsystem an IPNAME value by updating the BSDS DDF record. Setting up DDF to not activate its SNA/APPC support is not supported by the Db2 installation option panels. Db2 TCP/IP communications uses the IPNAME value and a character representation of the TCP/IP resync port (RESPORT) hexadecimal value to identify units of work.

## Testing the connections

You should test systems with each other to ensure that their communications setups are correct. If you are testing with another Db2 for z/OS, enter the location name of that other site in field REMOTE LOCATION of installation panel DSNTIPY. The remote location must also have DDF installed and active and must have run the first sample job, DSNTJ1.

### Related concepts

[Customize VTAM for Db2](#)

For Db2 to provide the best performance for distributed database systems, you probably need to customize VTAM.

### Related tasks

[Connecting Db2 for z/OS distributed database systems with TCP/IP](#)

TCP/IP (which stands for *Transmission Control Protocol/Internet Protocol*) is a standard communication protocol for network communications. Previous versions of Db2 supported TCP/IP requesters, although additional software and configuration was required.

[Connecting Db2 for z/OS distributed database systems with VTAM \(deprecated\)](#)

*Virtual Telecommunications Access Method* (VTAM) is a program that you can use to control remote Db2 communication.

### Related reference

[SNA Network Implementation Guide](#)

[IBM Tivoli NetView for z/OS \(Installation: Getting Started\)](#)

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## The DRDA database protocol

Applications can use the Distributed Relational Database Architecture™ (DRDA) protocol to control remote access.

With DRDA, the application connects to a server at another location and executes packages that have been previously bound at that server. The application uses a CONNECT statement, a three-part name, or an alias to access the server.

Queries can originate from any system or application that issues SQL statements as a *requester* in the formats required by DRDA.

For two-phase commit using Systems Network Architecture (SNA) connections, Db2 supports both presumed abort and presumed nothing protocols that are defined by DRDA. If you are using TCP/IP, Db2 uses the sync point manager that is defined in the documentation for DRDA Level 3.

### Related concepts

[Types of Two-Phase Commit \(z/OS MVS Programming: Resource Recovery\)](#)

### Related information

[DRDA Volume 1: Distributed Relational Database Architecture \(Open Group Library - Data Management Standards\)](#)

[DRDA Volume 3 "Distributed Data Management Architecture" \(Open Group Library - Data Management Standards\)](#)

## Connecting Db2 for z/OS distributed database systems with TCP/IP

TCP/IP (which stands for *Transmission Control Protocol/Internet Protocol*) is a standard communication protocol for network communications. Previous versions of Db2 supported TCP/IP requesters, although additional software and configuration was required.

### About this task

**Tip:** TCP/IP is the recommended communication protocol for communication with Db2. Although SNA communication remains supported in Db2 12, SNA communication (including the VTAM interface) is deprecated, and support might be removed in the future. You can disable SNA communication by setting the value of the DB2 TCP/IP IPNAME setting. See [“DB2 TCP/IP IPNAME field”](#) on page 304.

In a TCP/IP network, the domain name (IP address) and port number (service name) uniquely identify a Db2 subsystem. The domain name and the server port number (service name) of the database server must be defined in the communications database (CDB) at a requesting Db2 so that the Db2 subsystem can connect to a remote location. If you use a port number in the CDB to access a remote Db2 location, the port number must be defined to TCP/IP.

The domain name must be defined to the TCP/IP host so that a Db2 subsystem can accept connections from remote locations. Port numbers are never used by a Db2 subsystem that accepts connections. Optionally, you can protect the port number that Db2 uses when acting as a server within TCP/IP from being used by any other task or job in the subsystem. When DDF is started, the Db2 subsystem binds itself to its designed port.

### TCP/IP terminology for Db2 for z/OS

The following terms are used for TCP/IP communication in Db2 for z/OS.

#### IP address

Uniquely identifies a host within the TCP/IP network. This is sometimes called an internet address. A Db2 subsystem resides on a TCP/IP host. The IP address can take two forms. The first form is a 32 bit address that displays in dotted decimal format where X '05041020' displays as 5.4.16.32. The second form is a 128-bit address that displays in colon-hexadecimal format, such as FEDC:BA98:7654:3210:FEDC:BA98:7654:3210.



**Domain name**

The fully qualified name that identifies an IP address. This can be used instead of the IP address. An example fully qualified domain name is 'stlmvs1.svl.example.com'. Some software refers to *stlmvs1* as the hostname and *st1.example.com* as the domain name. Db2 allows the network administrator to identify a host using a domain name.

**Domain name server (DNS)**

Manages a distributed directory of domain names and related IP addresses. Domain names can be translated into IP addresses and you can find a domain name associated with a given IP address. Db2 uses the *gethostbyname* service to get a list of IP addresses for a given domain name.

**Port**

Identifies an application executing in a host. For example, a port number identifies a Db2 subsystem to TCP/IP. A port number is a two byte integer value that is displayed in decimal format. This number identifies the application within a TCP/IP instance. A port number of X'01D2' displays as 466. There are three basic kinds of TCP/IP ports:

<b>Well-known ports</b>	Port numbers in the range 1–1023 that are reserved in the TCP/IP architecture for a specific TCP/IP application. Some typical well-known port numbers are: <ul style="list-style-type: none"> <li>• FTP is port number 21</li> <li>• Telnet is port number 23</li> <li>• DRDA relational database is port number 446</li> </ul>
<b>Ephemeral ports</b>	Port numbers that are dynamically assigned to a client process by the client TCP/IP instance. Db2 uses an ephemeral port when it is acting as the DRDA requester. This ephemeral port is associated with the requester for the life of the thread or connection.
<b>Server ports</b>	Port numbers that are used when a TCP/IP program does not have a well-known port number, or another instance of the server program is already installed using the well-known port number. As a requester, Db2 defaults to using the DRDA relational database well-known port number to connect to a server location. We suggest that your Db2 subsystem be defined with the DRDA well-known port number of 446. However, the network administrator can assign a server port to the Db2 subsystem. If two different Db2 subsystems reside on the same host, acting as two different locations (a non-data-sharing group), each Db2 subsystem must have a unique port. In this case, only one Db2 subsystem can use the DRDA well-known port number.

**Service name**

Another way to refer to a port number. A network administrator can assign a service name for a remote location instead of using the port number.

**Limitations of TCP/IP communication**

TCP/IP does not have the built-in security features that SNA has, such as SNA partner LU verification.

Because IP addresses are not as reliable as LU names, DDF support for TCP/IP differs from support for SNA in these ways:

- Inbound name translation is not supported.
- Inbound security requirements cannot be established on individual clients, so the TCPALVER subsystem parameter defines the minimum security requirements for all TCP/IP clients. For more information, see [“TCP/IP ALREADY VERIFIED field \(TCPALVER subsystem parameter\)”](#) on page 310.
- You cannot use the CDB for *come from* checking of TCP/IP clients.

## Procedure

To enable TCP/IP communication between DRDA partners and Db2, complete the following steps. You do not have to complete the following steps in exact order, but steps 1–3 should be completed before the other steps.

1. Prepare the Language Environment run time library by completing one of the following actions.
  - Concatenate the Language Environment library in the z/OS link list, which does not require the library to be APF-authorized. This is the standard method. If you choose this method, remove the Language Environment library concatenation from the DDF JCL procedure.
  - Include the Language Environment library in a STEPLIB concatenation for the DDF JCL procedure. The Language Environment library must be APF-authorized to be added to the DDF JCL procedure. The Db2 installation automatically adds the library to the DDF STEPLIB concatenation.
2. Enable DDF for UNIX System Services as described in [“Enabling Db2 to access TCP/IP services in z/OS UNIX System Services”](#) on page 873.
3. Define the Db2 subsystem to TCP/IP as described in [“Db2 configuration with TCP/IP”](#) on page 875.
4. Populate the communications database as described in [“Populating the communications database for use with TCP/IP”](#) on page 878.
5. Start TCP/IP support by starting DDF. For more information, see [“Starting TCP/IP support”](#) on page 881.
6. Optional: Tune TCP/IP to help protect Db2 from outages. Specify a small value for the TCP/IP keep-alive timer, which is specified by the TCPKPALV subsystem parameter. Five minutes or less is best. See [“TCP/IP KEEPALIVE field \(TCPKPALV subsystem parameter\)”](#) on page 311.

If the network fails between the server's reply and the next client request, TCP/IP waits until the keep-alive timer expires, then notifies the Db2 subsystem of the failure.

The server thread hangs while the timer is running. Do not use the timer default of ENABLE because it results in a value of 2 hours, which means that threads can hang for up to 2 hours. A hanging thread can cause unpredictable results, depending on what resources it has locked.

If you are connecting to a location whose LINKNAME is associated with a row in the table SYSIBM.IPNAMES and it has a domain name in the IPADDR field, *gethostbyname* can return a list of IP addresses associated with the LINKNAME. When trying to connect to this location, Db2 will try each of these IP addresses in a round-robin fashion (starting with the first address) until the connection is successful, or the attempt to connect to each IP address has timed out.

7. Specify security requirements for TCP/IP. For more information, see [Managing inbound TCP/IP-based connection requests \(Managing Security\)](#).

## What to do next

If you do not plan to communicate with remote sites with SNA/APPC, update the BSDS DDF record with an IPNAME value. The Db2 TCP/IP communications use the IPNAME value and a character representation of the TCP/IP resync port (RESPORT) hexadecimal value to identify units of work. If the BSDS DDF record does not contain an IPNAME value, you must define VTAM to Db2 because Db2 TCP/IP communications uses the VTAM network ID and LUNAME to identify units of work.

DDF enables TCP/IP communication with partners with DRDA Level 3 support and earlier. Clients must have the updated versions of Db2 Connect or any DRDA requester or server that supports the latest DRDA database protocols. TCP/IP connectivity lets you connect DDF to clients on multiple platforms directly.

### Related tasks

[Managing inbound TCP/IP-based connection requests \(Managing Security\)](#)

## Enabling Db2 to access TCP/IP services in z/OS UNIX System Services

Db2 uses the assembler callable interface of z/OS UNIX System Services to perform TCP/IP services.

### About this task

Any address space that needs to use z/OS UNIX System Services must have a z/OS user ID that is defined with an OMVS segment, and can also have a z/OS group name. The user ID associated with the *ssnmDIST* started task and *ssnmDBM1* started task requires an OMVS segment for DDF functions and system profile functions.

The standard way to assign a z/OS user ID and a z/OS group name to a started address space is to use the z/OS Security Server (RACF) STARTED resource class. This method enables you to dynamically assign a z/OS user ID by using commands instead of requiring an IPL to have the assignment take effect.

The alternative method to assign a z/OS user ID and a z/OS group name to a started address space is to change the RACF started procedures table, ICHRIN03. For more information about this approach, see [Defining RACF user IDs for Db2-started tasks \(Managing Security\)](#).

### Procedure

To enable Db2 address spaces to access TCP/IP services in z/OS UNIX System Services, complete the following steps:

1. Use either of the following z/OS Security Server (RACF) commands to assign an OMVS segment to a z/OS user ID, where *user-ID* is the z/OS user ID for the Db2 address space and *nnn* is any valid, unique identifier. If you set *nnn* to 0, the process has UNIX System Services superuser authorization.

- `ADDUSER user-ID OMVS(UID(nnn))...`

- `ALTUSER user-ID OMVS(UID(nnn))...`

You should either set the MAXFILEPROC parameter to at least 131072 or grant superuser authority to the *user-ID*. Because setting the MAXFILEPROC parameter within the active BPXPRM*nnn* z/OS PARMLIB member to 131072 affects the entire system, any z/OS UNIX System Services process can open 131072 files or sockets concurrently.

2. During initialization, DDF calls z/OS UNIX System Services to obtain the maximum number of socket descriptors that can be opened concurrently. The value is defined by the MAXFILEPROC parameter in the active z/OS UNIX System Services (BPXPRM*nnn*) of the z/OS PARMLIB. If the defined value is less than 131072, DDF invokes z/OS UNIX System Services to raise it to 131072, which requires the DDF user ID to have superuser authority. DDF executes as an authorized program and is protected against unauthorized use of this privilege. If you do not want to set the system-wide MAXFILEPROC parameter to 131072 and do not want to grant superuser authority to the DDF user ID, you can explicitly authorize the DDF user ID to raise the limit to 131072 by using one of the following RACF commands, where *user-ID* is the z/OS user ID and *nnn* is any valid, unique identifier:

- `ADDUSER user-ID OMVS(UID(nnn) FILEPROCMAX(131072))...`

- `ALTUSER user-ID OMVS(UID(nnn) FILEPROCMAX(131072))...`

3. If you also want to assign a z/OS group name to the address space, assign an OMVS segment to the z/OS group name by using one of the following RACF commands, where *group-name* is the z/OS group name and *nnn* is any valid, unique identifier

- `ADDGROUP group-name OMVS(GID(nnn))...`

- `ALTGROUP group-name OMVS(GID(nnn))...`

4. If you actively administer the STARTED resource class, issue the following RACF commands to assign a z/OS user ID and a z/OS group name to the address space started procedure, where VC1ADIST . \*

is the addressspace started procedure, *user-ID* is the z/OS user ID, and *group-name* is the z/OS group name. DDF requires only a z/OS user ID. A z/OS group name is optional.

```
RDEFINE STARTED (VC1ADIST.*) STDATA(USER(user-ID) GROUP(group-name)) ...  
RALTER STARTED (VC1ADIST.*) STDATA(USER(user-ID) GROUP(group-name)) ...
```

**Requirement:** The profile name that you specify in the RACF command must be in the generic format; that is, the profile name must end with a period followed by an asterisk (. \*).

5. Issue the following RACF command so that the changed profile takes effect:

```
SETROPTS RACLIST(STARTED) REFRESH
```

6. When a member-specific dynamic VIPA (VIPARANGE DVIPA) is specified in the Db2 BSDS using the DSNJU003 keywords IPv4 or IPv6, DDF internally activates the DVIPA using the SIOCSVIPA/SIOCSVIPA6 IOCTL. However, you must either grant superuser authority to the DDF user ID or define a security profile for MODDVIPA under the SERVAUTH class to authorize the DDF user ID to execute the SIOCSVIPA/SIOCSVIPA6 IOCTL. You can define the security profile using RACF as follows:

```
RDEFINE SERVAUTH (EZB.MODDVIPA.sysname.tcpname)UACC(NONE)  
PERMIT EZB.MODDVIPA.sysname.tcpname ACCESS(READ) CLASS(SERVAUTH) ID(USER1)
```

- *sysname* is the name of the MVS system where the ID runs the MODDVIPA utility or issues the SIOCSVIPA/SIOCSVIPA6 IOCTL.
- *tcpname* is the job name of the TCP/IP started task.
- *USER1* is the DDF user ID that is being permitted to run the MODDVIPA utility (and thus the SIOCSVIPA/SIOCSVIPA6 IOCTL).

If this security profile is created, the user ID must be permitted to access this profile. Otherwise, the SIOCSVIPA/SIOCSVIPA6 IOCTL (and thus the MODDVIPA utility) fails with a "permission denied" error, regardless of superuser authority.

Also note that when using RACF, you might need to refresh these profiles before they take effect. Use the following RACF command to refresh these profiles:

```
SETROPTS RACLIST(SERVAUTH) REFRESH
```

7. Db2 for z/OS utilizes a TCP/IP DROP API through the EZBNMIFR callable service (NMI), and Db2 requires that RACF security profiles be defined to permit Db2 to successfully utilize this API. You must issue a RACF PERMIT command to enable *ssnmDIST\_userid* CONTROL access to the MVS.VARY.TCPIP.DROP command for the OPERCMDS class, where *ssnmDIST\_userid* is the user ID that is associated with the *ssnmDIST* started task.

Example (where the *ssnmDIST\_userid* is SYS0):

```
RDEFINE OPERCMDS MVS.VARY.TCPIP.DROP OWNER(SYS0) UACC(NONE)  
PERMIT MVS.VARY.TCPIP.DROP CLASS(OPERCMDS) ID(SYS0) ACCESS(CONTROL)
```

Failure to provide this permission might result in a ICH408I message similar to the following:

```
ICH408I USER(ssnmDIST_userid) ...  
MVS.VARY.TCPIP.DROP CL(OPERCMDS) ...
```

For more information, see [EZBNMIFR: Configuration and enablement \(z/OS Communications Server: IP Programmer's Guide and Reference\)](#).

## Related tasks

[Defining RACF user IDs for Db2-started tasks \(Managing Security\)](#)

## Related information

[Methods for associating started procedures with RACF identities \(z/OS Security Server RACF System Programmer's Guide\)](#)

[The STARTED class \(z/OS Security Server RACF Security Administrator's Guide\)](#)

[The started procedures table \(ICHRIN03\) \(z/OS Security Server RACF System Programmer's Guide\)](#)

## Db2 configuration with TCP/IP

The Db2 subsystem uses different TCP/IP ports to do different tasks.

- As a requester, Db2 uses an ephemeral port. You do not need to specify this port.
- As a server processing TCP/IP connection requests for DRDA SQL applications, Db2 uses a server port or the well-known port, 446, which is used for relational database communications.
- A server resynchronization port is used for processing 2-phase commit resynchronization requests.

This requires some planning because the port number is used to pass the network requests to the appropriate Db2 subsystem. Each location must have a unique port number.

The figure below shows some typical z/OS system configurations.

- SYSTEM1 contains only one Db2 subsystem, so the DRDA well-known port (446) can be assigned to Db2. In the example, port number 5020 is assigned for 2-phase commit resynchronization.
- SYSTEM2 contains two Db2 subsystems, so it is impossible to assign the port numbers 446 and 5020 to both Db2 subsystems because TCP/IP can only support one server at each port number. The problem is resolved by assigning the 446 and 5020 port numbers to DB2C, and port numbers 5021 and 5022 to DB2D.

Be sure to consider the impact of future system consolidations. If SYSTEM1 and SYSTEM2 are consolidated so that DB2A, DB2C, and DB2D run on a single z/OS system, you must take special precautions because DB2A and DB2C have the same TCP/IP port numbers. You can resolve this conflict by changing the port numbers of either DB2A or DB2C to eliminate the duplicate port numbers.

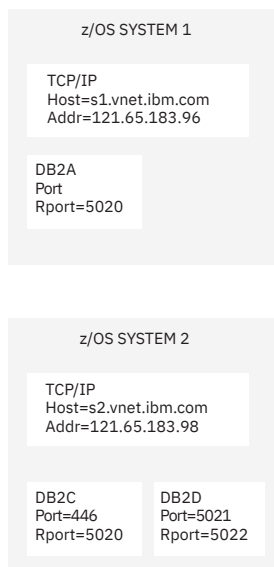


Figure 126. Typical z/OS configurations

### Related concepts

[Reserving the DRDA port \(Db2 Data Sharing Planning and Administration\)](#)

### Customizing the TCP/IP data sets or files

To use TCP/IP, you must customize your TCP/IP data sets or files.

### Before you begin

UNIX System Services should already be installed. For required maintenance levels, see [Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#).

## Procedure

To customize your TCP/IP data sets or files:

1. Find the high level qualifier (*hlq*) value in the `resolve/tcpip.data` file that z/OS UNIX applications use in their TCP/IP stacks.

This data set defines the high level qualifier, which is added to the beginning of other data set names used by TCP/IP.

2. Find the *hlq*.TCPparms(PROFILE) data set.

This data set contains the PORT statement used to make DRDA and resync port reservations. The following example shows a sample *hlq*.TCPparms(PROFILE) entry for SYSTEM2:

```
PORT 446 TCP DB2CDIST          ; DRDA SQL port for DB2C
PORT 5020 TCP DB2CDIST          ; Resync port for DB2C

PORT 5021 TCP DB2DDIST          ; DRDA SQL port for DB2D
PORT 5022 TCP DB2DDIST          ; Resync port for DB2D
```

This example assumes that *DB2CDIST* and *DB2DDIST* are the Db2 started procedure names.

3. Define the TCP/IP hostnames that Db2 needs to know.

The local host name **must** be defined before DDF is started. All domain names referenced in the table SYSIBM.IPNAMES **must** be defined. You define the hostnames by configuring the *hlq*.HOSTS.LOCAL data set, the `/etc/hosts` file in the hierarchical file system (HFS), or the domain name server (DNS).

After the *hlq*.HOSTS.LOCAL data set is configured, you have to execute the utility MAKESITE. This utility generates the *hlq*.HOSTS.ADDRINFO and the *hlq*.HOSTS.SITEINFO data sets that are used to translate between domain names and IP addresses. MAKESITE generates under the userid that issued the MAKESITE. Therefore, those files have to be moved to the high level qualifier that represents TCP/IP. The hostname for the local Db2 subsystem must be defined in at least one of these places.

You can also run the MAKESITE command with the HLQ parameter. You can set the HLQ parameter to the high level qualifier of the stack that you obtained in step 1. If you use the HLQ parameter, the *hlq*.HOSTS.ADDRINFO and the *hlq*.HOSTS.SITEINFO data sets are created and updated under the correct high level qualifier, so you do not have to move the data sets from under the userid high level qualifier to the TCP/IP high level qualifier.

If domain names are present in the CDB (in field IPADDR of table SYSIBM.IPNAMES), they must be defined in the z/OS data sets, the HFS or the DNS.

**Recommendation:** To support a Parallel Sysplex environment, use Dynamic Virtual IP Addresses (VIPA). To configure a Db2 subsystem to perform Dynamic VIPA routing, specify the Db2 group Dynamic VIPA on the TCP/IP PORT statement for the DRDA PORT number. This Dynamic VIPA must be the same for all Db2 members in the data sharing group. All clients must use the Dynamic VIPA to route requests to the Db2 group. To Db2 member-specific Dynamic VIPA is specified on the TCP/IP RESYNC PORT number in the TCP/IP profile data set for each Db2 member of the sysplex.

The following example shows a sample *hlq*.TCPparms(PROFILE) entry for SYSTEM2:

```
PORT 446 TCP DB2DIST BIND db2_sysplex_VIPA      ;DRDA SQL port for DB2
PORT 5001 TCP DB2DIST BIND member_specific_VIPA ;RESYNC port for DB2
```

4. Define the TCP/IP service names that Db2 needs to know.

Configure the *hlq*.ETC.SERVICES data set or the `/etc/services` file in the HFS. If service names are present in the CDB (in field PORT of table SYSIBM.LOCATIONS), they must be defined in the z/OS data set or the HFS.

The following example shows a sample *hlq*.ETC.SERVICES entry:

```
DRDA          446/tcp          ; DRDA databases
```

## Related concepts

[Db2 configuration with TCP/IP](#)

The Db2 subsystem uses different TCP/IP ports to do different tasks.

[Supported methods for specifying DVIPAs \(Db2 Data Sharing Planning and Administration\)](#)

#### **Related tasks**

[IP configuration overview \(z/OS IP Configuration Guide\)](#)

#### **Related information**

[Configuration files for the TCP/IP stack \(z/OS Communications Server: IP Configuration Guide\)](#)

### ***Modifying the change log inventory job for using TCP/IP***

You can use the DDF statement of the change log inventory job (DSNJU003) to specify or change TCP/IP port values for the Db2 server.

## **Procedure**

Specify the **PORT** and **RESPORT** parameters in the DDF statement of the DSNJU003 utility.

The **PORT** parameter specifies TCP/IP port number that DDF uses to accept incoming DRDA connection requests. The **RESPORT** parameter specifies the TCP/IP port number that DDF uses to accept incoming DRDA 2-phase commit resynchronization requests. The values for these parameters must be decimal numbers between 0 and 65534, where 0 indicates that TCP/IP support is being deactivated. The non-zero value for **PORT** must not be the same as the non-zero value for **RESPORT**.

You can also specify the **SECPORT** parameter, to specify the secure port that accepts incoming TCP/IP connection requests from remote DRDA clients that use secure SSL protocol. If the **SECPORT** parameter specifies the same value as the **PORT** parameter, the TCP/IP port accepts only secure TCP/IP connection requests. For more information, see [Configuring the Db2 server for SSL \(Managing Security\)](#).

Db2 uses the resync port only for transaction completion states after failures, so no user data or authentication protocols are ever exchanged on the secure port. You can enable SSL security for the resync port by defining a network policy on all Db2 requesters and Db2 servers.

For data sharing, all members of the Db2 data sharing group must have the same value for **PORT**. **RESPORT** must be uniquely assigned to each Db2 member so that no two Db2 members use the same TCP/IP port for 2-phase commit resynchronization. The **PORT** and **RESPORT** parameters can be changed on any Db2 member by running the utility change log inventory. After running the utility, you must stop and then restart Db2. Because **PORT** is the same for all members of the Db2 group, this process must be repeated on every member of the group when **PORT** is changed.

If you use dynamic VIPA to support a Parallel Sysplex environment, specify the Db2 group dynamic VIPA on the TCP/IP **PORT** statement for the DRDA port number.

You can define an alias location for all or selected members of a data sharing group by using the **ALIAS** parameter.

Remember, a zero value for either **PORT** or **RESPORT** is the same as deactivating TCP/IP support in Db2.

You can also specify an IPv4 address and an IPv6 address for the subsystem in the DDF statement of the change log inventory utility (DSNJU003). Specifying an IPv4 and an IPv6 address keeps the subsystem IP addresses constant, regardless of the z/OS system where the subsystem is started. The IP address moves with the Db2 subsystem. In data sharing environments, a constant IPv4 address and a constant IPv6 address can be assigned to represent the entire group.

#### **Related concepts**

[Supported methods for specifying DVIPAs \(Db2 Data Sharing Planning and Administration\)](#)

[Update the BSDS with the DSNJU003 utility \(Db2 Data Sharing Planning and Administration\)](#)

#### **Related tasks**

[Configuring subsets for member-specific access \(Db2 Data Sharing Planning and Administration\)](#)

#### **Related reference**

[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

[TCP/IP PORT field](#)

The value of the TCP/IP PORT field determines the TCP/IP port number that is to be used for accepting TCP/IP connection requests from remote DRDA clients and REST services.

#### SECURE PORT field

The value of the SECURE PORT field specifies the TCP/IP port number that is to be used for accepting secure TCP/IP connection requests from remote DRDA clients and REST services.

#### RESYNC PORT field

The value of the RESYNC PORT field specifies the TCP/IP port number that is to be used to process requests for two-phase commit resynchronization.

### ***Identifying the source IP address of a Db2 requester***

In most cases, to configure Db2 for z/OS outbound remote communications that use TCP/IP with other DRDA servers, you do not need to know the source IP address of the Db2 requester, which is chosen by the TCP/IP stack. However, you do need to know the source IP address that is chosen by the TCP/IP stack of a Db2 requester in the following situations:

- When the DRDA servers that are being targeted by that Db2 requester have implemented trusted context definitions
- When the DRDA servers that are being targeted by that Db2 requester have implemented system monitoring profiles that are dependent on the remote location's IP address

Note that the IP address and domain name that Db2 displays when it is started is not the IP address that will be used as a source IP address from this Db2 requester. When an application requests that an outbound TCP connection be established with a remote server at a specific IP address, the TCP/IP stack will provide the source IP address of the connection.

TCP/IP uses an established sequence to select the source IP address for outbound requests. For an explanation of this sequence and to determine how to identify the source IP address of a Db2 for z/OS requester, see [How TCP/IP selects a source IP address](#).

For outbound TCP/IP communications that originate from a Db2 for z/OS requester, the selection sequence employed by the TCP/IP stack starts at step 6.

### ***Populating the communications database for use with TCP/IP***

If you plan to use Db2 only as a server, you do not need to populate the CDB.

## **About this task**

#### **GUI**

For example, Spiffy's USIBMSTODb21 subsystem works as a server for many requesters. It is not necessary for Spiffy to register those requesters in the Db2 CDB.

However, if you intend to request data, you need to enter port numbers or service names in field PORT of table SYSIBM.LOCATIONS, and IP addresses or domain names in field IPADDR of table SYSIBM.IPNAMES. The LINKNAME in table SYSIBM.LOCATIONS is used to search tables SYSIBM.IPNAMES and SYSIBM.LUNAMES.

Updates to the following tables take place whenever a new remote connection is requested, without any need to stop and restart DDF:

- SYSIBM.LOCATIONS
- SYSIBM.IPNAMES
- SYSIBM.IPLIST

If you use RACF PassTickets, the LINKNAME must match the following values at the remote site:

- LUNAME

If the remote site is a Db2 subsystem that is defined with only an LUNAME value and no GENERIC LU name value or IPNAME value.

- GENERIC



If the remote site is a Db2 subsystem that is defined with a GENERIC LU name value in addition to an LUNAME value, but no IPNAME value.

- IPNAME

If the remote site is a Db2 subsystem that is defined with an IPNAME value, which triggers the DDF on the remote Db2 subsystem to activate TCP/IP communications support only.

## Procedure

- Insert rows into the SYSIBM.LOCATIONS table.

The LOCATIONS table contains the port number or service name that is used to connect to remote locations. The LINKNAME column of the LOCATIONS table corresponds to a row in the IPNAMES table.

The LOCATIONS table has the following columns that relate to TCP/IP:

### **DBALIAS VARCHAR(128) NOT NULL**

The name that is associated with the server. This name is used to access a remote database server. If DBALIAS is blank, the location name is used to access the remote database server. This column does not change database object names that are sent to the remote by using a location qualifier. Use the DBALIAS column to access data at two or more different remote locations when those remote locations have the same name.

### **LOCATION CHAR(16)**

The unique network location name, or DRDA RDBNAM, that is assigned to a remote or local system. You must provide location names for any systems from which you request data. This column is the primary key for this table.

### **LINKNAME CHAR(8)**

Identifies the TCP/IP attributes that are associated with this location. For each specified LINKNAME, you must have a row in SYSIBM.IPNAMES whose LINKNAME matches the value that is specified in this column. Because this table is used for outbound requests, you must provide a LINKNAME or your requests fail. Do not enter blanks in this column.

### **PORT CHAR(32)**

If blank, the default port, 446, is used for TCP/IP communications. Otherwise, the value can be either of the following values:

- The port number of the remote database server. The number must be one to five characters and left-justified.
- A TCP/IP service name. The service name is converted to a TCP/IP port number with the *getservbyname* socket call.

For example, Spiffy's USIBMSTODB21 location expects a LOCATIONS table that looks like the table below. The location USIBMSTODB21 uses the default DRDA PORT, 446.

*Table 131. Spiffy's LOCATIONS table*

<b>LOCATION</b>	<b>LINKNAME</b>	<b>PORT</b>
USIBMSTODB21	LUDB21	
USIBMSTODB22	LUDB22	
USIBMSTOSQL1	LUSQLDS	1234
USIBMSTOSQL2	LUSQLDS	DRDA

For example, add the second row with this statement:

```
INSERT INTO SYSIBM.LOCATIONS (LOCATION, LINKNAME)
VALUES ('USIBMSTODB22', 'LUDB22');
```

Because no port number is specified, location USIBMSTODB22 uses the default DRDA port number 446.

**Tip:** You do not need a row for the local Db2 in the IPNAMES and LOCATIONS tables. For example, Spiffy's USIBMSTODB21 subsystem does not require a row that shows its own LINKNAME and location name.

- Insert rows into the SYSIBM.IPLIST table.

The IPLIST table contains a list of multiple IP addresses that are specified for a given location.

IPLIST has the following columns:

**LINKNAME CHAR(8) NOT NULL**

This column is associated with the value of the LINKNAME column in SYSIBM.LOCATIONS and SYSIBM.IPNAMES. The values of the other columns in the SYSIBM.IPNAMES row apply to the server that is identified by the LINKNAME column in this row.

**IPADDR VARCHAR(256) NOT NULL**

This column contains an IPv4 or IPv6 address or domain name of a remote TCP/IP host of the server. If using WLM domain name server workload balancing, this column must contain the member-specific domain name. If you use dynamic VIPA workload balancing, this column must contain the member-specific dynamic VIPA address.

- An IPv4 address must be left justified and is represented as a dotted-decimal address. An example of an IPv4 address is *9.112.46.111*.
- An IPv6 address must be left justified and is represented as a colon-hexadecimal address. An example of an IPv6 address is *2001:0DB8:0000:0000:0008:0800:200C:417A*, which can also be expressed in compressed form as *2001:DB8::8:800:200C:417A*.
- A domain name is converted to an IP address by the domain name server where a resulting IPv4 or IPv6 address is determined. An example fully qualified domain name is 'stlmvs1.svl.example.com'. The *gethostbyname* socket call is used to resolve the domain name.

**IBMREQD CHAR(1) NOT NULL WITH DEFAULT 'N'**

This column indicates whether the row came from the basic machine-readable material (MRM) tape: N=no, Y=yes

- Insert rows into the SYSIBM.IPNAMES table.

The IPNAMES table defines the outbound security and hostnames that are used to connect to other systems through TCP/IP.

IPNAMES has the following columns:

**LINKNAME CHAR(8)**

This value matches that specified in the LINKNAME column of the associated row in SYSIBM.LOCATIONS.

**SECURITY\_OUT CHAR(1)**

Defines the security option that is used when local Db2 SQL applications connect to any remote server associated with this TCP/IP host. The default, A, means that outgoing connection requests contain an authorization ID without a password.

**USERNAMES CHAR(1)**

This column is used for outbound requests to control translations of authorization IDs. The values 'O' or 'B' are valid for TCP/IP connections.

**IPADDR VARCHAR(254)**

This column contains an IPv4 or IPv6 address or fully qualified domain name of a remote TCP/IP host.

- An IPv4 address must be left justified and is represented as a dotted-decimal address. An example of an IPv4 address is *9.112.46.111*.
- An IPv6 address must be left justified and is represented as a colon-hexadecimal address. An example of an IPv6 address is *2001:0DB8:0000:0000:0008:0800:200C:417A*, which can also be expressed in compressed form as *2001:DB8::8:800:200C:417A*.

- A domain name is converted to an IP address by the domain name server where a resulting IPv4 or IPv6 address is determined. An example fully qualified domain name is 'stlmvs1.svl.example.com'. The *gethostbyname* socket call is used to resolve the domain name.
- Insert rows into the SYSIBM.USERNAMES table.  
The USERNAMES table contains information that is needed for outbound translation only.

**Remember:** Inbound ID translation and *come from* checking are not done for TCP/IP requesters.

The USERNAMES table has the following columns:

**TYPE CHAR(1)**

Whether the row is for outbound translation. The value 'O' is valid for TCP/IP connections.

**AUTHID CHAR(8)**

Authorization ID to translate. If blank, it applies to all authorization IDs.

**LINKNAME CHAR(8)**

Identifies the TCP/IP network location associated with the row. A blank indicates it applies to all TCP/IP partners. For nonblank values, this value must match the LINKNAME value in SYSIBM.IPNAMES.

**NEWAUTHID CHAR(8)**

The translated value of AUTHID.

**PASSWORD CHAR(8)**

The password to accompany an outbound request. This column is ignored if RACF PassTickets, or already verified USERIDs are used.

## What to do next

After you populate these tables, you can write queries that access data at a remote system.



### Related concepts

[Support for executing long SQL statements in a distributed environment \(Db2 Application programming and SQL\)](#)

### Related tasks

[Granting privileges to remote users \(Managing Security\)](#)

### Related reference

[SYSIBM.USERNAMES columns \(Managing Security\)](#)

## Starting TCP/IP support

Before you start DDF, ensure that z/OS UNIX System Services and TCP/IP are started. Also ensure that the local host information is set up correctly in the TCP/IP configuration files.

## About this task

**Important:** When using dynamic VIPA, the IP addresses that have been assigned to Db2 by the TCP/IP profile must be registered with the DNS.

## Procedure

Start DDF.

DDF executes the following steps when it is started:

- a. Establishes the TCP/IP listener by opening sockets for the DRDA SQL, Secure SQL, and resync ports to accept connections from remote locations.

b. Obtains the hostname that is specified in TCPIP.DATA. The hostname is used to register with WLM and, in some cases, to obtain the IP address. You can specify the IP address that Db2 should use for communication with its partners as follows:

- Note that Db2 12 is an IPv6 system and does not use gethostid to obtain the IP addresses because gethostid does not support IPv6. You can instead specify the address in the domain name server (DNS), if one is present, or in a local host file. You can specify an IPv4 address, an IPv6 address, or both, which should be mapped to the hostname that is specified in TCPIP.DATA. Db2 obtains the user-specified IP addresses by resolving the hostname.
- If you want DDF to accept connections only on a specific IP address (IPv4 or IPv6), specify the IP address on the SQL port in the TCP/IP profile by using the BIND keyword. For example, use the following configuration, where 446 is the SQL port and Vx is either an IPv4 or IPv6 address:

```
PORT
446 TCP DB2ADIST BIND Vx
```

With this method, Db2 only accepts connections on the specified IP address. Moreover, this method is not supported with secure SQL port. If your subsystem is running in data sharing mode, you must also specify an IP address on the DRDA resync port. For more details, see [TCP/IP access methods for Db2 data sharing \(Db2 Data Sharing Planning and Administration\)](#).

- The most recommended place to specify the IP address is in the DDF communication record of the bootstrap data set (BSDS) by using the DSNJU003 utility. For example:

```
//SAMPLE      EXEC PGM=DSNJU003
//SYSIN       DD *
DDF IPV4=1.2.3.4,
IPV6=1::2
```

The advantage of this approach is that Db2 accepts connections not only on the specified IP address, but on any IP address that is active on the TCP/IP stack. Additionally, connections are accepted on both secure and non-secure SQL ports. Db2 also resolves the hostname to an IP address through a name server or local host file to fill up any IP address that is not specified in the BSDS. For example, if the BSDS specified IPv4 but not IPv6, Db2 would try to obtain the IPv6 address by resolving the hostname.

**Important:** IP addresses should not be specified simultaneously in both the Db2 BSDS and TCP/IP PORT statement. Binding to a specific IP address and binding to any IP address (INADDR\_ANY) are mutually exclusive, and DDF TCP/IP services will not be available until the IP addresses are specified in only one place.

c. Obtains the domain name by resolving the IPv6 address, if one is specified, or the IPv4 address through a name server or the local host file. If you use data sharing, member domain names are obtained by resolving member IP addresses, and group domain names are obtained by resolving group IP addresses.

**Important:** Whether you use data sharing or not, Db2 12 uses the domain name that you specify in the name server, if one is present, or in a local host file, without further modifying or qualifying the name. However, DDF tolerates the absence of a domain name, when the IP address is specified in the Db2 BSDS.

To determine the host IP address and domain name, issue a DISPLAY DDF command. The IPADDR field of the DSNL085I message displays the IPv4 and IPv6 addresses, if any, that are associated with the host.

```
DSNL081I STATUS=STARTD
DSNL082I LOCATION          LUNAME          GENERICLU
DSNL083I STLEC1           USIBMSY.SYEC1DB2  -NONE
DSNL084I TCPPOPT=446     SECPOR=0         RESPOR=5001
DSNL085I IPADDR=:9.30.113.198
DSNL085I IPADDR=2001:DB8::8:800:200C:417A
DSNL099I DSNLTDDF DISPLAY DDF REPORT COMPLETE
```

Until the local host information is available, DDF TCP/IP services are not available to local and remote applications. If a failure occurs obtaining the local host information, DDF periodically attempts to get

the local host information until successful or until DDF is stopped. DDF tolerates the absence of a domain name as long as an IP address is specified in the Db2 BSDS.

d. Listens and accepts connection requests on SQL, secure SQL, and resync ports.

### Related concepts

[Communicating with data sharing groups \(Db2 Data Sharing Planning and Administration\)](#)

[Supported methods for specifying DVIPAs \(Db2 Data Sharing Planning and Administration\)](#)

## Initializing a TCP stack for use with a VIPA

During initialization of a TCP stack for use with a virtual IP address (VIPA), the PROFILE.TCPIP configuration should contain the HOME list with the VIPA. The HOME list should be followed by the PRIMARYINTERFACE statement pointing at the appropriate VIPA that is to be used by Db2.

### About this task

**Recommendation:** Do not change the stack's HOME list or the PRIMARYINTERFACE while DDF is started.

### Procedure

Use the VARY OBEY command to change the PRIMARYINTERFACE and the stack's HOME list.

This command can be used while the stack is running without recycling the stack. If a new HOME list is specified with the VARY OBEY file, the PRIMARYINTERFACE should also be specified.

## Initializing a TCP stack for use with both IPv4 and IPv6 addresses

To use both IPv4 and IPv6 addresses, Db2 requires TCP/IP dual-mode stack support. Dual-mode stack support allows IPv4 address communication with IPv4 partners, and IPv6 address communication with IPv6 partners.

### About this task

If you need only IPv4 address communication, an IPv4-only stack environment is sufficient because Db2 detects if the stack supports IPv6, and if not, Db2 allows communication with IPv4 addresses only.

### Procedure

To enable TCP/IP for IPv4/IPv6 dual-mode stack:

1. Modify the BPXPRMxx member to define two NETWORK statements, one for AF\_INET, and another for AF\_INET6.

The following example shows two NETWORK statements in the BPXPRMxx member:

```
FILESYSTYPE TYPE(INET) ENTRYPPOINT(EZBPFINI)
NETWORK DOMAINNAME(AF_INET)
          DOMAINNUMBER(2)
          MAXSOCKETS(12000)
          TYPE(INET)
NETWORK DOMAINNAME(AF_INET6)
          DOMAINNUMBER(19)
          MAXSOCKETS(13000)
          TYPE(INET)
SUBFILESYSTYPE NAME(TCPIP) ENTRYPPOINT(EZBPFINI)
                TYPE(INET)
```

Separate MAXSOCKETS values are supported. The IPv6 default will be the IPv4 specified value.

2. To verify that TCP/IP is configured to support a dual-mode environment, enter a `d tcpip, , netstat, home` command on the z/OS console. Look for the INTFNAME field that has a value of LOOPBACK6 and verify that the associated ADDRESS field has a compressed colon-hexadecimal IPv6 address of ::1.

The following example shows that TCP/IP is configured to support both IPv4 and IPv6:

```
d tcpip,,netstat,home
EZD0101I NETSTAT CS V1R5 TCPIP 034
HOME ADDRESS LIST:
LINKNAME: CTC1LINK
  ADDRESS: 9.30.115.135
  FLAGS: PRIMARY
LINKNAME: LOOPBACK
  ADDRESS: 127.0.0.1
  FLAGS:
INTFNAME: LOOPBACK6
  ADDRESS: ::1
  TYPE: LOOPBACK
  FLAGS:
3 OF 3 RECORDS DISPLAYED
```

### Related reference

[z/OS Communications Server: IPv6 Network and Application Design Guide](#)

## Two-phase commit for TCP/IP clients

Db2 supports two types of two-phase commit for TCP/IP clients.

- The DRDA client coordinates the two-phase commit. If a failure occurs during the commit process, Db2 might need to resynchronize with the DRDA client.
- The DRDA client gives responsibility for the resynchronization to Db2. The client sends Db2 a list of server LOCATION names, domain names, and resync IP addresses that are part of the client's unit of work. Db2 Connect uses this support by allowing Db2 to act as its Transaction Manager Database (TM\_DATABASE), thereby eliminating the need to have a local database to manage the two-phase commit process. If a failure occurs during the two-phase commit process, Db2 might need to resynchronize with one or more of the server locations sent by the client.

Db2 uses the port specified on the RESYNC PORT field of installation panel DSNTIP5 for two-phase commit resynchronization. Db2 begins resynchronization using the partner's IP address and LOCATION name, and the RESYNC PORT obtained at the time of initial connection. If the partner's IP address changed, the resynchronization fails. For example, if the partner was Db2 for z/OS, the IP address can change when the automatic restart manager (ARM) restarts a data sharing member on a different CPC. The IP address can also change when an z/OS adapter fails and virtual IP addresses were not used.

If the IP address fails, Db2 uses the partner's domain name to determine the IP address for resynchronization. DRDA requesters receive the port number and domain name to be used for two-phase commit resynchronization from the server during DRDA connect processing.

No CDB definition is required to do resynchronization.

## Multiple TCP/IP stacks and Db2

Running multiple TCP/IP stacks does not provide performance advantages over a single TCP/IP stack, which can provide high levels of scalability and performance by itself. Running multiple stacks requires more private and ECSA memory consumption and some additional processor consumption. It is also a much more complicated environment to manage from an administrative perspective.

Although multiple TCP/IP stacks are not recommended for Db2, multiple stacks might be appropriate for your installation. A possible scenario for using multiple TCP/IP stacks could be where a single Db2 system must connect to multiple networks that have distinct security characteristics (for example, intranet and internet) and strict separation is required. The firewall on the external stack can be configured to forward only selected traffic internally, while the internal stack does what is indicated with internal traffic, including forwarding to the external stack. Second, a denial-of-service attack on the stack that handles external traffic would not affect the stack that handles internal traffic, so two stacks offer an element of resistance to attack.

## Multiple TCP/IP stacks for multiple Db2 subsystems

The TCP Server Bind Control allows multiple Db2 subsystems to use the same port number within the same z/OS image. This configuration allows multiple Db2 subsystems that bind to any IP address (also known as INADDR\_ANY in sockets API terms) and the same port number on the same stack to be bound to separate IP addresses.

For example, consider two Db2 subsystems in a data sharing group where both have the same LOCATION and same DRDA PORT. A new 'BIND *ipaddr*' parameter is added to the PORT statement. When Db2 (identified by job name *ssnmDIST*) issues a bind to the port number in the PORT statement and to INADDR\_ANY, the bind is restricted to the IP address specified on the PORT statement for that Db2 subsystem. This allows two Db2 subsystems to share the same stack by limiting them to different single IP addresses (virtual IP addresses are recommended). This allows them to be reached by any physical connectivity that can get to the stack.

## One TCP/IP stack for multiple Db2 subsystems

z/OS UNIX System Services provides a way to configure each Db2 subsystem to use a single transport stack. This configuration allows each Db2 subsystem to be restricted to a single stack. Each is reachable by any IP address that is owned by the selected stack, but not by other IP addresses.

This approach allows multiple Db2 subsystems that bind to any IP address (also known as INADDR\_ANY in sockets API terms) and the same port number on the same stack to be bound to separate IP addresses. For example, consider two Db2 subsystems in a data sharing group where both have the same LOCATION and same DRDA PORT. A new 'BIND *ipaddr*' parameter is added to the PORT statement. When Db2 (identified by job name *ssnmDIST*) issues a bind to the port number in the PORT statement and to INADDR\_ANY, the bind is restricted to the IP address specified on the PORT statement for that Db2 subsystem. This allows two Db2 subsystems to share the same stack by limiting them to different single IP addresses (virtual IP addresses are recommended). This allows them to be reached by any physical connectivity that can get to the stack.

### Related reference

[PORT statement \(z/OS Communications Server: IP Configuration Reference\)](#)

## Connecting Db2 for z/OS distributed database systems with VTAM (deprecated)

*Virtual Telecommunications Access Method* (VTAM) is a program that you can use to control remote Db2 communication.

### About this task

**Tip:** TCP/IP is the recommended communication protocol for communication with Db2. Although SNA communication remains supported in Db2 12, SNA communication (including the VTAM interface) is deprecated, and support might be removed in the future. You can disable SNA communication by setting the value of the DB2 TCP/IP IPNAME setting. See [“DB2 TCP/IP IPNAME field” on page 304](#).

Remote communications terminology:

#### Logical unit (LU)

A source of requests entering the network and a receptor of replies from the network. For example, a particular Db2 is an LU.

#### Session

A logical connection between two LUs. Multiple sessions can run on a single physical connection.

#### Conversation

A dialog that uses a session to transfer information between transaction programs, such as Db2 to Db2. A single session can support multiple conversations, but only one at a time.

To prepare Db2 for communication using VTAM and the distributed data facility (DDF), complete the following steps. You can complete steps 1, 2, and 3 after installing Db2. Steps 6 through 8 are optional.

- **Step 1: Customize VTAM for Db2**

To make monitoring of the network easier, consider installing NetView®.

- **Step 2: Choose names and a password**

You need to choose two names for the local Db2 subsystem: a location name and a logical unit name (LU name).

A *location name* distinguishes a specific database management system in a network, so applications use this name to direct requests to your local Db2 subsystem. Other systems use different terms for a location name. For example, Db2 Connect calls this the *target database name*. The DRDA term, *RDBNAM*, is used to refer to non-Db2 systems' relational database names.

An *LU name* is the name by which VTAM recognizes this subsystem in the network. You might need to know the LU names of other systems that can request data from the local Db2 subsystem, or you can use a default LU name of eight blanks.

If you plan to request data from other systems, you need the LU names *and* location names for those serving systems. Most of the time, system administrators and operators need to know both names, because they can use both names in various commands, and Db2 uses both names in messages.

In addition to the names mentioned above, you can choose an optional password to validate your local Db2 subsystem to VTAM. If the z/OS system on which Db2 is running is part of an z/OS Parallel Sysplex, you can choose a generic LU name to define a Db2 group to remote locations.

- **Step 3: Define the Db2 subsystem to VTAM**

Use the VTAM APPL statement to make the Db2 subsystem known to VTAM. You must include the APPL definitions in the VTAM SYS1.VTAMLST library at VTAM startup.

Also use the VTAM MODEENT statement to define default session modes. You must include mode tables in the VTAM SYS1.VTAMLIB library at VTAM startup.

Sample VTAM definitions are provided in the data set DSN8VTAM in SDSNSAMP and in examples throughout this topic.

- **Step 4: Populate the communications database**

The Db2 catalog includes the communications database (CDB), which contains several tables that hold information about your connections with remote systems. You must populate some of these tables before you can request data from those remote systems. If this Db2 system only services data requests, you do not have to populate the CDB; you can use the default values.

- **Step 5: Start VTAM to use Db2**

When you start VTAM to use Db2, you must be sure that the proper definitions are in the VTAM libraries VTAMLST and VTAMLIB.

- **Step 6: Tune the system**

This is an optional step, which you can do after you have established communications between two or more systems. The procedure outlined up to this point gives you default values for your Db2 modes and your class of service. Although the defaults are probably adequate for your preliminary testing, you can change them to improve performance in the network, or to assign different modes to different application plans.

When VTAM links two nodes, it establishes a session. The number of available sessions can have a significant impact on performance; therefore, you might need to modify your session limit values. Also, large amounts of Db2 data travelling through the network can severely affect VTAM storage, and you might need to tune buffer storage.

You can also tune the system by changing mode options. A *mode* describes various characteristics of a session, such as the maximum number of bytes sent at one time. Modes can point to a *class of service* table, which ranks the available virtual routes for this mode with respect to preference of use and paths through the network. Essentially, the class of service table allows you to assign different network priorities to your modes.

- **"Step 7: Create Aliases"**



This is an optional step. Each Db2 location can create aliases for the tables it wants to access, using DRDA, at the other Db2 locations.

- **"Step 8: Provide Authorization for an Appropriate Level of Security"**

### **Related concepts**

[Sample VTAM definitions to connect two Db2 subsystems](#)

Sample VTAM definitions are provided to give you some guidance on setting up your network to connect two Db2 subsystems. The samples are not intended to give you information about all the options.

### **Related tasks**

[Calculating session limits](#)

You can calculate session limit values for DRDA access.

[Calculating VTAM I/O buffer pool \(IOBUF\) storage](#)

You can estimate VTAM buffer pool storage when you use the distributed data facility of Db2. Every *path information unit* (PIU) that enters or leaves VTAM resides in one or more IOBUF buffers.

### **Related reference**

[IBM Tivoli NetView for z/OS \(Installation: Getting Started\)](#)

[Generic resources \(SNA Network Implementation Guide\)](#)

[Implementing a VTAM network \(SNA Network Implementation Guide\)](#)

[Tuning VTAM for your environment \(SNA Network Implementation Guide\)](#)

### **Related information**

[Managing distributed access \(Managing Security\)](#)

## **Customize VTAM for Db2**

For Db2 to provide the best performance for distributed database systems, you probably need to customize VTAM.

Before you customize VTAM, consider the communication needs of your Db2 connections. Because you could allow your Db2 subsystem to send large amounts of data through the network, reexamine the capacity of your existing network. In some cases, portions of your existing network might need additional communication hardware to provide the required capacity.

### **Related reference**

[SNA Network Implementation Guide](#)

## **Choosing names and a password for VTAM communication**

When you connect a Db2 subsystem to VTAM, you must choose names for your local Db2 subsystem and, possibly, a VTAM password for it. You might also need to know the names of remote systems in the network.

### ***Choosing names for the local subsystem***

You define the names for the local subsystem and its VTAM password to Db2 by using the installation panels, or by using the change log inventory utility.

### **Procedure**

Choose the following names for the local Db2 subsystem:

- A unique name by which the other systems in the network can recognize your subsystem. The name can have 1–16 characters and is called the *location name*. (Db2 Connect refers to this as the *target database name*.) Make sure that the local location name is different from the name of every other system in the network, no matter where it is physically located.

You must share the location name with the other systems that need to send SQL requests to this one.

The location name should not change even if the network changes. Therefore, tightly control the allocation of location names. To ensure uniqueness, you use an IBM-registered SNA NETID as the first

six bytes of your location name. If location names are not unique, you have to change many programs and tables if your network is later joined with another network using the same location name.

The IBM recommendation for the NETID is the following format:

- The first two bytes are the country code as defined in ISO standard ISO 3166. These codes include the uppercase letters A through Z.
- The next four bytes are the enterprise code of the registering enterprise. This might already be registered with IBM as your SNA NETID. The enterprise code can include the uppercase letters A through Z, the numbers 0 through 9, and the underscore character (\_).

To register your SNA NETID, see your IBM representative.

- A name by which VTAM can recognize the local subsystem. It must be either a unique name or, in some cases, a generic name.
  - The *unique* name must be unique within the network of connected systems, can have 1–8 characters, and is called the *LU name*. The LU name and the location name of a subsystem can be identical, but this is not recommended; LU names are unique only within a network, and networks can change. You must share the LU name with any system that requests data from your local subsystem. Later, you enter this name in the VTAM APPL statement.
  - If the z/OS system on which Db2 is running is part of an z/OS sysplex, you can use a *generic* 8-character name to represent a group of VTAM LU names. The generic name might be useful if your network is in a transitional period, and you want to use generic names to reference network nodes.

Specify the generic LU name in the field Db2 GENERIC LUNAME on installation panel DSNTIPR. Use column GENERIC of SYSIBM.LUNAMES to indicate that you want to use the generic LU name for CNOS processing and SQL requests to a particular server.

- Server location aliases. You can use the Change Log Inventory utility to define up to eight aliases for a location. Applications can use these alias names to refer to the local Db2 subsystem or data sharing group.

Aliases are most useful in a data sharing environment in which two or more Db2 subsystems are migrated to a single data sharing group. In this case, you can define the old location for each subsystem as an alias for the location name of the group. Remote applications that refer to the old location names do not need to change.

Use the Print Log Map utility to print all location alias names that are defined for a Db2 subsystem.

You can set up multiple server location aliases as locations on the z/OS requester to restrict which members an application will use when accessing a data sharing group. The z/OS requester must be using the IPLIST or LULIST table to route connections to the data sharing group.

### **Related concepts**

[SYSIBM.LUNAMES \(Db2 Data Sharing Planning and Administration\)](#)

### **Related tasks**

[Defining the Db2 subsystem to VTAM](#)

You need to use an APPL definition statement and a MODEENT macro to define the Db2 subsystem to VTAM. Samples of both the APPL and MODEENT macros are in the DSN8VTAM sample data set.

[Using the change log inventory utility to update the BSDS](#)

The DDF statement of the change log inventory utility can be used to insert or update information that is stored in the bootstrap data set.

### **Choosing a password for the local subsystem**

Choosing a VTAM password is optional. Db2 does not require you to use a password as long as you have not included one in the VTAM APPL statement.

### **Procedure**

To set a local subsystem password:

- Enter the password by using the PRTCT option of the VTAM APPL statement. The password can have from one to eight EBCDIC characters.

This password is not transmitted through the network, so there is no need to share the password with the other systems.

### Related tasks

[Controlling LU attachments to the network \(Managing Security\)](#)

### Related reference

[DB2 VTAM PASSWORD field](#)

The optional DB2 VTAM PASSWORD field specifies the password that VTAM is to use to recognize this Db2 subsystem.

### **Names that you need from the remote systems**

If you plan to have your Db2 subsystem request data from other systems, you need the LU names and location names for those serving systems.

**Location names and LU names:** When you populate the communications database (CDB) in the local Db2, you must know the location names (or DRDA RDBNAMs) and LU names of remote servers. The remote servers are the systems from which this Db2 system is to request data. The local Db2 system does not need location names of requesters. However, you need to know the LU names of the requesters if you intend to change default communication options.

Db2 does not receive DRDA RDBNAM from requesters other than Db2 for z/OS. If Db2 does not have an RDBNAM, it displays LU names in messages, display output, and trace output. To help you distinguish between location names and LU names in those cases, the LU name is enclosed in less-than (<) and greater-than (>) brackets.

When your systems begin communicating, you and others involved in working with distributed systems need to be aware of the LU name to DRDA RDBNAM mappings. When you have obtained the necessary names, enter them in the CDB.

**Transaction program names (TPNs):** If a server is not a Db2 for z/OS, it might have an additional name that uniquely identifies it. In LU 6.2, this is known as a *transaction program name* (TPN), and can be 1–64 characters long. When a Db2 for z/OS subsystem communicates with other Db2 for z/OS subsystems, you do not need to supply TPN values. The Db2 subsystems automatically choose the correct TPN values.

**When a TPN is necessary:** You might need to supply TPN values when a Db2 subsystem requests data from a server that is not a Db2 for z/OS subsystem. For cases where the server does not accept the default TPN for DRDA access, enter into your CDB the TPN chosen by that server. For Db2 for VM, for example, the TPN is the SQL database machine ID.

**TPN values accepted by Db2 for z/OS:** A requester that is not Db2 for z/OS must use either the TPN name X'07F6C4C2' or DB2DRDA, which are the only values Db2 recognizes when it accepts a request from another system. Some requesters enter the TPN as two separate fields: a 1-byte prefix (X'07') and a 3-byte suffix ('6DB').

### Related tasks

[Populating the communications database for use with TCP/IP](#)

If you plan to use Db2 only as a server, you do not need to populate the CDB.

### **Names that Spiffy Computer Company chose**

Spiffy has chosen location names and LU names, some of which are used in the provided examples.

*Table 132. Spiffy's location names, LU names, and transaction program names (TPNs)*

Location Name	LU Name	TPN	Comments
USIBMSTODB21	LUDB21		Db2 *
USIBMSTODB22	LUDB22		Db2
USIBMSTOSQL1	LUSQLDS	TPNSQLDS1	Db2 for VM production system

Table 132. Spiffy's location names, LU names, and transaction program names (TPNS) (continued)

Location Name	LU Name	TPN	Comments
USIBMSTOSQL2	LUSQLDS	TPNSQLDS2	Db2 for VM test system

**Note:** \*USIBMSTODDB21 plans to accept requests from many Windows requesters.

## Defining the Db2 subsystem to VTAM

You need to use an APPL definition statement and a MODEENT macro to define the Db2 subsystem to VTAM. Samples of both the APPL and MODEENT macros are in the DSN8VTAM sample data set.

### The APPL statement

A VTAM APPL definition statement defines the VTAM options for the Db2 subsystem and includes it in a major node.

With VTAM, you can use a model application program definition for Db2. With a model definition, you use wild card characters for the application name (LU name).

Spiffy uses the statement in the table below for the USIBMSTODDB21 Db2 subsystem:

LUDB21 APPL	APPC=YES,	X
	ATNLOSS=ALL,	X
	AUTH=(ACQ),	X
	AUTOSES=1,	X
	DMINWNL=25,	X
	DMINWNR=25,	X
	DSESLIM=50,	X
	MODETAB=DB2MODES,	X
	PRTCT=D02DN,	X
	SECACPT=ALREADYV,	X
	SRBEXIT=YES,	X
	SYNCLVL=SYNCPT,	X
	VERIFY=NONE,	X
	VPACING=2	

Figure 127. Example of a VTAM APPL definition statement

For your convenience, the APPL statement example is provided in data set DSN8VTAM, in the sample library, SDSNSAMP.

The topics that follow describe the APPL options that Spiffy uses and a few more in which you might be interested. Not all APPL options are described.

### Related reference

[VTAM Application Program Major Node \(SNA Resource Definition Reference\)](#)

#### Options for which you must choose values

For some options in your APPL statement, you must supply a specific value; for others, Db2 suggests values that are not the VTAM default values.

In your APPL statement, you must code values for the following options:

#### **name**

The 1 to 8 character LU name you chose. For their USIBMSTODDB21 Db2 system, Spiffy uses LUDB21.

#### **AUTOSES**

The number of contention winner sessions that VTAM is to activate automatically between this Db2 and another system on a given mode before Db2 requests a conversation to be created.

Contention occurs when two LUs want to allocate a conversation at the same time in the same session. In order to resolve contention situations, VTAM denotes one LU as the contention winner and one as the contention loser. The winner automatically prevails and is allowed to allocate its conversation. The loser must wait to allocate its conversation.

The default is 0. The suggested value is 1 or greater to ensure that VTAM informs Db2 if a session is inactivated.

Too large a number can take up storage and create resources that are not used. A small number can result in a one-time delay to bring up additional sessions when they are needed by an application.

#### **DMINWNL**

The minimum number of parallel sessions in which, if there is contention for a conversation, this local Db2 subsystem is the winner.

The suggested value is one-half the value of DSESLIM, described below.

#### **DMINWNR**

For the same situation as described for DMINWNL, the number of sessions in which the remote system is the winner. The suggested value is one-half the value of DSESLIM, described below.

#### **DSESLIM**

The default maximum number of sessions allowed for this Db2 subsystem as it communicates with any other system on a given mode. For performance reasons, the Db2 suggested value for DSESLIM is the maximum number of sessions that can possibly be in use on any mode. For example, assume you have 5 modes for which the following maximum numbers of sessions could be active: 10, 12, 20, 30, 40. In this case, DSESLIM should be 40.

Because calculating a precise value for this number can be rather difficult if you do not know exactly how many applications run on a specific mode, Spiffy chooses 50. They can modify this option later if they have problems obtaining enough sessions, or if they find they are requesting sessions that they never need.

You can use DSESLIM to control the number of sessions that this subsystem can issue or receive. For example, to avoid overloading this subsystem with requests from remote application processes, you can assign a low number to DSESLIM to limit the number of simultaneous remote requests issued by a given partner and mode.

Use the CONVLIMIT column of the LUMODES table in the CDB to override this value for specific cases.

#### **MODETAB**

The name of the VTAM logon mode table you use to define Db2 session modes. Only modes defined in this table are eligible for conversations created by the local Db2. If you leave this blank, Db2 uses the default mode table shipped with VTAM (ISTINCLM). Spiffy decides to set up a separate mode table and chooses the name DB2MODES. Db2 cannot use either the default mode table or the one you set up yourself until you make entries into the table.

#### **PRTCT**

If you decided to use a password, this is that password. Later, you must store the same password in the bootstrap data set (BSDS), entering it through installation panels or the change log inventory utility.

If you prefer not to use a password, omit this option. The installation panels and the change log inventory utility do not require you to enter a password.

#### **SECACPT**

The level of conversation-level security allowed.

**Recommendation:** Use ALREADYV, which gives you the most flexibility in determining your security. You can use the CDB to determine levels of security on a more granular basis.

In general, SECACPT=CONV should not be used because in many cases, it does not allow already verified conversations for DRDA access.

#### **VERIFY**

Whether you want SNA partner LU verification. The default, VERIFY=NONE, means that any system can connect with yours. Because Spiffy is setting up a small, restricted network, it chooses the default for now.

Use VERIFY=REQUIRED to activate partner LU verification. This means that you let RACF and VTAM check the identity of an LU that is attempting to connect with yours.

Db2 has no dependency on the value you choose.

### **VPACING**

The maximum number of messages that another system can send to this local Db2 subsystem during a conversation before waiting to receive a pacing response. The suggested value is 2.

These message sizes are determined by the RUSIZES option of the MODEENT macro. VPACING and RUSIZES, together with some overhead, determine the amount of storage required for the pacing window.

### **Related concepts**

#### CNOS processing in Db2

The distributed data facility of Db2 can request to alter the number of sessions with another system for a specific VTAM logon mode. This automatic process is called *change number of sessions* (CNOS).

#### Session-level pacing

*Session-level pacing* is the mechanism by which the receiver of data (Db2, in this case) can control the pace at which the sender sends data (in the form of RUs).

#### The MODEENT macro

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

### **Related tasks**

#### Calculating session limits

You can calculate session limit values for DRDA access.

#### Update SYSIBM.LUMODES with conversation limits

Use SYSIBM.LUMODES to provide VTAM with conversation limits for specific LU name and mode name combinations.

#### Controlling LU attachments to the network (Managing Security)

### **Related reference**

#### LU 6.2 Security (SNA Network Implementation Guide)

#### *Options that you must code exactly as given*

In some cases, Db2 requires particular values of APPL options.

For the following options, you must code the values exactly as shown; they are *not* the VTAM defaults:

#### **APPC=YES**

Tells VTAM that Db2 uses APPC conversation verbs.

#### **AUTH=(ACQ)**

Determines the Db2 system authority to use certain VTAM functions.

#### **SRBEXIT=YES**

Tells VTAM that Db2 uses service request block (SRB) processing in its exit routines.

#### **SYNCLVL=SYNCPT**

Tells VTAM that Db2 supports two-phase commit. Other systems communicating with this Db2 use this indication to determine if Db2 supports the updating of many locations in one unit of work.

Coding SYNCLVL=SYNCPT does not preclude the support of partner LUs that do not support two-phase commit. Db2 still supports the non-two-phase process.

#### *Options that must use VTAM defaults*

Some options in your APPL statement require you to use the VTAM default values. You do not need to code these options.

Db2 must use the VTAM default values for the following options:

#### **HAVAIL=NO**

Indicates whether an XRF session can be supported. Db2 requires the default, NO.

#### **PARSESS=YES**

Specifies that parallel sessions are allowed. This defaults to YES when APPC=YES.

**ENCR=NONE**

Specifies information about specific cryptographic requirements. There is no support for encryption in this release of VTAM for LU 6.2 applications; therefore, this must be NONE.

**SONSCIP=NO**

Specifies information about SCIP exit routines. Db2 does not have SCIP exit routines; this must be NO.

**VTAMFRR=NO**

Specifies whether a VTAM functional recovery routine is in effect when control is returned to Db2. Db2 uses its own recovery routines; this must be NO.

*Other options of interest*

In most cases, you can reasonably use the VTAM default values for the APPL statement at first.

You can change these values later. The options are listed below in case you have some reason to not use the default values.

**ACBNAME**

The LU name for the Db2 subsystem. If the ACBNAME is different from the APPL name and both the originating and destination LUs are in the same VTAM domain, do not refer to the ACBNAME in a CDB definition. If the ACBNAME is not the same as the APPL name, VTAM may encounter name conflicts.

**DDRAINL**

Whether the local Db2 subsystem wants to accept permission to drain its allocation requests if a change-number-of-sessions (CNOS) request is received that specifies that draining is allowed. The suggested value is the default, NALLOW (do not allow draining).

**DRESPL**

Whether the local Db2 is responsible for deactivating sessions when it receives a CNOS request specifying the local Db2 as the responsible system. The suggested value is the default, NALLOW (do not be responsible).

**EAS**

The approximate number of concurrent sessions for this Db2 subsystem. For performance reasons, it is better to estimate slightly high. The VTAM default is 509.

**LMDENT**

The number of entries to be used for a hash table of other systems. The suggested value is the approximate number of other systems in the network. In the scenario, Spiffy decides to use the default value of 19.

**MAXPVT**

The maximum additional amount of private area storage that can be used by VTAM within the DDF address space (*ssnmDIST*) for the session-related control blocks and messages for Db2. Specifying 0 indicates an unbounded amount; this is the VTAM default.

**OPERCNOS**

The ability to have a VTAM operator display and set VTAM session limits for a given LUNAME and MODENAME.

- Use ALLOW to enable a VTAM operator to change session limits dynamically without stopping DDF or changing the CONVLIMIT column of the SYSIBM.LUMODES table.
- Use NALLOW, the default, to make sure VTAM operators are not able to dynamically change session limits for Db2.

*Options that are ignored by Db2*

Some options for VTAM APPL statements are not applicable to Db2. Do not code these options in your APPL statement.

The following options are not applicable to Db2:

ASLENT  
ASLTAB  
ATNLOSS  
MDLENT

MDLTAB  
POAQNAM  
SSCPFM  
USSTAB

### **The *MODEENT* macro**

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

This is the table that you named in the *MODETAB* option of the *APPL* statement.

You can create your own log mode table or add mode names to the default mode table, *ISTINCLM*, which is shipped with VTAM. If you decide to add your modes to *ISTINCLM*, you can find that table in *SYS1.SAMPLIB*.

Spiffy uses the Db2 default modes at first, but also sets up a separate mode table for modes that are used by Db2 for distributed data processing. This table can then be populated with additional modes as they are needed.

### **Related concepts**

#### The *APPL* statement

A VTAM *APPL* definition statement defines the VTAM options for the Db2 subsystem and includes it in a major node.

#### Default VTAM modes

Use the *MODEENT* macro to enter each default mode into your mode table. When this table is complete, you must assemble and link-edit it into *SYS1.VTAMLIB*.

The following modes are the default modes:

- *SNASVCMG* is an optional mode. It is reserved for use by VTAM for CNOS processing and exists in the VTAM default log mode table. Because *SNASVCMG* is reserved for use by VTAM, do not enter it as a mode name in the CDB. If you have decided to set up a separate mode table for Db2, you can, if you choose, copy the *SNASVCMG* mode entry into your Db2 mode table, or just use it as it exists in the *ISTINCLM* mode table.
- *IBMRDB* is a recommended mode entry because it is used as a default for DRDA access whenever you do not explicitly assign a mode to a session. It does *not* exist in the default table; to use it as a default you must add it to your mode table.

### **Related concepts**

#### CNOS processing in Db2

The distributed data facility of Db2 can request to alter the number of sessions with another system for a specific VTAM logon mode. This automatic process is called *change number of sessions* (CNOS).

### **Related information**

User-defined tables and data filter (SNA Resource Definition Reference)

#### Sample mode entries

The sample mode entries for *IBMRDB* contain some options that are necessary for dependent LUs to request VTAM sessions.

The following options are necessary for dependent LUs to request VTAM sessions:

- *COMPROT*
- *PRIPROT*
- *TSPROF*
- *SECPROT*
- *FMFPROF*
- *PSERVIC*
- *TYPE*



The samples in the figure below work for both dependent and independent LUs. However, if you have no dependent LUs, it is not necessary to re-assemble your existing mode table with the above options. For your convenience, a sample MODEENT is included in data set DSN8VTAM, in SDSNSAMP.

The ENCR option is ignored by LU 6.2 and is thus not included in the Db2 samples.

```

DB2MODES  MODETAB
IBMRDB    MODEENT LOGMODE=IBMRDB,      DB2 DEFAULT MODE FOR APP-DIR ACC  X
          TYPE=0,                      NEGOTIABLE BIND                   X
          SSNDPAC=X'02',                SECONDARY SEND PACING COUNT       X
          SRCVPAC=X'00',                SECONDARY RECEIVE PACING COUNT   X
          RUSIZES=X'8989',              RUSIZES IN-4096 OUT-4096        X
          FMPROF=X'13',                 LU6.2 FM PROFILE                 X
          TSPROF=X'07',                 LU6.2 TS PROFILE                 X
          PRIPROT=X'B0',                 LU6.2 PRIMARY PROTOCOLS         X
          SECPROT=X'B0',                 LU6.2 SECONDARY PROTOCOLS       X
          COMPROT=X'50A5',              LU6.2 COMMON PROTOCOLS         X
          PSERVIC=X'0602000000000000122F00' LU6.2 LU TYPE
MODEEND
END

```

Figure 128. Sample mode entries

### MODEENT options

When you define your Db2 subsystem to VTAM, you can specify mode values. As you choose these values, be aware that partner systems can have different values. VTAM negotiates different values to limits that are acceptable to both systems when the session is established for the mode.

The options that are used in the MODEENT macro have the following meanings.

#### **name**

The *name* option (IBMDB2LM and IBMRDB in the examples) is optional and has no function in the specification of a logon mode table.

#### **LOGMODE**

Specifies the logon mode name that is to be used as a key for the session options in this table entry. This logon mode name corresponds to mode name columns in the CDB.

#### **TYPE**

TYPE=0 indicates that Db2 is using a negotiable BIND, which is required for communicating with dependent LUs.

#### **SRCVPAC**

Specifies the secondary receive pacing count. The Db2 suggested value is X'00'.

#### **SSNDPAC**

Specifies the secondary send pacing count. The Db2 suggested value is any nonzero number. Do not use 0; this turns off pacing, which can result in problems with IOBUF storage.

#### **RUSIZES**

Specifies the maximum length of data in bytes that can be sent and received in one *request/response unit* (RU). It is read as two numbers, each having two hexadecimal digits. The first number is for the send amount. The second number is for the receive amount. The suggested value of X'8989' means that VTAM sends a maximum of 4096 bytes ( $8 \times 2^9$ ) across at one time, but there is no limit to how much total information can be sent.

#### **FMPROF**

This constant specifies the function management profile that is required for LU 6.2.

#### **TSPROF**

This constant specifies the transmission services profile that is required for LU 6.2.

#### **PRIPROT**

This constant specifies the primary LU protocols that are used in LU 6.2.

#### **SECPROT**

This constant specifies the secondary LU protocols that are used in LU 6.2.

#### **COMPROT**

This constant specifies the common LU protocols that are used in LU 6.2.

## PSERVIC

This constant specifies this LU as an LU type 6.2.

Some of the above options can have a profound effect on performance because of their impact on pacing.

The ENCR option is not included in the sample above because it is ignored by LU 6.2.

## Related concepts

Session-level pacing

*Session-level pacing* is the mechanism by which the receiver of data (Db2, in this case) can control the pace at which the sender sends data (in the form of RUs).

## Populating the communications database for use with VTAM

If you plan to use Db2 only as a server, you do not need to populate the CDB; default values are used. However, if you intend for Db2 to act as a requester, you need to insert one row for each remote system into SYSIBM.LOCATIONS and SYSIBM.LUNAMES.

## About this task

For example, Spiffy's USIBMSTODB21 subsystem works as a server for many Windows requesters. It is not necessary for Spiffy to register all those requesters in the Db2 CDB.

You do not need to populate table SYSIBM.LULIST unless Db2 is acting as a requester of data that resides in a data sharing group.

After you populate these tables, you can write queries that access data at a remote system.

## Procedure

- Add rows to the SYSIBM.LOCATIONS table.

When you issue an SQL CONNECT statement, the LOCATION column of the SYSIBM.LOCATIONS table correlates the location name (or DRDA RDBNAM) with the VTAM LU name. If necessary, the location name is also correlated with the transaction program names (TPNs). The following SYSIBM.LOCATIONS table columns relate to VTAM:

### **DBALIAS VARCHAR(128) NOT NULL**

The name that is associated with the server. This name is used to access a remote database server. If DBALIAS is blank, the location name is used to access the remote database server. This column does not change database object names that are sent to the remote site using a location qualifier. Use the DBALIAS column to access data at two or more different remote locations when those remote locations have the same name. The LOCATION specifies where the database is in the network, and the DBALIAS is used to access the database server. This column does not change database object names that are executed in the application using the LOCATION. All fully qualified table names must reference the server's LOCATION name or one of its server LOCATION alias names, otherwise the SQL statement will fail because the table does not exist.

### **LOCATION CHAR(16)**

The unique network location name, or DRDA RDBNAM, assigned to a system, remote or local. You must provide location names for any systems that you request data from. This column is the primary key for this table. If the remote LU exists in the same VTAM domain, specify the APPL name, not the ACBNAME. DBALIAS can override this name.

### **LINKNAME CHAR(8)**

Identifies the VTAM attributes associated with this location. For each LINKNAME specified, you must have a row in SYSIBM.LUNAMES whose LUNAME matches the value specified in this column. Because this table is used for outbound requests, you must provide an LUNAME or your requests fail. Do not enter blanks in this column.

### **TPN VARCHAR(64)**

This column is used to enter a transaction program name (TPN) for SNA conversations with non-Db2 systems. You only need to use this column if you are sending or receiving SQL requests from systems using non-default TPNs.

For example, Spiffy's USIBMSTODB21 location wants a LOCATIONS table that looks like the following table.

Table 133. Spiffy's LOCATIONS table

LOCATION	LINKNAME	TPN
USIBMSTODB21	LUDB21	
USIBMSTODB22	LUDB22	
USIBMSTOSQL1	LUSQLDS	TPNSQLDS2
USIBMSTOSQL2	LUSQLDS	TPNSQLDS1

To add the second row, Spiffy can issue the following statement:

```
INSERT INTO SYSIBM.LOCATIONS (LOCATION, LINKNAME)
VALUES ('USIBMSTODB22', 'LUDB22');
```

**Tip:** No row is needed for the local Db2 in the LUNAMES and LOCATIONS tables. For example, Spiffy's USIBMSTODB21 subsystem does not require a row that shows its own LU name and location name. However, for convenience, Spiffy decides to populate one LUNAMES table and one LOCATIONS table and to duplicate them entirely at each location. As a result, each table contains a row for its own LU name or location name.

- Insert rows into the SYSIBM.LUNAMES table.

The LUNAMES table defines the security and mode requirements for conversations with other systems. Decisions about how to populate this table depend on how you intend to use Db2.

- If you use this system only as a server, Db2 can use a blank in the LUNAME column as a default. Db2 uses the values in the default row as defaults for LUs that are not explicitly defined in LUNAMES. If you do not have a row with a blank in the LUNAME column, Db2 rejects client connections that do not explicitly state a valid LUNAME. The DSNTIJSJG installation job creates the default row in table SYSIBM.LUNAMES.
- If this Db2 requests data from other systems, you need to provide LU names for those systems. If the remote LU exists in the same VTAM domain, specify the APPL name, not the ACBNAME.

The LUNAMES table has the following columns:

#### **LUNAME CHAR(8)**

The LU name of the remote system. The default of 8 blanks indicates that this row is used for serving the requests of any system that is not specifically listed in the LUNAMES table. For example, because USIBMSTODB21 acts strictly as a server for many Windows requesters, Spiffy leaves the LUNAME column blank for those requesters and uses default values for the entire row.

However, you must provide LU names for any remote system that uses different values from the defaults.

#### **SYSMODENAME CHAR(8)**

This column is ignored for DRDA access conversations.

#### **SECURITY\_IN CHAR(1)**

Defines the security options that are accepted by this Db2 subsystem when an SNA client connects to Db2. The default, A, means that an incoming connection request is accepted if it includes any of these:

- A user ID
- A user ID and password
- A user ID and RACF PassTicket
- A Kerberos security ticket.

### SECURITY\_OUT CHAR(1)

Defines the security option that is used when local Db2 SQL applications connect to any remote server associated with this LUNAME. The default, A, means that outgoing connection requests contain an authorization ID without a password.

### ENCRYPTPSWDS CHAR(1)

For now, Spiffy uses a blank to indicate no encryption of passwords.

### MODESELECT CHAR(1)

Determines whether to use the default mode or to choose a mode from the MODESELECT table. Spiffy uses a blank to use the default IBMRDB mode for conversations using DRDA access.

### USERNAMES CHAR(1)

This column is used for inbound and outbound requests to control authorization ID translation.

Spiffy uses a blank to indicate that no authorization IDs are translated, and also that no passwords are sent to the server.

### GENERIC CHAR(1)

A Y in this column indicates that a generic LU name is to be used for CNOS processing and SQL requests sent to the partner LU. A value of N or a blank indicates that the name specified in the LUNAME column is to be used.

For example, Spiffy's USIBMSTODB21 location wants a LUNAMES table that looks like the following table.

Table 134. Spiffy's SYSIBM.LUNAMES table. The row of blanks is a default row that Spiffy intends to use for Windows requesters in its initial testing.

LUNAME	SYSMODENAME	USERSECURITY "1" on page 898	ENCRYPTPSWDS	MODESELECT	USERNAMES
LUDB21					
LUDB22					
LUSQLDS					
(blanks)					

#### Note:

1. USERSECURITY refers to SECURITY\_IN AND SECURITY\_OUT

Spiffy can use an SQL INSERT statement to add the appropriate rows. For example, they add the LU name for USIBMSTODB22 with this statement:

```
INSERT INTO SYSIBM.LUNAMES (LUNAME)
VALUES ('LUDB22');
```

- Add rows in the SYSIBM.USERNAMES table.  
The SYSIBM.USERNAMES table contains information that is needed for outbound and inbound ID translation and also for "come from" checking. For more information, see [SYSIBM.USERNAMES](#) columns (Managing Security).

#### Related concepts

[Support for executing long SQL statements in a distributed environment \(Db2 Application programming and SQL\)](#)

[SYSIBM.LULIST \(Db2 Data Sharing Planning and Administration\)](#)

[SYSIBM.LUNAMES \(Db2 Data Sharing Planning and Administration\)](#)

#### Related tasks

[Granting privileges to remote users \(Managing Security\)](#)

[Associating applications with modes](#)

As you tune your system, you can assign certain applications, such as a high-priority job, to the mode that is best suited for that job.

### **Related reference**

[SYSIBM.LUNAMES columns \(Managing Security\)](#)

[SYSIBM.USERNAMES columns \(Managing Security\)](#)

## **Starting VTAM to use Db2**

You do not need to code any special VTAM start options to use Db2, but you can tailor start option values for Db2 communications.

### **About this task**

You must start VTAM before starting DDF.

Two VTAM libraries must contain definitions for Db2:

- SYS1.VTAMLST contains the definitions that define Db2 as a VTAM application.
- SYS1.VTAMLIB contains mode table definitions used by DDF. This must be an APF-authorized library, or in a concatenation of APF-authorized libraries.

### **Procedure**

You can use the following VTAM command, assuming that the member DB2APPLS contains definitions for Db2:

```
V NET,ACT,ID=DB2APPLS
```

### **Related concepts**

[The MODEENT macro](#)

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

### **Related tasks**

[Starting the Domain \(SNA Network Implementation Guide\)](#)

[Defining the Db2 subsystem to VTAM](#)

You need to use an APPL definition statement and a MODEENT macro to define the Db2 subsystem to VTAM. Samples of both the APPL and MODEENT macros are in the DSN8VTAM sample data set.

### **Related reference**

[VTAM Start Options \(SNA Resource Definition Reference\)](#)

## **Tuning the VTAM system**

As you begin testing with the Db2 distributed data facility, you probably need to modify VTAM options and CDB values to handle certain potential problems.

### **About this task**

You should consult a VTAM communications expert to tune your network. Consider the following tasks when tuning VTAM for DDF.

- Controlling buffer storage

By sending large amounts of data through the network, Db2 can cause problems with your VTAM I/O buffer pool.

- Controlling pacing

You probably need to tune your pacing options if your VTAM buffers become overloaded with data that is sent to this local Db2.

- Modifying default session limits

Consider modifying session limits if you have problems obtaining enough sessions to handle your distributed workload efficiently.

- Modifying class of service

Specifying a class of service can help you assign priorities to your network applications.

- Associating applications with modes

Tuning the system can require that you add new modes to your log mode table so that there is a greater variety of classes of service available for your sessions. This variety allows you to have more flexibility in tuning the system for specific uses. This topic tells you how to associate specific sessions with modes.

Before you begin tuning the network, you must understand the relationship between VTAM options and associated values in the CDB for Db2. The table below summarizes the relationship.

Table 135. Relationship between the CDB for Db2 and VTAM macros

Macro Name	Option	CDB table.column	Relationship
APPL	<i>name</i>	LOCATIONS.LINKNAME LUNAMES.LUNAME LUMODES.LUNAME MODESELECT.LUNAME USERNAMES.LINKNAME LULIST.LINKNAME	The LU name used in VTAM communication. This name maps 1:1 to the system's location name in LOCATIONS.
APPL	DSESLIM	LUMODES.CONVLIMIT	CONVLIMIT overrides session limits specified with DSESLIM. Session limit values are used in CNOS processing.
MODEENT	LOGMODE	LUMODES.MODENAME	LUMODES creates session limits for <i>specific</i> LU name and mode name combinations.
MODEENT	LOGMODE	MODESELECT.MODENAME	MODESELECT maps authorization IDs and plans to specific modes.

### Related tasks

[Improving performance for applications that access distributed data \(Db2 Performance\)](#)

### Controlling buffer storage

VTAM uses buffer pools for control blocks, network traffic data, and channel programs. A shortage of buffer pools can have an adverse effect on VTAM CPU time, storage consumption, and the ability to serve Db2 requests.

### Procedure

To control buffer storage:

- Monitor VTAM buffer pools by using one of the following methods:
  - The VTAM command DISPLAY NET,BFRUSE
  - A VTAM trace, obtained by entering the following z/OS MODIFY command:

```
F procname,TRACE,TYPE=SMS,ID=VTAMBUF
```

*Procname* in the command is the VTAM start procedure name. The data is collected by the generalized trace facility (GTF).

- Use any of the following methods to prevent shortages of these VTAM buffers (IOBUFs):

### **Increase the number of IOBUF buffers**

The IOBUF pool definition is one of the VTAM start options. You can enter the IOBUF option from the z/OS console, or you can include it at VTAM startup in SYS1.VTAMLST in member ATCSTRxx.

Tuning the IOBUF pool encompasses both base allocation and dynamic expansion values. At installation, you can specify a base allocation for the IOBUF pool (in number of buffers) and a dynamic expansion (in number of buffers). When storage runs short in the buffer pool, VTAM temporarily expands the IOBUF pool by the dynamic expansion value, based on a trigger which you can also specify in VTAM definitions. Recommendation: Set a maximum size for the IOBUF pool size using the *xpanlim* start option for the buffer pool. If you turn off pacing accidentally, *xpanlim* prevents Db2 from causing VTAM to grab unlimited amounts of storage.

### **Decrease the session level pacing count**

Pacing is vital for controlling the potentially large amounts of data that are transferred around the network.

### **Decrease the number of concurrent conversations**

You can reduce the number of concurrent conversations by reducing the number of sessions.

### **Decrease the request unit (RU) size**

The RUSIZES option is part of the mode entry statement.

Because reducing the number of sessions and the RUSIZES value can adversely affect performance, you should first consider increasing IOBUF buffers and decreasing the session pacing count.

### **Related concepts**

#### Session-level pacing

*Session-level pacing* is the mechanism by which the receiver of data (Db2, in this case) can control the pace at which the sender sends data (in the form of RUs).

#### The MODEENT macro

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

### **Related tasks**

#### Calculating VTAM I/O buffer pool (IOBUF) storage

You can estimate VTAM buffer pool storage when you use the distributed data facility of Db2. Every *path information unit* (PIU) that enters or leaves VTAM resides in one or more IOBUF buffers.

### **Related reference**

Buffer pools (SNA Network Implementation Guide)

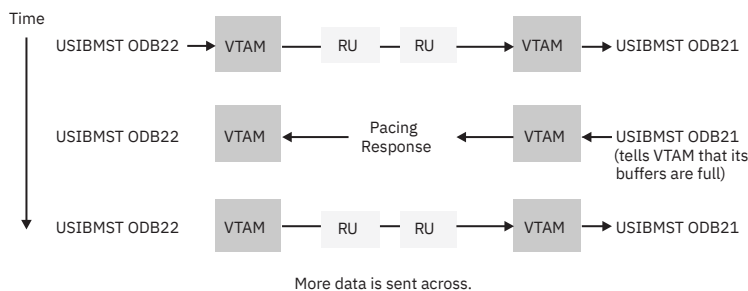
### ***Session-level pacing***

*Session-level pacing* is the mechanism by which the receiver of data (Db2, in this case) can control the pace at which the sender sends data (in the form of RUs).

The pacing size is the number of RUs that VTAM sends across the line at one time, and you can set that value by using the VPACING option of the VTAM APPL definition statement. You set the RU size in the MODEENT macro. The receiving VTAM stores these RUs in its IOBUF pool; it uses pacing so that its buffers do not become flooded with data.

The pacing process works as shown in the following figure. The system at the sending side (assume it is USIBMSTODB22) passes data to its VTAM system. VTAM formats the data into RUs and sends those RUs across the network. If, for example, the pacing size is 2, then it sends two RUs. A 29-byte network header is sent with each RU.

After the USIBMSTODB22 VTAM system sends the specified number of RUs, it does not send any more data on this session until it receives a pacing response from the VTAM system at USIBMSTODB21. The USIBMSTODB21 VTAM system does not send a response until VTAM transfers the data into the Db2 buffers.



Although it is generally true that the receiving system can control inbound pacing, both communicating systems negotiate final pacing values.

### Related concepts

#### The APPL statement

A VTAM APPL definition statement defines the VTAM options for the Db2 subsystem and includes it in a major node.

#### The MODEENT macro

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

### Related reference

[Session-level pacing \(SNA Network Implementation Guide\)](#)

#### *Recommendation for APPL pacing option*

The VPACING option of the APPL statement determines the maximum number of RUs that another LU can send, on a session, to this LU. When the maximum number of RUs is sent, the other LU waits to receive a pacing response.

Specify a nonzero value for this option unless you want to turn off all pacing for all sessions that are affected by this option.

**Recommendation:** Start with a value of 2 for both communicating systems. This pacing size is the same in both directions for all modes.

The VPACING value is used with the RUSIZES option of the MODEENT macro to control the pacing window size. Thus, if VPACING is 2 and RUSIZES is 4-KB (X'8989'), then about  $2 \times 4\text{KB} = 8\text{KB}$  are sent before waiting to receive a pacing response. You should verify that your VTAM buffer pools are large enough to accommodate the chosen pacing and RU sizes.

### Related tasks

#### Calculating VTAM I/O buffer pool (IOBUF) storage

You can estimate VTAM buffer pool storage when you use the distributed data facility of Db2. Every *path information unit* (PIU) that enters or leaves VTAM resides in one or more IOBUF buffers.

#### *Recommendation for MODEENT pacing options*

The MODEENT macro contains several pacing options.

#### **PSNDPAC**

This does not apply to Db2; therefore, you can ignore this option.

#### **SSNDPAC**

This option is really a flag that you set to either 0 (off) or nonzero (on). When 0, outbound pacing for sessions is disabled, which can lead to severe problems with IOBUF storage.

**Recommendation:** Specify a nonzero value for this option.

#### **SRCVPAC**

If 0, which is the recommended value, the VPACING option of the VTAM APPL statement controls both the send and receive pacing for all sessions in all modes. A value of 0 makes it easier for you to predict pacing results and makes it easier to maintain your pacing definitions.



If nonzero, VPACING controls pacing in one direction, and SRCVPAC controls it in another. LU 6.2 protocols make it difficult to predict which option is in control at any given time.

### **Related concepts**

The MODEENT macro

A VTAM link between two systems is a *session*. For every session, a defined set of characteristics called a *mode* must exist in a VTAM table called a *log mode table*.

### **Modifying class of service**

You can define the transmission priority and paths between systems with entries in a class of service (COS) table.

### **About this task**

Each entry in the table is associated with a list of routes to be used with a particular class. For example, you might want to place interactive sessions on a faster route than a batch job.

### **Procedure**

Use the COS option of the MODEENT macro.

When you specify a name of a COS entry in the mode description, you select the list of routes that you want to be used for the session. When VTAM establishes the session, it chooses the first available route in the list of routes that you tell it to use for that class.

If you do not specify a COS name, the mode gets the default list of routes from VTAM.

### **Associating applications with modes**

As you tune your system, you can assign certain applications, such as a high-priority job, to the mode that is best suited for that job.

### **About this task**

#### **GUIP**

You can also use a specific mode assignment for an application that uses many conversations. You can assign such an application to a mode that allows more conversations than the VTAM DSESLIM value you entered in the APPL statement.

To associate a specific mode with a particular session, you need to update or insert rows into three tables in the CDB: LUNAMES, LUMODES, and MODESELECT.

#### **GUIP**

### **Related concepts**

When updates to CDB values take effect for VTAM (SNA) connections

Any table in the CDB can be updated while DDF is active.

*Update LUNAMES to associate modes with LU names*

The LUNAMES table associates a mode with each remote system that the local subsystem can send a query to.

### **About this task**

#### **GUIP**

You can specify the following type of connections in this table:

### **SQL processing conversations**

For DRDA access, an SQL processing conversation is established. The mode name for SQL processing conversations is determined by the MODESELECT table of the CDB. If the MODESELECT column of

LUNAMES table is blank or contains N, then the default mode (IBMRDB) is used. If it contains a Y, then MODESELECT is searched.

#### GUPI

### Related tasks

[Populating the communications database for use with TCP/IP](#)

If you plan to use Db2 only as a server, you do not need to populate the CDB.

*Update SYSIBM.LUMODES with conversation limits*

Use SYSIBM.LUMODES to provide VTAM with conversation limits for specific LU name and mode name combinations.

### About this task

#### GUPI

Populating SYSIBM.LUMODES is optional; if you do not specify mode names in this table, the VTAM defaults are used. The table is unlike the DSESLIM option of the VTAM APPL definition statement, which provides the default session limits for *all* LU name and mode name combinations. The primary key for this table is formed by the LU name and mode name combination. Only one entry with the same LU name and mode name is allowed.

LUMODES is accessed for negotiation of session limits with a remote Db2 for a specific mode. This negotiation is called *change number of sessions* (CNOS).

### Example

For example, suppose Spiffy wants to allocate 75 sessions instead of 50 (the value in DSESLIM) for conversations to USIBMSTODB22, using the mode named LOC2MODE. They can use the INSERT statement below to update the value in the CONVLIMIT column to 75. The new session limit takes effect the next time DDF is started, or in the initial connection to this LU for this mode.

```
INSERT INTO SYSIBM.LUMODES VALUES ('LUDB22', 'LOC2MODE', 75, 'N');
```

CNOS processing negotiates a value that is the lesser of the number of sessions available at either system for that mode. Therefore, USIBMSTODB22 must also increase its CONVLIMIT value to at least 75.

See [“CNOS processing in Db2” on page 908](#) for an example of how CNOS processing works.

#### **Columns of the LUMODES table:**

##### **LUNAME CHAR(8)**

Again, this is the LU name of the other system. This column is a foreign key of the LUNAMES table; thus, all LU names defined in this table must be defined in LUNAMES. When you delete an LU name from the LUNAMES table, all associated rows in LUMODES are deleted.

##### **MODENAME CHAR(8)**

The name of the logon mode description in the VTAM logon mode table that VTAM uses when creating a conversation to support the request from the local Db2 for data from another system. The mode named here must exist in the mode table used by Db2 before a conversation can be created between USIBMSTODB21 and USIBMSTODB22.

##### **CONVLIMIT SMALLINT**

The maximum number of conversations to be concurrently active between this Db2 subsystem and the other system for this mode. This number overrides the number in the DSESLIM option of the VTAM APPL definition statement during CNOS processing..

#### GUPI

### Related concepts

[CNOS processing in Db2](#)

The distributed data facility of Db2 can request to alter the number of sessions with another system for a specific VTAM logon mode. This automatic process is called *change number of sessions* (CNOS).

*Update SYSIBM.MODESELECT to associate plans with modes*

SYSIBM.MODESELECT correlates authorization IDs and plan names with mode names. The primary key for this table is the combination of AUTHID, LUNAME, and PLANNAME.

## About this task



Only one entry with the same AUTHID, LUNAME, and PLANNAME is allowed.

Use this table to make sure that certain authorization IDs using certain plans always have a predefined class of service suited for that operation. For example, the USIBMSTODB21 location might want to work with USIBMSTODB22 to set up a high performance mode for DBADM to run queries to USIBMSTODB22. After the following statement is committed, all subsequent threads to USIBMSTODB22 use mode DB2MODE1 to process SQL processing conversations:

```
INSERT INTO SYSIBM.MODESELECT VALUES ('DBADM', ' ', 'LUDB22', 'DB2MODE1');
```

Populating this table is optional. If the remaining columns are blank for any given LU name, then the mode name applies to all authorization IDs for all PLANNAMEs accessing the given LU name.

### Columns of the MODESELECT table:

#### AUTHID CHAR(8)

The authorization ID of the request for data from another system. A blank AUTHID indicates that the specified mode name applies to all authorization IDs. Blank is the default.

#### PLANNAME CHAR(8)

The plan name associated with the request for data from another system. A blank plan name indicates that the specified mode name applies to all plan names. Blank is the default.

#### LUNAME CHAR(8)

The LU name to which the specific mode name applies. This column is a foreign key of the LUNAMES table; therefore, all LU names defined in this table must be defined in LUNAMES.

#### MODENAME CHAR(8)

The name of the logon mode description in the VTAM logon mode table that is used when creating a conversation to support the request for data from another system. If this column is blank, the default mode (IBMDB2LM or IBMRDB) is used.

### How an SQL processing conversation mode is chosen:

The MODESELECT table of the CDB is used to choose a mode for an SQL processing conversation (if the MODESELECT column of the LUNAMES table contains Y for this LU name). The table below shows the search order of the MODESELECT table.

Table 136. Precedence search order for MODESELECT table of CDB

AUTHID	PLANNAME	Result
Name	Name	The MODENAME applies to the named AUTHID for the named PLANNAME accessing the named LU.
Name	Blank	The MODENAME applies to the named AUTHID for all PLANNAMEs accessing the named LU.
Blank	Name	The MODENAME applies to all AUTHIDs for the named PLANNAME accessing the named LU.
Blank	Blank	The MODENAME applies to all AUTHIDs for all PLANNAMEs accessing the named LU.

If the MODESELECT column of the LUNAMES table contains Y for a particular LU name and no row is found for that LU name in the MODESELECT table, then you receive a negative SQL return code when trying to access the system at that LU.

**Plan name for remote bind operations:** If you want to specify a particular mode for remote bind operations, use the plan name DSNBIND in MODESELECT.



### ***When updates to CDB values take effect for VTAM (SNA) connections***

Any table in the CDB can be updated while DDF is active.

The changes take effect as follows:

- Updates to LUMODES take effect the next time DDF is started, or on the initial session to a given LUMODE combination.
- Updates to LUNAMES, LOCATIONS, and LULIST take effect as follows:
  - If DDF has not yet tried to communicate with a particular remote location, rows added to LUNAMES and LOCATIONS take effect when DDF attempts to communicate with that location.
  - If DDF has already attempted communication with a particular location, rows added to LUNAMES and LOCATIONS take effect the next time DDF is started.
- Updates to USERNAMES and MODESELECT take effect at the next thread access.
- Deletion of rows from any CDB table takes effect the next time DDF is started.

In all cases, existing conversations continue to operate as the table specified before the update.

**Recommendation:** If you are switching from TCP/IP to VTAM connections, stop and start DDF after you modify the CDB tables.

**Important:** The process of modifying the CDB, particularly MODESELECT and USERNAMES, can interfere with DDF access to the tables. This could potentially cause deadlocks and timeouts, which cause the attempted access to the remote system to fail.

### ***Calculating session limits***

You can calculate session limit values for DRDA access.

### **About this task**

You might have to derive a precise figure for your session limits (DSESLIM). For example, if you specify a very large number for your session limits and you are running short of space, it might help to calculate a number closer to what you actually need.

### **Procedure**

For DRDA access, determine the maximum number of concurrently active applications that use the mode to and from the remote system.

### **Example**

For example, suppose location A has a maximum of 3 DRDA access applications that can run concurrently on Mode1 to other locations. Also suppose that a maximum of 10 DRDA access applications can be incoming to location A on Mode1. In this case, Mode1 should support 13 sessions for DRDA access applications.

## Calculating VTAM I/O buffer pool (IOBUF) storage

You can estimate VTAM buffer pool storage when you use the distributed data facility of Db2. Every *path information unit* (PIU) that enters or leaves VTAM resides in one or more IOBUF buffers.

### About this task

A PIU is composed of a 26-byte transmission header, a 3-byte request/response header, and the request/response unit (RU) that contains VTAM application data. You define the length of the RU in a mode entry, using the RUSIZES option.

### Procedure

To calculate the maximum number of buffers that are required for the local Db2 subsystem:

1. Calculate the number of buffers that each PIU occupies, and call it PIUBUF.

$$\text{PIUBUF} = \text{CEILING}((29 + \text{RUSIZE}) / \text{BUFSIZE})$$

RUSIZE is the length of the RU in bytes. It is assumed to be the same for both session directions. BUFSIZE is the value you specified in the IOBUF pool definition.

Assume you have a buffer size of 441 bytes, and an RUSIZE of 4096. With these values, PIUBUF would be 10  $((29+4096) / 441, \text{rounded up})$ .

For channel-to-channel (CTC) and NCP connections, you need to be concerned with the VTAM MAXBFRU value. For CTC connections, MAXBFRU is the number of 4KB buffers allocated to hold the PIUs sent over the channel. If your RU size is 4096 and you allow 29 bytes for the header, then you need to allocate at least 2 4KB buffers. Thus, you need a MAXBFRU value of at least 2.

When you route data through NCP, MAXBFRU is the number of VTAM IOBUF buffers allocated to hold the PIUs sent to the NCP, which means MAXBFRU must be at least as large as PIUBUF.

2. Calculate the maximum number of IOBUF buffers used by a session, and call it SESSBUF.

$$\text{SESSBUF} = \text{PACECNT} \times \text{PIUBUF}$$

PACECNT stands for pacing count. For this example, assume that pacing is the same in both directions, and it is the same for all modes.

If pacing is set to 2, then SESSBUF is 20.

3. Calculate the maximum number of sessions that can be active for all modes to all systems and call it SESCNT. Calculate the maximum for each mode, then add those results to get SESCNT.
4. Calculate the maximum number of VTAM buffers used by Db2, and call this DB2BUF.

The formula for DB2BUF is based on a worst case scenario, because it assumes that all sessions are used by concurrent conversations.

$$\text{DB2BUF} = \text{SESCNT} \times \text{SESSBUF}$$

If you assume that the maximum number of sessions that can be active is 50 (SESCNT), then 1000 is the number of IOBUF entries required by Db2 in a worst case scenario.

5. Calculate actual VTAM buffer storage consumption used by Db2, and call it STORAGE.

$$\text{STORAGE} = \text{DB2BUF} \times (\text{BUFSIZE} + 71)$$

Each buffer includes 71 bytes for VTAM internal headers.

So, to continue the above example, an upper value of real storage is estimated as follows:

$$1000 \times (441 + 71) = 500\text{KB}$$

### Related concepts

[Session-level pacing](#)

*Session-level pacing* is the mechanism by which the receiver of data (Db2, in this case) can control the pace at which the sender sends data (in the form of RUs).

### Definitions for channel-connected Db2 subsystems

When determining your channel-to-channel definitions, remember that MAXBFRU must be large enough to handle the largest PIU.

### NCP-connected Db2 subsystems

The Advanced Communications Facility/Network Control Program (ACF/NCP) is a product that you can use to generate a network control program load module. The network control program load module is loaded from the host into a communications controller.

### **Related tasks**

#### Calculating session limits

You can calculate session limit values for DRDA access.

### **CNOS processing in Db2**

The distributed data facility of Db2 can request to alter the number of sessions with another system for a specific VTAM logon mode. This automatic process is called *change number of sessions* (CNOS).

This topic contains a brief overview of the process as it relates to Db2; it should help you understand the messages that CNOS processing generates.

**When sessions are started:** The AUTOSSES option of the VTAM APPL determines whether, and how many, sessions are started at the time CNOS is negotiated. If AUTOSSES is 0, then the sessions are not started at CNOS negotiation time; they are started as they are needed. AUTOSSES should generally not be 0, because then Db2 is not informed if CNOS fails, and you receive a "resource unavailable" SQL code with the first SQL request to the remote system.

If AUTOSSES is not 0, then sessions are started as follows:

- If AUTOSSES is equal to or less than the number of contention winner sessions for a specific Db2 subsystem, then the number of sessions that are automatically started at CNOS negotiation is equal to AUTOSSES.
- If AUTOSSES is greater than the number of contention winner sessions for a specific Db2 subsystem, only the contention winner sessions are automatically started at CNOS negotiation.

Each LU has its own value for the number of contention winner sessions to start. The total number of sessions started on behalf of a CNOS negotiation request is the sum of the sessions started at each site.

**Example:** Suppose the Db2 subsystems at USIBMSTODB21 and USIBMSTODB22 have the following values in their VTAM APPL statements and LUMODES tables:

USIBMST ODB21 APPL values		USIBMST ODB22 APPL values	
DSESLIM	50	DSESLIM	40
DMINWNL	25	DMINWNL	20
DMINWNR	25	DMINWNR	20
AUTOSSES	1	AUTOSSES	1

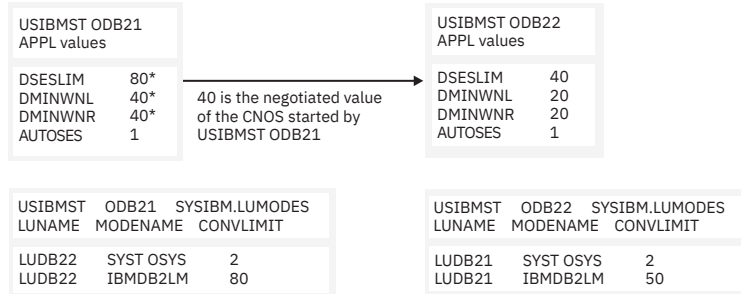
  

USIBMST ODB21 SYSIBM.LUMODES				USIBMST ODB22 SYSIBM.LUMODES			
LUNAME	MODENAME	CONVLIMIT		LUNAME	MODENAME	CONVLIMIT	
LUDB22	SYST OSYS	2		LUDB21	SYST OSYS	2	
LUDB22	IBMDB2LM	80		LUDB21	IBMDB2LM	50	

Assume that USIBMSTODB21's DDF is started first. CNOS processing fails because USIBMSTODB22's DDF has not yet started, and you get a message at the console. When USIBMSTODB22's DDF is started, CNOS processing can begin. The CNOS negotiation process is as follows:

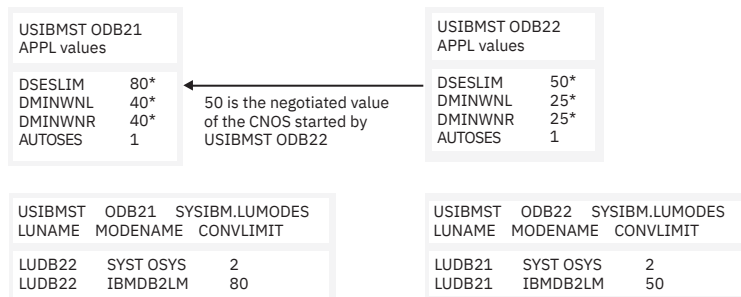
1. USIBMSTODB21 has a DSESLIM value of 50, and a CONVLIMIT value of 80. For this first step in the CNOS negotiation, the CONVLIMIT value overrides the DSESLIM value, so USIBMSTODB21 sends an initial CNOS value of 80 to USIBMSTODB22. During this initial negotiation step, the LUMODES information for USIBMSTODB22 is not yet used. USIBMSTODB22 replies to USIBMSTODB21 with its DSESLIM value of 40, which is less than the initial CNOS value of 80. An initial negotiated value of 0 to 40 sessions is therefore established. A second and final negotiation, as described in step ["2"](#) on

page 909, is then initiated by USIBMSTODB22. The following image shows the result of the CNOS negotiation that was started by USIBMSTODB21. Overridden values are noted with asterisks (\*).



After the number of sessions is negotiated, both systems begin starting the number of sessions that are specified in their respective AUTOSSES options. VTAM does not start all 40 sessions unless the two AUTOSSES values total up to 40 or greater. Instead, VTAM delays starting the other sessions until they are needed.

- Everything up to this point occurred because USIBMSTODB21 initiated CNOS, resulting in an initial negotiation of 0 to 40 sessions. Now, as shown in the following figure, USIBMSTODB22 initiates a second CNOS negotiation back to USIBMSTODB21 because USIBMSTODB22's LUMODES table has a CNOS limit specified by the CONVLIMIT value of 50. USIBMSTODB21's VTAM sees that Db2 allows up to 80 sessions, so VTAM sends the CNOS reply message back to USIBMSTODB22 with an unchanged value of 80. USIBMSTODB22's CONVLIMIT value of 50 is compared with USIBMSTODB21's overridden value of 80 from the previous CNOS, and a final value of 40 to 50 sessions is negotiated. The following image shows the CNOS negotiation from USIBMSTODB22 to USIBMSTODB21. Overridden values are noted with asterisks (\*).



If the new negotiated value is smaller than the number already started by USIBMSTODB21, VTAM terminates the number of sessions that makes up the difference. If the CONVLIMIT value at USIBMSTODB22 is 20, for example, VTAM terminates 20 sessions on behalf of the request from USIBMSTODB22 because the lowest negotiated value always wins. If a session is currently being used by a conversation, the session is terminated as soon as the conversation is deallocated.

### Related reference

[Managing Sessions \(z/OS Communications Server: SNA Programmer's LU 6.2 Guide\)](#)

## Sample VTAM definitions to connect two Db2 subsystems

Sample VTAM definitions are provided to give you some guidance on setting up your network to connect two Db2 subsystems. The samples are not intended to give you information about all the options.

This set of definitions includes the basic definitions you need to connect two Db2 subsystems. Additional options for channel-to-channel and Network Control Program (NCP) connections are covered as well.

### Basic VTAM definitions

Some basic definitions are required for all VTAM connections.

These definitions are listed below.

```
*****
**          APPL STATEMENT FOR SYSTEM 1          *
*****
```

```

DB1APPL  APPL APPC=YES,           X
          ATNLOSS=ALL,           X
          AUTH=(ACQ),            X
          AUTOSES=1,             X
          DSESLIM=20,            X
          DMINWNL=10,            X
          DMINWNR=10,            X
          PRTCT=DB1PWD,          X
          SECACPT=ALREADYV,      X
          EAS=509,                X
          MODETAB=DB2MODES,      X
          PARSESS=YES,           X
          SRBEXIT=YES,           X
          SYNCLVL=SYNCPT,        X
          VPACING=2

```

```

*****
**      APPL STATEMENT FOR SYSTEM 2      *
*****
DB2APPL  APPL APPC=YES,           X
          ATNLOSS=ALL,           X
          AUTH=(ACQ),            X
          AUTOSES=1,             X
          DSESLIM=20,            X
          DMINWNL=10,            X
          DMINWNR=10,            X
          PRTCT=DB2PWD,          X
          SECACPT=ALREADYV,      X
          EAS=509,                X
          MODETAB=DB2MODES,      X
          PARSESS=YES,           X
          SRBEXIT=YES,           X
          SYNCLVL=SYNCPT,        X
          VPACING=2

```

```

*****
**      LOGMODE TABLE FOR SYSTEM 1 TO SYSTEM 2 CONNECTIONS
*****
DB2MODES MODETAB
*      LU6.2 SERVICES MANAGER BASE MODE FOR APPC/VTAM
*****
SNASVCMG MODEENT LOGMODE=SNASVCMG, X
                FMPROF=X'13',      X
                TSPROF=X'07',      X
                PRIPROT=X'B0',     X
                SECPROT=X'B0',     X
                PSERVIC=X'06020000000000000000300', X
                COMPROT=X'D0B1',   X
                RUSIZES=X'8585',   X
                ENCR=B'0000'
*****

```

```

*****
**      DB2 DEFAULT FOR SYSTEM 1 AND SYSTEM 2 DRDA ACCESS      **
*****
IBMRDB MODEENT LOGMODE=IBMRDB,    X
                TYPE=0,            X
                PSNDPAC=X'00',     X
                SSNDPAC=X'02',     X
                SRCVPAC=X'00',     X
                RUSIZES=X'8989',   X
                FMPROF=X'13', LU6.2 FM PROFILE X
                TSPROF=X'07', LU6.2 TS PROFILE X
                PRIPROT=X'B0', LU6.2 PRIMARY PROTOCOLS X
                SECPROT=X'B0', LU6.2 SECONDARY PROTOCOLS X
                COMPROT=X'50A5', LU6.2 COMMON PROTOCOLS X
                PSERVIC=X'0602000000000000122F00' LU6.2 LU TYPE

```

```

*****
**      ATCSTRTA VTAM START OPTIONS FOR SYSTEM 1, INCLUDES IOBUF
*****
CONFIG=TA, X
SSCPID=53, MAXSUBA=150, HOSTSA=53, X
SSCPNAME=SSCP004, NETID=USIBMSY, X
IOBUF=(328,441,20,,64,48,768)
*****
**      ATCSTRTB VTAM START OPTIONS FOR SYSTEM 2, INCLUDES IOBUF

```



```
*****  
CONFIG=TB, X  
SSCPID=54, MAXSUBA=150, HOSTSA=54, X  
SSCPNAME=SSCP00E, NETID=USIBMSY, X  
IOBUF=(328,441,20,,64,48,768)
```

Figure 129. Basic VTAM definitions

### Related reference

[VTAM Application Program Major Node \(SNA Resource Definition Reference\)](#)

[VTAM Start Options \(SNA Resource Definition Reference\)](#)

[VTAM Logon Mode Table \(SNA Resource Definition Reference\)](#)

### **Definitions for channel-connected Db2 subsystems**

When determining your channel-to-channel definitions, remember that MAXBFRU must be large enough to handle the largest PIU.

Because Db2 is sending 4096 bytes, you need enough 4KB buffers to accept 4096 + 29 bytes (the 29 bytes is for the network header). Thus MAXBFRU must be at least 2 in our example.

In many cases, the Db2 RU size is larger than any other PIUs used on existing CTCs, which can mean you must examine your MAXBFRU values on existing CTC definitions. If the values are too small, you get an SNA X'800A' sense code, indicating that the PIU was truncated during transmission.

```

*****
**          CTC DEFINITIONS FOR SYSTEM 1          *
*****
DB1CTC  VBUILD TYPE=CA          CTC MAJOR NODE DEFINITION
DB1GRPB GROUP LNCTL=CTCA,      CTCA LINE TYPE                      X
MIH=YES,REPLYTO=10.0
DB1CTCL LINE ADDRESS=(500),    CTC ADDRESS FOR THIS LINE        X
DELAY=0,                                           CTC DELAY                  X
MAXBFPU=8,                                         MAX BUFFER USED           X
ISTATUS=ACTIVE  INITIAL STATUS IS ACTIVE
DB1CTCP PU ISTATUS=ACTIVE

*****
**          CTC DEFINITIONS FOR SYSTEM 2          *
*****
DB2CTC  VBUILD TYPE=CA          CTC MAJOR NODE DEFINITION
DB2GRPB GROUP LNCTL=CTCA,      CTCA LINE TYPE                      X
MIH=YES,REPLYTO=10.0
DB2CTCL LINE ADDRESS=(500),    CTC ADDRESS FOR THIS LINE        X
DELAY=0,                                           CTC DELAY                  X
MAXBFPU=8,                                         MAX BUFFER USED           X
ISTATUS=ACTIVE  INITIAL STATUS IS ACTIVE
DB2CTCP PU ISTATUS=ACTIVE

*****
**          PATH - NETWORK ROUTES FOR SYSTEM 1    *
*****
MVSDB2  PATH DESTSA=2,ER1=(2,1),VR1=1,          X
VRPWS10=(2,30),VRPWS11=(2,30),VRPWS12=(2,30)
*****
**          PATH - NETWORK ROUTES FOR SYSTEM 2    *
*****
MVSDB1  PATH DESTSA=1,ER1=(1,1),VR1=1,          X
VRPWS10=(2,30),VRPWS11=(2,30),VRPWS12=(2,30)

*****
**          CDRSC DEFINITIONS FOR SYSTEM 1        *
*****
VBUILD TYPE=CDRSC
DB2APPL CDRSC CDRM=DB2CDRM,ISTATUS=ACTIVE
*****
**          CDRSC DEFINITIONS FOR SYSTEM 2        *
*****
VBUILD TYPE=CDRSC
DB1APPL CDRSC CDRM=DB1CDRM,ISTATUS=ACTIVE

*****
**          CDRM DEFINITIONS FOR SYSTEM 1 AND 2 (SAME DEFINITION USED) *
*****
VBUILD TYPE=CDRM
DB1CDRM CDRM SUBAREA=1,ISTATUS=ACTIVE,CDRSC=OPT
DB2CDRM CDRM SUBAREA=2,ISTATUS=ACTIVE,CDRSC=OPT

*****
**          ATCCONTA - NETWORK CONFIGURATION LIST FOR SYSTEM 1          *
*****
DB1PATH,DB1CTC,DB1RSC,DB1APPLS,DBCDRMS
*****
**          ATCCONTB - NETWORK CONFIGURATION LIST FOR SYSTEM 2          *
*****
DB2PATH,DB2CTC,DB2RSC,DB2APPLS,DBCDRMS

```

Figure 130. Channel-to-channel (CTC) definitions

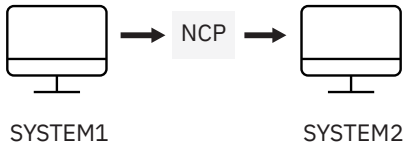
### NCP-connected Db2 subsystems

The Advanced Communications Facility/Network Control Program (ACF/NCP) is a product that you can use to generate a network control program load module. The network control program load module is loaded from the host into a communications controller.

The network control program controls the lines and devices attached to it. It transfers data to and from the devices and handles any errors that occur, including retries after line errors.

A communications controller can be locally attached to a host via a channel, or it can be link-attached to another communications controller that is channel-attached.

Our sample definitions are used for the following setup:



When you are defining your NCP connections, remember the following:

- MAXBFRU must be large enough to handle the biggest PIU that is sent to the NCP. In our example, Db2 is sending 4125 bytes per PIU (4096 + a 29-byte network header). Given an IOBUF buffer size of 441 bytes, MAXBFRU must therefore be at least 10 (10 × 441 = 4410, which is greater than 4125).
- The MAXDATA option must also be large enough to handle biggest PIU (RUSIZE + 29 bytes).

If Db2 is using existing NCP definitions, you should make sure your MAXBFRU and MAXDATA options are large enough. If these values are too small, you get an SNA X'800A' sense code, indicating that the PIU was truncated during transmission.

```

*****
*          PCCU SPECIFICATION - FOR SYSTEM 1          *
*****
PCCU1  PCCU  CUADDR=C02,          3745 BLOCK CHANNEL          X
          AUTOSYN=YES,           X
          AUTODMP=NO,            X
          AUTOIPL=NO,            X
          BACKUP=YES,            X
          DELAY=0,               X
          DUMPDS=DUMPDS,         DUMP DATA SET          X
          CDUMPDS=CDUMPDS,       CSP DUMP DATA SET       X
          MDUMPDS=MDUMPDS,       MOSS DUMP DATA SET       X
          INITEST=NO,            NO 3745 INITIAL TESTS AT LOAD TIME X
          MAXDATA=4302,          = BFRS*TRANSFR - 18      X
          OWNER=HOST1,           HOST SUBAREA             X
          SUBAREA=3,             X
          VFYLM=YES
  
```

```

*****
*          PCCU SPECIFICATION - FOR SYSTEM 2          *
*****
PCCU2  PCCU  CUADDR=C02,          3745 BLOCK CHANNEL          X
          AUTOSYN=YES,           X
          AUTODMP=NO,            X
          AUTOIPL=NO,            X
          BACKUP=YES,            X
          DELAY=0,               X
          DUMPDS=DUMPDS,         DUMP DATA SET          X
          CDUMPDS=CDUMPDS,       CSP DUMP DATA SET       X
          MDUMPDS=MDUMPDS,       MOSS DUMP DATA SET       X
          INITEST=NO,            NO 3745 INITIAL TESTS AT LOAD TIME X
          MAXDATA=4302,          = BFRS*TRANSFR - 18      X
          OWNER=HOST2,           HOST SUBAREA             X
          SUBAREA=4,             X
          VFYLM=YES
  
```

```

*****
*          BUILD MACRO SPECIFICATIONS                 *
*****
ACFNCPBD BUILD BFRS=(240),       NCP BUFFER SIZE,# EP BUFFERS X
          BRANCH=1000,           X
          CATRACE=(YES,10),      X
          CSMHDR=27F5C711C3F0405C40C8C4D9405C, X
          CSMHDC=40E3C5E7E3405C5C, X
          CSMMSG=5C5C40E5E3C1D440E2C8E4E3C4D6E6D540, X
          CSMMSGC=6040C8C1E240C2C5C7E4D5405C5C, X
          DIALTO=60,             WAIT 1 MIN FOR AUTOCALL ANSWER X
          DR3270=NO,             NO DYNAMIC RECONFIG       X
          DSABLTO=3.0,           TIME TO DETECT DSR DROP     X
          ENABLTO=2.2,           TIME TO DETECT DSR AFTER ENABLE X
          LOADLIB=NCPLoad,       LIBRARY FOR ACF/NCP LOAD MODULE X
  
```

```

LTRACE=8,          UP TO 8 LINES CONCURRENTLY TRACED X
MAXSSCP=8,        NUMBER OF SSCPS IN SESSION X
MAXSUBA=63,       MUST BE SAME AS IN ATCSTRXX X
MEMSIZE=4M,       AMOUNT OF MEMORY X
MODEL=3745,       3745 MODEL 410 X
NETID=BCR1,       3745 MODEL 410 X
NEWNAME=DDBLCO,   LOAD MODULE NAME X
PUNAME=DDB,       X
NPA=YES,          NPA WILL NOT COLLECT DATA X
OLT=NO,           INCLUDE ONLINE TEST FACILITY-OLTEP X
PRTGEN=NOGEN,     DON'T PRINT ASSEMBLED STATEMENTS X
PWROFF=NO,        X
SLOWDOWN=15,     SLOWDOWN AFTER 15% BUFFERS AVAIL X
SUBAREA=26,       NCP SUBAREA X
TRACE=(YES,10),  10-16 BYTE ADDRESS TRACE ENTRIES X
                   =(4096+51)/BFRS--ROUNDED UP X
TRANSFR=18,      SIZE OF LINE AND SIT TRACE X
TRCPIU=2000,     X
TYPGEN=NCP,      MVS OPERATING SYSTEM X
TYP SYS=MVS,     NCP USAGE TIER - REQUIRED X
USGTIER=5,       X
VERSION=V5R3,    X
XBREAK=NONE

```

```

*****
**
*          SYSCNTRL OPTIONS - REQUIRED BY VTAM          *
**
*****
SYSCNTRL OPTIONS=(ENDCALL,MODE,RCNTRL,RCOND,RECMD,RIMM, X
SESSION,NAKLIM,LNSTAT,SSPAUSE,XMTLMT,BHSASSC,STORDSP) X
*****
HOST2  HOST  BFRPAD=0,          VTAM REQUIREMENT FOR OS X
           INBFRS=18,         INITIAL BUFFERS FOR EACH RECEIVE X
           MAXBFRU=10,        < BASENO IN IOBUF FOR VTAM X
           SUBAREA=4,         = BUFSIZE IN IOBUF FOR VTAM X
           UNITSZ=441
HOST1  HOST  BFRPAD=0,          VTAM REQUIREMENT FOR OS X
           INBFRS=18,         INITIAL BUFFERS FOR EACH RECEIVE X
           MAXBFRU=10,        < BASENO IN IOBUF FOR VTAM X
           SUBAREA=3,         = BUFSIZE IN IOBUF FOR VTAM X
           UNITSZ=441

```

```

*****
*          PATH STATEMENTS          *
*****
PATH DESTSA=3,          SYS1 X
ER4=(3,1),             SYS1
PATH DESTSA=4,          SYS2 X
ER4=(4,1),             SYS2

```

```

*****
*          *
*  HOST 1 CHANNEL ADAPTER          *
*          *
*  LINE ADDR = 0; PHYSICAL POSITION = 5.          *
*****
DDBCA5  GROUP LNCTL=CA,          X
           ISTATUS=INACTIVE      STOP VTAM FROM ACT CHAN LINK
DDBL05  LINE  ADDRESS=0,          1ST CA PHYSICAL POSITION 1 X
           CA=TYPE6,             3745 CHANNEL ADAPTER TYPE X
           CASDL=120,            TIME ALLOWED TO BLOCK INBOUND DATA X
           DELAY=0,              CHAN ATTN DELAY X
           DYNADMP=NONE,         NO EP SUBCHANNELS TO DUMP X
           INBFRS=18,            # BUFS FOR EACH TRANSFER TO HOST X
           NPACOLL=YES,          NPA WILL COLLECT DATA ON CHANNEL X
           TIMEOUT=120           INTERVAL BEFORE CHANNEL DISCONTACT
DDBP05  PU    PUTYPE=5,          INTERMEDIATE SUBAREA FUNCTION X
           TGN=1                 MUST BE 1 FOR PUTYPE5

```

```

*****
*          *
*  HOST 2 CHANNEL ADAPTER          *
*  LINE ADDR = 2; PHYSICAL POSITION = 7.          *
*****

```

DDBCA7	GROUP	LNCTL=CA, STATUS=INACTIVE	ACT CHAN LINK	X
DDBL07	LINE	ADDRESS=2, CA=TYPE6, CASDL=120, DELAY=0, DYNADMP=NONE, INBFRS=18, NPACOLL=YES, TIMEOUT=120	3RD CA PHYSICAL POSITION 3 3745 CHANNEL ADAPTER TYPE TIME ALLOWED TO BLOCK INBOUND DATA CHAN ATTN DELAY NO EP SUBCHANNELS TO DUMP #BUFS FOR EACH TRANSFER TO HOST NPA WILL COLLECT DATA ON CHANNEL INTERVAL BEFORE CHANNEL DISCONTACT	X X X X X X X X
DDBP07	PU	PUTYPE=5, TGN=1	INTERMEDIATE SUBAREA FUNCTION MUST BE 1 FOR PUTYPE5	X

Figure 131. Network control program (NCP) definitions

## Using the change log inventory utility to update the BSDS

The DDF statement of the change log inventory utility can be used to insert or update information that is stored in the bootstrap data set.

### Procedure

Use the options of the DDF statement of the change log inventory utility as follows.

- To update any value, you need to use only the option for that value. To insert new values, you need values for LOCATION, LUNAME, and any other values that you want to specify.

#### Value

##### Option for inserting or updating

##### Location alias

ALIAS *names*

This value is optional. You can add or delete aliases by respecifying the ALIAS names. The new list of names replaces the existing list.

##### Location name

LOCATION=*name*

##### LU name

LUNAME=*name*

##### Generic LU name

GENERIC=*name*

##### Password

PASSWORD=*password*

This value is optional, depending on whether you entered a password in the VTAM APPL statement

##### TCP/IP connection port

PORT=*number*

This value is optional. If you specify a value, it must be nonzero and different from the value of RESPORT. You can delete the port by entering 0.

##### TCP/IP resync port

RESPORT=*number*

This value is optional. If you specify a value, it must be nonzero and different from the value of PORT. You can delete the port by entering 0.

- To delete either a generic LU name, a password, or an alias, use one of these keywords:

#### Value

##### Statement for deleting

##### Generic LU name

NGENERIC

**Password**  
NOPASSWD

**Alias**  
NOALIAS

**Related reference**  
[DSNJU003 \(change log inventory\) \(Db2 Utilities\)](#)

## Installing the Unified Debugger session manager on a z/OS system

The session manager can handle communications between a debug client, such as the debug client of IBM Data Studio, and a Db2 for z/OS data server. The session manager can run on the client on which the Unified Debugger is installed, or on a z/OS system. For better performance when you debug Db2 for z/OS routines, you can install the session manager on a z/OS system.

### Before you begin

Ensure that the session manager file, `db2dbgm.jar`, was installed on the z/OS system during the Db2 for z/OS installation process. It should be in following HFS directory: `/usr/lpp/db2c10/base/lib`.

### About this task

The session manager that you install on a z/OS system is compatible with all currently supported versions of Db2 for z/OS. However, this could change in the future.

### Procedure

To install the session manager on a z/OS system, follow these steps:

1. Create the JCL for a started task that runs the session manager, in a member named `DB2UDSMD` in the system `PROCLIB`. See the comments in the example for the values that you need to change.

**Important:** The started task must be named `DB2UDSMD`.

```
//UDBG3 JOB CLASS=A,  
// MSGCLASS=H,MSGLEVEL=(1,1), REGION=4096K,  
// USER=STDTSKID,PASSWORD=STDTSKPW  
//*-----  
//* This job creates the started task JCL for DB2UDSMD. You can then  
//* launch the Unified Debugger session manager on z/OS with a  
//* START command.  
//* - Change STDTSKID and STDTSKPW to the user ID and password that  
//* are associated with the started task.  
//* The ID that is associated with the started task is defined in  
//* the RACF STARTED class profile DB2UDSMD.**  
//*-----  
//*-----  
//* This step uses IEBUPDTE to write a JCL member into your system  
//* PROCLIB.  
//* - Change SYS1.PROCLIB to the name of your system PROCLIB.  
//*-----  
//WRITEJCL EXEC PGM=IEBUPDTE,PARM=NEW  
//SYSPRINT DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//SYSUT2 DD DISP=SHR,DSN=SYS1.PROCLIB  
//SYSIN DD DATA  
./ ADD NAME=DB2UDSMD  
//DB2UDSMD PROC PORT=4553,TIMEOUT=60  
//*  
//* DB2UDSMD starts the Unified Debugger session manager daemon for  
//* UNIX System Services.  
//* Change the default PORT and TIMEOUT values to valid values  
//* for your z/OS system. You can override these values when  
//* you issue the START command for the DB2UDSMD started task.  
//*  
//* This JCL assumes that no .profile file exists for the user  
//* ID under which the started task runs.  
//*  
//* Environment settings (PATH, CLASSPATH) come from the
```

```

/** file that is specified by the STDENV DD statement.
/** - Change /u/stdtskid/DB2UDSMDenvironment to the path and
/** file name for the environment file.
/** - Change the paths in the STDOUT and STDERR to the appropriate
/** paths for your UNIX System Services installation.
/** Ensure that the user ID under which the started task runs
/** has the privileges to write to STDOUT and STDERR.
/**DB2UDSMD EXEC PGM=BPXBATCH,DYNAMNBR=128,REGION=0M,TIME=1440,
/** PARM='SH date;java com.ibm.db2.psmmgr.Daemon -timeout
/** &TIMEOUT -port &PORT -log /dev/null;date'
/**STDOUT DD PATH='/tmp/DB2UDSMD.stdout',
/** PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
/** PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
/**STDERR DD PATH='/tmp/DB2UDSMD.stdout',
/** PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
/** PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
/**STDENV DD PATH='/u/stdtskid/DB2UDSMDenvironment',
/** PATHOPTS=ORDONLY
/** PATHOPTS=ORDONLY
./ ENDUP
/*

```

2. Define the DB2UDSMD started task to RACF, by customizing and running JCL similar to this example:

```

//UDBG1 JOB ...
/**-----
/** A security administrator runs this job to define the started task
/** for the Unified Debugger session manager to RACF. The job
/** performs these steps:
/** 1. Defines an OMVS segment for the user ID that is associated
/** with the started task. This step is necessary because the
/** started task runs a Java program from OMVS. In the ALTUSER
/** statement:
/** - Change STDTSKID to the user ID that is associated with
/** the started task.
/** - Change /u/stdtskid to the current working directory for
/** the user's process when the started task issues the OMVS
/** command.
/** 2. Adds a profile for the started task, which is named
/** DB2UDSMD.** to the RACF database.
/** In the RDEFINE statement, change STDTSKID to the user ID
/** that is associated with the started task.
/** 3. Activates the started task definition in current memory.
/**-----
//RACFDEF EXEC PGM=IKJEFT01,DYNAMNBR=20
//SYSTSPRT DD SYSOUT=A
//SYSTSIN DD *
ALTUSER STDTSKID OMVS( UID(5) HOME('/u/stdtskid') PROGRAM('/bin/sh') )
RDEFINE STARTED DB2UDSMD.** STDATA(USER(STDTSKID))
SETROPTS RACLIST(STARTED) REFRESH
END

```

3. Create the file in the home directory of the user ID under which the DB2UDSMD started task runs. The file must specify at least the settings for the ENV, PATH, and CLASSPATH parameters.

```

//UDBG2 JOB ...
/**-----
/** Create a file in HFS to hold the environment settings that are used
/** when the Unified Debugger session manager runs as a started task
/** on z/OS.
/**
/** Replace /u/stdtskid with the path that is associated with the
/** home directory of the user ID under which the started task runs.
/** You can use DB2UDSMDenvironment for the environment file name,
/** or change the name to something else. The environment file path
/** and name need to be the same as those specified in the JCL for
/** the session manager started task.
/**-----
//OCOPY EXEC PGM=IKJEFT01,DYNAMNBR=30
//SYSTSPRT DD SYSOUT=*
//HFSOUT DD PATH='/u/stdtskid/DB2UDSMDenvironment',
// PATHOPTS=(OWRONLY,OCREAT,OAPPEND,OTRUNC),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
//INLINE DD *
#-----
# Environment settings for running the Unified Debugger session manager:
#
# The _BPX_BATCH_SPAWN=NO and _BPX_SHAREAS=YES settings
# cause the JVM to run in the same address
# space as the z/OS UNIX shell. Doing this avoids launching two

```

```

# additional address spaces for the started task.
#
# The ENV variable value identifies the file that contains the
# location of the environment variable settings. For the session
# manager, set the location to this file. Replace
# /u/stdtskid/DB2UDSMDenvironment with the path and file name
# for this file.
#
# The PATH variable value identifies the path name where
# the Java runtime environment binaries and the system binaries
# are located.
#
# The CLASSPATH variable value identifies the location of the
# session manager db2dbgm.jar file.
#
# The JAVA_COMPILER=NONE setting disables the JIT compiler.
# The started task runs the session manager only once, so
# disabling the JIT compiler saves space.
#-----
_BPX_BATCH_SPAWN=NO
_BPX_SHAREAS=YES
ENV=/u/stdtskid/DB2UDSMDenvironment
PATH=/usr/lpp/java170/J7.0/bin:/bin
CLASSPATH=/usr/lpp/db2c10/base/lib/db2dbgm.jar
JAVA_COMPILER=NONE
//SYSTSIN DD *
OCOPY INDD(INLINE) OUTDD(HFSOUT) TEXT

```

4. Start the session manager on z/OS to ensure that it was installed correctly, by completing the following steps:

- a) Issue the following command on the z/OS console.

```
START DB2UDSMD,TIMEOUT=1
```

- b) Wait several minutes. During that time, the following events occur:

- i) The started task is launched.
- ii) The session manager program begins.
- iii) The session manager waits for activity for one minute.
- iv) The session manager shuts down.

5. Review the contents of the HFS file that is assigned to STDOUT in the started task JCL.

The following example shows output when the test is successful. The args array contains three keyword and value pairs that indicate:

- The period after which the session manager times out if there is no activity
- The port number of the session manager's network address
- The path name of the file that contains the session manager trace, the timeout, port values, and the location of the log.

```

args[0]: -timeout
args[1]: 1
args[2]: -port
args[3]: 4553
args[4]: -log
args[5]: /dev/null
Code Level: 070418
Debug Session Manager started on IP: 9.30.114.205 - port: 4553
idleTimeOut: 1

```

6. Specify in the IBM Data Studio routine debugger preferences that you want to use the session manager that is on the z/OS system by selecting the option "Run the session manager on each connected server."

The port number must match the port number that you specify when you start the DB2UDSMD started task. If you do not specify a port number when you start DB2UDSMD, the port number that you specify in the routine debugger preferences must match the default port number in the DB2UDSMD started task JCL.



The port number can identify a session manager anywhere on the network. A session manager is associated with a z/OS system or LPAR, and not with a specific Db2 for z/OS subsystem or data sharing group.

#### 7. Optional: Set up additional session managers.

A single debug session can connect to only a single session manager. However, you can follow these steps to connect to another session managers on the same z/OS system.

- a) In the IBM Data Studio routine debugger preferences, specify a different port to which you want the Unified Debugger to connect.
- b) Start DB2UDSMD with the port number that you specified in the previous step.

```
START DB2UDSMD,PORT=4558
```

To set up additional session managers on different LPARs, follow these steps:

- a) Create the JCL for a started task that runs the session manager, in a member named DB2UDSMD in the system PROCLIB of the LPAR.
- b) In the IBM Data Studio routine debugger preferences, specify a port to which you want the Unified Debugger to connect.
- c) Start DB2UDSMD with the port number that you specified in the previous step.

#### **Related tasks**

[Debugging stored procedures by using the Unified Debugger \(Db2 Application programming and SQL\)](#)

#### **Related information**

[Db2 for z/OS Stored Procedures: Through the CALL and Beyond \(IBM Redbooks\)](#)

## **Installing a second Db2 subsystem on the same operating system**

If you are considering installing a second Db2 subsystem on the same operating system, first see the implications of a second Db2 subsystem.

### **Implications of a second Db2 subsystem**

The primary consideration in planning for a second Db2 subsystem is its purpose. Using a second subsystem has a substantial impact on your environment.

Second Db2 subsystems are not uncommon; organizations use a second Db2 subsystem to:

- Run separate service levels or releases of the code. This can provide more extensive testing of preventive service or a new Db2 release before use with a production system. Separate levels or releases of Db2 on the same system must have separate libraries.
- Separate test and production activities. This setup can improve Db2 performance and availability for production.

For example, suppose the processor that runs your production subsystem fails. If your test subsystem is on another processor, you can stop the test subsystem and start the production subsystem on that processor. This only works if the requisite Db2 data sets are on shared storage devices and you have used global resource serialization (GRS) (or an equivalent) to protect the production Db2 data sets.

- Prevent access by one class of users to certain data. If this is your primary purpose, reconsider the Db2 authorization scheme.
- Run an application that requires different subsystem parameter settings from other applications or other environments.
- Isolate an application from other applications.

The table below lists other implications of a second Db2 subsystem.

Table 137. Considerations for installing a second Db2 subsystem

Considerations	Decisions that you need to make
Libraries	A single, shared library or separate libraries
RACF protection	Resource and ID for the two subsystems
Db2 logging	BSDS, active, and archive log space requirements
Database space requirements	Db2 directory, Db2 catalog, and user data
Performance	Processor and main storage use
Distributed data facility requirements	<ul style="list-style-type: none"><li>Location names, logical unit names, and network passwords must be coordinated with remote Db2 subsystems</li><li>In a non-data sharing environment, each Db2 subsystem needs a unique TCP/IP port and resync port.</li></ul>
Common service area (CSA) requirement	Db2 and the IRLM
Shared storage devices	Giving different names to active and archive log data sets, or including those data sets in the GRS inclusion list
ERLY code	Choose a level of ERLY code that is appropriate for all Db2 subsystems.

Each subsystem must have a separate *prefix.SDSNEXIT* library. Sharing the *prefix.SDSNSAMP* library requires coordination to avoid overlaying parameter members.

### Related concepts

#### [Active log data sets storage requirements](#)

Active log data sets record significant events and data changes. Active log data sets are periodically offloaded to archive log data sets. Storage requirements for active log data sets depend on the frequency of data updates and of offloads to archive log data sets.

#### [Connecting distributed database systems](#)

You can use the distributed data facility (DDF) of Db2 to access data that is held by other data management systems. You can also use DDF to make your Db2 data accessible to other systems.

#### [Virtual storage requirements for Db2 address spaces](#)

Db2 uses several types of private address spaces, and each type requires storage.

#### [Program directories for Db2 12 \(Db2 for z/OS in IBM Documentation\)](#)

### Related tasks

#### [Loading Db2 libraries for a second Db2 subsystem](#)

If you are installing a second Db2 subsystem on the same operating system, you might need to create separate libraries for each subsystem.

#### [Enabling multiple Db2 subsystems to share disk storage](#)

If you use a non-data sharing environment, you can enable multiple Db2 subsystems to share disk storage. If you use a data sharing environment, the logs must be on shared disk storage.

#### [Establishing RACF protection for Db2 \(Managing Security\)](#)

## Loading Db2 libraries for a second Db2 subsystem

If you are installing a second Db2 subsystem on the same operating system, you might need to create separate libraries for each subsystem.

### About this task

If the systems have different code releases or different service levels, they must have separate libraries.

## Procedure

To load libraries for a second Db2 subsystem:

1. Separately plan the space for each library.
2. Load the libraries, using different prefixes for each library and for the SMP/E data sets or separate SMP/E zones.

## Tailoring installation jobs for a second Db2 subsystem

Before installing a second Db2 subsystem on the same operating system, change the parameter values that are to be used by the installation jobs during the installation.

## Procedure

Use the installation CLIST to change parameter values as described in the previous table, as described in Chapter 4, “Generating tailored Db2 12 installation, migration, or function level activation jobs,” on page 43.

You must change the parameter values listed in the following table. For any parameters that are not in the list, check the values and make appropriate changes.

*Table 138. Parameters to change when installing the second subsystem*

Installation panel	Action
DSNTIPA1	For separate libraries, change LIBRARY DATA SET NAME PREFIX and DATA SET NAME PREFIX.
DSNTIPA2	You must change CATALOG ALIAS. You can change the values for the DATA CLASS, MGMT CLASS, and STOR CLASS fields.
DSNTIPA3	You can change the values for the VOL/SER, DATA CLASS, MGMT CLASS, and STOR CLASS fields.
DSNTIPI	Change SUBSYSTEM NAME.
DSNTIPP	Change ICF catalog to match the new ICF catalog. Change all passwords.
DSNTIPM	Change SUBSYSTEM NAME and SUBSYSTEM PREFIX.
DSNTIPL	Change data set names and prefixes.
DSNTIPA	Change data set names and prefixes.
DSNTIPS	Change data set names and prefixes.
DSNTIPR	Change names and password.
DSNTIPC	Check values of DSMAX, EDMSTMTC, EDMDBDC, EDM_SKELETON_POOL, MAXSORT_IN_MEMORY, SRTPOOL, and MAXRBLK; no other changes can be made.

## Related concepts

[The Db2 installation CLIST panel session](#)

The installation CLIST displays a series of ISPF panels that prompt you to supply parameter values or accept the supplied default values. In most cases, the fields on the ISPF panels correspond with Db2 subsystem parameters.

## Installing a second Db2 subsystem

When you install a second Db2 subsystem, some installation jobs are optional, some jobs are required, and some jobs are required under certain circumstances.

### Procedure

To install a second subsystem:

1. Optional: Run job DSNTIJSS

You can use job DSNTIJSS to create an SMS environment for the Db2 catalog and directory data sets. Data sets for the Db2 catalog and directory are managed by Db2 and must be SMS-managed. The SMS environment that you use for Db2 catalog and directory data sets must be established before you begin installation or migration to Db2 12. The SMS environment must include a data class for allocating the data sets in extended format and using extended addressability.

2. Run job DSNTIJCA if you are defining a new ICF catalog.

3. Run job DSNTIJMV.

Add another subsystem name and subsystem recognition character to IEFSSNxx. LNKLSTxx modifications are needed only for separate libraries.

For separate libraries, add STEPLIB statements to the precompile and bind steps for program preparation. Add STEPLIB statements for the Db2 offline utilities. Choose a naming convention for any new procedures, and change those as needed.

For a single library, you must add the exit module data set (*prefix*.SDSNEXIT) to the STEPLIB statement to contain your changed subsystem parameter. Put this data set first in the STEPLIB concatenation.

4. Run job DSNTIJIN.

It allocates the following data sets, which contain the sample DBRMs and programs:

```
prefix.DBRMLIB.DATA  
prefix.SRCLIB.DATA  
prefix.RUNLIB.LOAD
```

Two subsystems cannot share these data sets. If undetected sharing occurs, data could be lost. If you use the same library prefix for both subsystems, change the name of the data sets, unless you do not need them on the first subsystem. Subsequent jobs overwrite them, and then the packages that are bound in the first subsystem do not work with the new load modules.

5. Run job DSNTIJUZ without changes if you use separate libraries. For a single library, provide a separate *prefix*.SDSNEXIT data set for each subsystem.

The default SSID displayed by certain panels and procedures is the same for every subsystem. Ensure that the correct subsystem is specified in these cases.

6. Run jobs DSNTIJID, DSNTIJIE, and DSNTIJIF to initialize the Db2 data sets.

### What to do next

If you are using RACF, you can define new user profiles and IDs to provide a separate level of security for each Db2 subsystem.

#### Related tasks

[Granting users and groups access \(Managing Security\)](#)

## Connecting the TSO attachment facility to a second Db2 subsystem

After you install a second Db2 subsystem on the same operating system, you should connect the TSO attachment facility to that subsystem.

### Procedure

To connect the TSO attachment facility:

1. Add STEPLIB statements to the logon procedure if you are using a separate library for the second subsystem or you are managing two different SDSNEXIT data sets. The STEPLIB statement must be authorized using the authorized program facility (APF).

A Db2 logon procedure can use only one set of Db2 libraries.

2. Concatenate the CLISTs by updating the SYSPROC library if you decide to have a separate library for the second subsystem.
3. Concatenate the DB2I panels by updating the ISPPLIB library if you decide to have a separate library for the second subsystem.
4. Concatenate messages by updating the ISPMLIB library if you decide to have a separate library for a second subsystem.
5. Update the ISPF primary option panel (ISR@PRIM) if you decide to have a separate library for the second subsystem.
6. Grant authorization on both subsystems as necessary.
7. Specify the new subsystem name on the Db2I defaults panel as required.

## Connecting the IMS attachment facility to a second Db2 subsystem

After you install a second Db2 subsystem on the same operating system, you should connect the IMS attachment facility to that subsystem.

### Procedure

To connect the IMS attachment facility:

1. For separate libraries, change the STEPLIB DD statement in your startup procedure to refer to the new libraries.
2. For separate libraries, change the DFSESL DD statement in your startup procedure to refer to the new libraries.
3. Define a new subsystem name, language interface token (LIT), and command recognition character (CRC).
4. Define a new language interface and reassemble.
5. In the linkage editor JCL, specify the library that contains the new language interface.

## Preparing a second Db2 subsystem for use

After you have installed a second Db2 subsystem on the same operating system, you must run some jobs that prepare the subsystem for use.

### Procedure

To prepare your second Db2 subsystem for use:

1. IPL z/OS.

This step is required for any SYS1.PARMLIB changes. Alternatively, you can use the SETSSI, SETPROG APF, and SETPROG LNKLIST commands to define the subsystem to z/OS until the next IPL.

2. Start Db2 by using the new command prefix (formerly called the subsystem recognition character) that you named during the installation process.

3. Run job DSNTIJTC.
4. Run job DSNTIJTM.

If you use the same library prefix for both subsystems, change the name of the data sets listed below, unless you do not need them on the first subsystem. Subsequent jobs write information in these data sets and prevent use of the new load module DSNTIAD on the second subsystem with the previously bound plan DSNTIA91 on the first subsystem.

```
prefix.DBRMLIB.DATA  
prefix.RUNLIB.LOAD
```

5. Run job DSNTIJSG.
6. Optional: Run job DSNTIJRW to define core WLM environments for Db2-supplied stored procedures and user-defined functions.
7. Run job DSNTIJRT to install all Db2-supplied routines.
8. Run job DSNTIJRV to validate the Db2-supplied routines after they have been installed.
9. Optional: Run job DSNTIJIC to copy the catalog.
10. Verify your installation process.

See [“Verifying your installation process for a second Db2 subsystem” on page 924](#) for more information.

#### Related reference

[z/OS SETPROG Command \(MVS System Commands\)](#)

[z/OS SETSSI Command \(MVS System Commands\)](#)

## Verifying your installation process for a second Db2 subsystem

After you have installed a second Db2 subsystem and prepared it for use, you should verify a successful installation before you use the subsystem.

### Procedure

Run select phases of the sample application jobs, which are named DSNTEJxx.

Select the phases that you need based on the attachment facilities that you installed, the languages that you use, and whether the sample objects exist.

If you use the same library prefix for both subsystems, change the name of the data sets listed below, unless you do not need them on the first subsystem. Subsequent jobs overwrite information in these data sets and prevent use of the new load modules of sample programs on the second subsystem with the previously bound sample plans on the first subsystem.

```
prefix.DBRMLIB.DATA  
prefix.SRCLIB.DATA  
prefix.RUNLIB.LOAD
```

### Related tasks

[Verifying successful Db2 12 installation or migration with sample applications](#)

You can use the Db2 Db2 12 sample applications to verify the operation of Db2 after installation or new function activation. These sample applications are also called installation verification procedures (IVPs).

## Enabling multiple Db2 subsystems to share disk storage

If you use a non-data sharing environment, you can enable multiple Db2 subsystems to share disk storage. If you use a data sharing environment, the logs must be on shared disk storage.

### Procedure

To share disk storage among Db2 subsystems and avoid problems with your active and archive log data sets:

- Ensure that each subsystem has unique log data set names. This prevents situations like the following:

Subsystem A on operating system 1 and subsystem B on operating system 2 share the same z/OS catalog name, and their log data set names are the same. You start subsystem B while subsystem A is still running on operating system 1. This causes log data sets to be allocated for subsystem A, even though they already exist.

- Use GRS, or an equivalent, and include your active and archive log data sets in the GRS inclusion list. This prevents situations like the following:

Subsystem A on operating system 1 and subsystem B on operating system 2 share disk storage, and the active log is in a shared disk volume. Subsystem B fails. You attempt to start subsystem B, but you accidentally start subsystem A on operating system 2, even though it is still running on operating system 1. This causes log data sets to be allocated for subsystem A, even though they already exist.

## Data loading from remote locations

You can use an SQL cursor with the LOAD utility to load data from a remote location.

Before loading data, you must bind the DSNUT121 package at each location from which you want to load data. A local package for DSNUT121 is bound by installation job DSNTIJSJ when you install or migrate to a new version of Db2 for z/OS.

## Special packages and plans for SPUFI

Special packages and plans for SPUFI are required in some situations.

### Running SPUFI at remote systems

You can use SPUFI to connect to and then execute SQL statements at a remote location.

#### Procedure

**GUI** To run SPUFI at a remote location:

1. Ensure that DDF is started on the Db2 subsystem where SPUFI runs.
2. Bind the SPUFI packages on each target remote location that is not a Db2 for z/OS server, or on each target remote Db2 for z/OS location where the SPUFI packages have not been bound.

For example, use the following commands:

```

BIND PACKAGE (location_name.DSNTIAP) MEMBER(DSNTIAP)
ACTION(ADD) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')

BIND PACKAGE (location_name.DSNESPCS) MEMBER(DSNESM68)
ACTION(ADD) ISOLATION(CS) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')

BIND PACKAGE (location_name.DSNESPRR) MEMBER(DSNESM68)
ACTION(ADD) ISOLATION(RR) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')

BIND PACKAGE (location_name.DSNESPUR) MEMBER(DSNESM68)
ACTION(ADD) ISOLATION(UR) ENCODING(EBCDIC) LIB('prefix.SDSNDBRM')

```

If a BIND PACKAGE command fails because the package already exists, verify that the time and date formats that are returned by the existing packages are satisfactory. If they are, the existing packages can be used without any change to the package list in the SPUFI plans. However, if you need to change the time and date formats that are returned by the existing packages, you must bind new packages with different collection identifiers that have been agreed to by the database server.

For example, if the collection identifiers are PRIVATCS and PRIVATRR, the commands for doing a remote bind are as follows:

```

BIND PACKAGE (location_name.PRIVATCS) MEMBER(DSNESM68)
ACTION(ADD) ISOLATION(CS) LIB('prefix.SDSNDBRM')

```

```
BIND PACKAGE (location_name.PRIVATRR) MEMBER(DSNESM68)
ACTION(ADD) ISOLATION(RR) LIB('prefix.SDSNDBRM')
```

3. Bind the SPUFI plans to include the packages for all target remote locations, including other Db2 for z/OS servers. To include all locations, use an asterisk as the location name of the collection ID.

For example, use the following commands:

```
BIND PLAN(DSNESPCS) -
  PKLIST(*.DSNESPCS.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISO(CS) CURRENTDATA(YES) ENCODING(EBCDIC) ACTION(REPLACE)
BIND PLAN(DSNESPRR) -
  PKLIST(*.DSNESPRR.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISOLATION(RR) ENCODING(EBCDIC) ACTION(REPLACE)
BIND PLAN(DSNESPUR) -
  PKLIST(*.DSNESPUR.DSNESM68, -
         *.DSNTIAP.DSNTIAP) -
  ISOLATION(UR) ENCODING(EBCDIC) ACTION(REPLACE)
```

The SPUFI plans at the Db2 system must be rebound because the location name parameter (which is usually optional) must be explicitly specified for the remote access functions to construct the correct package name. (SPUFI does not use the SQL statement SET CURRENT PACKAGESET.) The location name entry in the package list must precede any pattern-matching character entry. For example, the package list for the DSNESPCS plan is as follows:

```
PKLIST(location_name.PRIVATCS.DSNESM68, -
       *.DSNESPCS.DSNESM68, -
       *.DSNTIAP.DSNTIAP)
```

The package list for the DSNESPRR plan is as follows:

```
PKLIST(location_name.PRIVATRR.DSNESM68, -
       *.DSNESPRR.DSNESM68, -
       *.DSNTIAP.DSNTIAP)
```

The package list for the DSNESPUR plan is as follows:

```
PKLIST(location_name.PRIVATUR.DSNESM68, -
       *.DSNESPUR.DSNESM68, -
       *.DSNTIAP.DSNTIAP)
```



## Making SPUFI work with different terminal CCSIDs

In some cases, a terminal CCSID might be different from the SPUFI CCSID. If the terminal CCSID cannot be changed to the SPUFI CCSID, consider creating additional SPUFI packages and plans that specify the terminal CCSID encoding.

### About this task

You can then use the SPUFI default panels to use the plans with the special CCSID encoding instead of the Db2-supplied plans (DSNESPCS, DSNESPRR, and DSNESPUR).

### Procedure

Suppose that when you install Db2, you create the SPUFI plans and packages using ENCODING(EBCDIC), and the default subsystem CCSID for EBCDIC data, as specified on installation panel DSNTIPF in the EBCDIC CCSID field. Most of the people in your organization use this CCSID as their terminal CCSID, so they do not encounter errors. However, a large group of Db2 application programmers code in the C language and prefer CCSID 1047 as their terminal CCSID. You can prevent this group from corrupting Db2 data and receiving errors by completing the following tasks:

- a) Bind SPUFI packages and plans specifically for users who require a terminal CCSID setting of 1047.



For example, your commands might look like the following commands:

#### GUIP

```
BIND PACKAGE(TIAP1047) MEMBER(DSNTIAP) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PACKAGE(SPCS1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(CS) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PLAN(SPCS1047) -  
  PKLIST(SPCS1047.DSNESM68 -  
    TIAP1047,DSNTIAP) -  
  ISOLATION(CS) ENCODING(1047) ACTION(REPLACE)  
BIND PACKAGE(SPRR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(RR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PLAN(SPRR1047) -  
  PKLIST(SPRR1047.DSNESM68 -  
    TIAP1047,DSNTIAP) -  
  ISOLATION(RR) ENCODING(1047) ACTION(REPLACE)  
BIND PACKAGE(SPUR1047) MEMBER(DSNESM68) -  
  ACTION(REPLACE) ISOLATION(UR) ENCODING(1047) -  
  LIBRARY('prefix.SDSNDBRM')  
BIND PLAN(SPUR1047) -  
  PKLIST(SPUR1047.DSNESM68 -  
    TIAP1047,DSNTIAP) -  
  ISOLATION(UR) ENCODING(1047) ACTION(REPLACE)
```

#### GUIP

- b) Grant access to the new packages and plans to the target user group.
- c) Instruct users who use terminal CCSID 1047 to specify the following settings in the SPUFI default panels:
  - In panel DSNESP02, specify YES for CHANGE PLAN NAMES.
  - In panel DSNESP07, specify SPCS1047 in the CS ISOLATION PLAN field, SPRR1047 in the RR ISOLATION PLAN field, and SPUR1047 in the UR ISOLATION PLAN field.

The programmers who require CCSID 1047 can now use SPUFI without receiving an error message.

## Setting up the Db2 command line processor

You can use the Db2 command line processor to issue SQL statements, bind DBRMs that are stored in HFS files, and call stored procedures. The Db2 command line processor on Db2 for z/OS is a Java application that runs under z/OS UNIX System Services.

### Before you begin

Before you begin setting up the Db2 command line processor, ensure that your system has the following features:

- Java 1.7 or later.
- IBM Data Server Driver for JDBC and SQLJ.

For information on installing this feature, see [Installing the IBM Data Server Driver for JDBC and SQLJ on Db2 for z/OS \(Db2 Application Programming for Java\)](#).

- Db2 metadata stored procedures installed and authorized. To install and authorize the Db2 metadata stored procedures, run the installation job DSNTIJRT. To check if the Db2 metadata stored procedures were successfully installed and activated, run the validation job DSNTIJRV.

### Procedure

To set up the Db2 command line processor, complete the following steps:

1. Modify the CLASSPATH variable in your .profile file to include the c1p.jar file.

If you install the Db2 command line processor into the `/usr/lpp/db2c10_base` directory, you can issue the following command to modify your CLASSPATH variable:

```
export CLASSPATH=$CLASSPATH:/usr/lpp/db2c10_base/lib/clp.jar
```

2. Optional: Define the CLPPROPERTIESFILE environment variable in your `.profile` file to include the full path name where the properties file is located.

You can create your own properties file with any name. A sample properties file is in the directory where the command line processor is installed. If you install the command line processor into the `/usr/lpp/db2c10_base` directory, you can issue the following command to define the CLPPROPERTIESFILE environment variable in your `.profile` file:

```
export CLPPROPERTIESFILE=/usr/lpp/db2c10_base/samples/clp.properties
```

If the CLPPROPERTIESFILE environment variable is undefined, the command line processor uses default values for all options when it is invoked.

3. Optional: Define an alias for starting the Db2 command line processor in your `.profile` file:  
For example:

```
alias db2="java com.ibm.db2.clp.db2"
```

## Results

Additional instructions for setting up the Db2 command line processor are available in the readme file. By default, the Db2 command line processor readme file (README\_CLP) is installed into the `/usr/lpp/db2c10_base` directory.

### Related concepts

[The Db2 command line processor \(Db2 Commands\)](#)

### Related tasks

[Running the Db2 command line processor \(Db2 Commands\)](#)

### Related information

[Tutorial: Using the Db2 command line processor \(Db2 Commands\)](#)

## Creating database objects that support query acceleration

If you use an accelerator, you must create a database, table spaces, tables, and indexes for the accelerator to use.

### Before you begin

1. Apply or verify that you have applied the PTF for [APAR PI96858 \(UI56078\)](#) and for [APAR PI96859 \(UI56897\)](#). For a data sharing group, you must apply these PTFs on all members of the group.
2. After applying the PTFs, restart the Db2 subsystem or each Db2 data sharing member in a data sharing group.

### Procedure

To create database objects for use by an accelerator:

1. Configure and run the DSNTIJAS sample job in the SDSNSAMP library to create the objects that are required for an accelerator.

After you run DSNTIJAS:

- The SYSACCEL.SYSACCELERATORS and SYSACCEL.SYSACCELERATEDTABLES tables are created. The accelerator will populate these tables with a server definition and the associated IP address.

- The SYSACCEL.SYSACCELERATEDPACKAGES table and its indexes are created. This table and its indexes will be populated by Db2 during a bind operation that specifies the QUERYACCELERATION bind option. They are not used by the accelerator.
  - The SYSACCEL.SYSACCELERATEDTABLESAUTH table and its index are created for federation support. This table and its index will be populated by the IBM Db2 Analytics Accelerator for z/OS SYSPROC.ACCEL\_GRANT\_TABLES\_REFERENCE and SYSPROC.ACCEL\_REVOKE\_TABLES\_REFERENCE stored procedures.
2. Restrict access to the SYSACCEL.SYSACCELERATORS, SYSACCEL.SYSACCELERATEDTABLES, and SYSACCEL.SYSACCELERATEDPACKAGES tables that were created by job DSNTIJAS.

The SYSACCEL.SYSACCELERATORS and SYSACCEL.SYSACCELERATEDTABLES tables are used by Db2 to control the acceleration behavior of the accelerator servers that are defined for the Db2 subsystem.

The SYSACCELERATEDPACKAGES table is used by Db2 to control the acceleration behavior of static SQL queries in a Db2 package.

## What to do next

Enable query acceleration in your Db2 for z/OS environment. For more information, see [Enabling Db2 for IBM Db2 Analytics Accelerator for z/OS \(Db2 Performance\)](#).

### Related tasks

[Enabling Db2 for IBM Db2 Analytics Accelerator for z/OS \(Db2 Performance\)](#)

### Related reference

[Tables that support query acceleration \(Db2 SQL\)](#)

### Related information

[IBM Db2 Analytics Accelerator for z/OS documentation](#)

## Migrating query acceleration tables to universal table spaces

This topic provides instructions for migrating query acceleration tables from a single segmented table space (SYSACCEL) to individual universal table spaces (UTSs).

### Before you begin



**Attention:** Before you migrate the acceleration tables to universal tables spaces, make sure that an accelerator has already been defined on your system. If you do not already have an accelerator defined on your system, defer this migration task until an accelerator has been defined.

### About this task

Migrating the query acceleration tables to individual UTSs is optional and can be deferred. However, if you are experiencing frequent timeout issues on the query acceleration tables, you should consider migrating.

If you choose to migrate the query acceleration tables from a single segmented table space to individual UTSs, you must complete all three of the following subtasks:

1. Complete the pre-migration steps, which are documented in this topic.
2. Run job DSNTIJAM, which migrates the tables.
3. Complete the post-migration steps, which are also documented in this topic.

### Procedure

Complete the following pre-migration steps:

1. Apply the PTF for APAR PI96858 (UI56078) and for APAR PI96859 (UI56897), or verify that these PTFs are applied.

In a Db2 data sharing group, these PTFs must be applied on all members of the group.

2. After the PTFs for APAR PI96858 are applied, restart Db2 or, for a data sharing group, restart each member.
3. Verify that the following Db2 query acceleration tables are present in the DSNACCEL.SYSACCEL table space and that they are at same level as PI91620 (UI54293):
  - SYSACCEL.SYSACCELERATORS
  - SYSACCEL.SYSACCELERATEDTABLES
  - SYSACCEL.SYSACCELERATEDPACKAGES
  - SYSACCEL.SYSACCELERATEDTABLESAUTH

Also, verify that column 13 of the SYSACCEL.SYSACCELERATEDTABLES table is the REMOTELOCATION column.

4. Drop, re-create, and rename any user-defined table spaces in the DSNACCEL database that are named SYSTSACC, SYSTSACT, SYSTSACP, or SYSTSATA.  
These names are reserved for the new UTs in which the Db2 query acceleration tables will reside.
5. Drop any user-defined objects in table space DSNACCEL.SYSACCEL, and re-create them in another table space.

When you run the DSNTIJAM job to migrate the query acceleration tables, the DSNACCEL.SYSACCEL table space and all of its objects will be dropped and re-created. However, only the following query acceleration tables and indexes will be re-created in the appropriate table space:

- SYSACCEL.SYSACCELERATORS
- SYSACCEL.SYSACCELERATEDTABLES
- SYSACCEL.SYSACCELERATEDPACKAGES
- SYSACCEL.SYSACCELERATEDTABLESAUTH
- SYSACCEL.DSNACC01
- SYSACCEL.DSNACT01
- SYSACCEL.DSNACP01
- SYSACCEL.DSNACP02
- SYSACCEL.DSNATA01

Therefore, if you created any user-defined objects in the DSNACCEL.SYSACCEL table space other than the ones in the previous list, you must drop and re-create them in another table space.

6. Rename any table that has the same name as the following tables.  
These names are reserved for the intermediate query acceleration tables that will be used during migration.
  - SYSACCEL.SYSACCELERATOR1
  - SYSACCEL.SYSACCELERATEDTABLE1
  - SYSACCEL.SYSACCELERATEDPACKAGE1
  - SYSACCEL.SYSACCELERATEDTABLESAUTH1

7. Rename any index that has the same name as the following indexes.  
These names are reserved for the indexes of the intermediate query acceleration tables that will be used during migration.
  - SYSACCEL.DSNACC1
  - SYSACCEL.DSNACT1
  - SYSACCEL.DSNACP1
  - SYSACCEL.DSNACP2
  - SYSACCEL.DSNATA1

8. Save any dependencies and authorization records for the following Db2 query acceleration objects so that you can re-create them after migration.

These dependencies can include views, triggers, and masks, as well as authorizations, referential integrity definitions, check constraints, history versioning, and comments.

- SYSACCEL.SYSACCELERATORS
- SYSACCEL.DSNACC01
- SYSACCEL.SYSACCELERATEDTABLES
- SYSACCEL.DSNACT01
- SYSACCEL.SYSACCELERATEDPACKAGES
- SYSACCEL.DSNACP01
- SYSACCEL.DSNACP02
- SYSACCEL.SYSACCELERATEDTABLESAUTH
- SYSACCEL.DSNATA01

Additionally, if the DSN6SPRM.ABIND subsystem parameter is set to NO, identify all packages that are dependent on the DSNACCEL.SYSACCEL table space. You must explicitly rebind these packages after you complete the migration.



**Attention:** Because the DSNACCEL.SYSACCEL table space will be dropped during migration, failure to complete this step prior to running DSNTIJAM can result in the loss of administrative control of the accelerator and render it unusable and not easily recoverable.

9. Set the Db2 DSN6SPRM.QUERY\_ACCEL\_OPTIONS subsystem parameter to a value of 98, which is a special serviceability option that indicates that the migration of the query acceleration tables is in progress. For a data sharing group, set this subsystem parameter to 98 for each member of the data sharing group. Setting this subsystem parameter to 98 eliminates interference from other Db2 workloads.
  - a) Create a temporary copy of your current customized copy of the DSNTIJUZ job.
  - b) Edit the temporary copy of DSNTIJUZ and set the QUERY\_ACCEL\_OPTIONS parameter to a value of 98. If necessary, remember to add a continuation character in column 72.
  - c) Run the first two steps of the temporary DSNTIJUZ job.
  - d) After the job completes, issue the -SET SYSPARM command, or stop and restart Db2 to enable this change.
  - e) Delete the temporary copy of DSNTIJUZ.
10. Issue the STOP ACCEL command (all query offload), stop all query accelerator data maintenance (incremental update and stored procedure jobs), and disconnect Data Studio from the database. For a data sharing group, complete these steps for each member of the data sharing group.

## What to do next

After you successfully complete the pre-migration steps, customize and run the DSNTIJAM job to migrate the table spaces, and confirm that it completes with a return code of 0. Then, return to this topic and complete the following post-migration steps to re-enable query acceleration.

1. Run the AQTIIJSP job with the MODE(INSTALL) parameter.
2. Reset the DSN6SPRM.QUERY\_ACCEL\_OPTIONS subsystem parameter back to its original value to indicate that the migration of the query acceleration tables is no longer in progress:
  - a. Run the first two steps of your original customized copy of job DSNTIJUZ.
  - b. After the job completes, either issue the -SET SYSPARM command or stop and restart Db2 to enable this change.
3. Re-create the dependencies and authorization records that you saved in step “8” on page 930 of the per-migration steps.

If the DSN6SPRM.ABIND subsystem parameter is set to NO, explicitly rebind the packages that you identified in step “8” on page 930.

4. Issue the START ACCEL command, start all query accelerator data maintenance (incremental update and stored procedure jobs), and reconnect to Data Studio. For a data sharing group, complete these steps for each member of the data sharing group.

**Related tasks**

[Enabling Db2 for IBM Db2 Analytics Accelerator for z/OS \(Db2 Performance\)](#)

**Related reference**

[Tables that support query acceleration \(Db2 SQL\)](#)

**Related information**

[IBM Db2 Analytics Accelerator for z/OS documentation](#)

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# Chapter 11. Working with international data

Db2 handles different character sets in distributed data through character conversions.

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## Character conversion concepts

Character data that is transmitted from one DBMS to another might need to be converted to a different coded character set.

In different database management systems (DBMSs), character data can be represented by different encoding schemes. Within an encoding scheme, there are multiple coded character set identifiers (CCSIDs). EBCDIC, ASCII, and Unicode are ways of encoding character data.

The Unicode character encoding standard is a character encoding scheme that includes characters from almost all living languages of the world. Db2 supports two implementations of the Unicode encoding scheme: UTF-8 (a mixed-byte form) and UTF-16 (a double-byte form).

All character data has a CCSID. Character conversion is described in terms of CCSIDs of the source and of the target. When you install Db2, you must specify a CCSID for Db2 character data in either of the following situations:

- You specify AUTO or COMMAND for the DDF STARTUP OPTION field on panel DSNTIPR.
- Your system will have any ASCII data, Unicode data, EBCDIC mixed character data, or EBCDIC graphic data. In this case, you must specify YES in the MIXED DATA field of panel DSNTIPF, and the CCSID that you specify is the mixed data CCSID for the encoding scheme.

The CCSID that you specify depends on the national language that you use.

Db2 performs most character conversion automatically, based on system CCSIDs, when data is sent to Db2 or when data is stored in Db2. If character conversion must occur, Db2 uses the following methods:

1. Db2 searches the catalog table SYSIBM.SYSSTRINGS.
2. Db2 uses z/OS Unicode Conversion Services.

If Db2 or z/OS Unicode Conversion Services does not provide a conversion for a certain combination of source and target CCSIDs, you receive an error message. If the conversion is incorrect, you might get an error message or unexpected output. To correct the problem, you need to understand the rules for assigning source and target CCSIDs in SQL operations.

### **Related concepts**

[System-coded character set identifiers](#)

To support character conversion, the IBM Distributed Relational Database Architecture (DRDA) uses CCSIDs to label the various character representation schemes.

[Unicode support in Db2](#)

*Unicode* is a universal encoding scheme for written characters and text that enables the exchange of data internationally. Unicode provides a character set standard that can be used all over the world.

[Coded character sets and CCSIDS \(Introduction to Db2 for z/OS\)](#)

### **Related reference**

[Character conversion \(z/OS: Unicode Services User's Guide and Reference\)](#)

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## System-coded character set identifiers

To support character conversion, the IBM Distributed Relational Database Architecture (DRDA) uses CCSIDs to label the various character representation schemes.

The CCSID is a two-byte binary number that uniquely identifies one or more pairs of character sets and code pages. The coded character set defines how bit configurations are mapped for character data.

The CCSID of character strings at your site is determined by the CCSID that you specify on installation panel DSNTIPF.

The correct CCSID is the number that identifies the coded character set that is supported by your I/O devices, local applications such as IMS and QMF, and remote applications such as CICS Transaction Server.



**Attention:** If this CCSID is not correct, character conversion produces incorrect results.

### Related concepts

[Introduction to character conversion \(Db2 Internationalization Guide\)](#)

### Related reference

[DSNTIPF: Application programming defaults panel 1](#)

The entries on the DSNTIPF panel and the DSNTIP4 panel define application programming default values. These values are used as default values by the program preparation panels, the program preparation CLIST (DSNH), and the precompiler. These values can also be used as default values by other programs, such as QMF.

## Unicode support in Db2

*Unicode* is a universal encoding scheme for written characters and text that enables the exchange of data internationally. Unicode provides a character set standard that can be used all over the world.

Unicode uses an encoding scheme that provides code points for approximately 100,000 characters. An extension called UTF-16 allows for encoding as many as a million more characters. Unicode provides the ability to encode all characters used for the written languages of the world. Unicode treats alphabetic characters, ideographic characters, and symbols equivalently because it specifies a numeric value and a name for each of its characters. Unicode includes punctuation marks, mathematical symbols, technical symbols, geometric shapes, and dingbats.

Db2 provides the following Unicode encoding forms:

- UTF-8: Unicode Transformation Format, 8-bit encoding form that is designed for ease of use with existing ASCII-based systems.
- UTF-16: Unicode Transformation Format, 16-bit encoding form that is designed to provide code values for over a million characters and a superset of UCS-2. UCS-2 is a universal character set and is coded in 2 octets, which means that characters are represented in 16 bits per character.

**Unicode CCSIDs:** The Unicode CCSID field of panel DSNTIPF is pre-filled with 1208. Db2 chooses the CCSIDs for double-byte and single-byte values (1200 for DBCS and 367 for SBCS). CCSID 1200 corresponds to UTF-16 and CCSID 367 is for 7-bit ASCII.

## Customizing support for Unicode

You must customize z/OS Unicode support to use Unicode data in Db2.

### Before you begin

Ensure that the conversion environment is active. The steps for this process can be found in [z/OS Support for Unicode: Using Unicode Services](#). Db2 can use the conversion services of z/OS support for Unicode only when the conversion environment is active. The infrastructure provides tools to create a conversion image. When the image is loaded into a common data space, the conversion environment is activated, and the conversion services are ready to be used by Db2.

### Procedure

To customize support for Unicode:

1. Customize the job card.



The jobs in *hlq*.SCUNJCL, as shipped by IBM, have placeholders for values on the JOB statement, such as in the following example:

```
//$JOBPREF$$JOBNAME$ JOB ($ACCOUNT$), '$USER$',  
// NOTIFY=$NOTIFY$,MSGCLASS=$MC$,MSGLEVEL=$ML$,  
// TIME=$TI$,CLASS=$CL$,REGION=$REGIONOM$
```

Use the REXX EXEC CUNRUCST in *hlq*.SCUNREXX to customize these values. When you run the REXX EXEC CUNRUALL, the values that you specify are supplied on all of the JCL images. You can choose to customize your system by displaying Japanese messages or displaying English messages with modified date and time formats. You can set up the z/OS Message Service to specify how you want messages to be displayed.

## 2. Set up the conversion image.

The following example is the sample JCL member in *hlq*.SCUNJCL (CUNJIUTL):

```
//CUNMIUTL EXEC PGM=CUNMIUTL  
//SYSPRINT DD SYSOUT=*  
//TABIN DD DISP=SHR.DSN=hlq.SCUNTBL  
//SYSIMG DD DSN=hlq.IMAGES(CUNIMG00),DISP=SHR  
//SYSIN DD *  
/*****  
* INPUT STATEMENTS FOR THE IMAGE GENERATOR *  
*****/  
CASE NORMAL; /* ENABLE TOUPPER AND TOLOWER */  
CONVERSION 1047,850; /* EBCDIC -> ASCII */  
CONVERSION 850,1047; /* ASCII -> EBCDIC */  
/*
```

In the preceding example, the two CONVERSION statements provide conversion between the EBCDIC code page 1047 and the ASCII code page 850 in both directions.

The DD names that are passed to CUNMIUTL are described as follows:

### **SYSPRINT**

A listing that shows the processed setups and error messages, if applicable.

### **TABIN**

Conversion tables for character conversion and case conversion. They are supplied by IBM; in this example, they are in data set *hlq*.SCUNTBL. The image transforms the conversion tables into an internal format and stores them in the conversion image.

### **SYSIMG**

Output is a single image of the entire conversion environment. The conversion image is built according to the specification in the SYSIN DD name. The conversion image resides in either a sequential data set or a member of a partitioned data set with a fixed-block 80-byte format. In this example, the image resides in the partitioned data set member *hlq*.IMAGES(CUNIMG00).

### **SYSIN**

Two types of statements are recognized in this DD statement: case conversion, which is identified by the CASE control statement, and character conversion, which is identified by the CONVERSION control statement.

#### **CASE control statement:**

Case conversion is defined as converting Unicode characters (for example, UTF-8) to their uppercase equivalent or their lowercase equivalent. In the preceding example, CASE NORMAL is specified, which means basic case conversion is provided. This basic case conversion is based on the UnicodeData.txt file that is provided by the Unicode consortium. It does not include special casing as described in the SpecialCasing.txt file that is provided by the Unicode consortium. Special casing typically includes characters that have significant differences in the case-based appearance. For example, the German "hard S", which appears as a flat B, appears as "SS" in uppercase German text. Because Db2 does not use the case conversion service, you do not need to specify a conversion.

#### **CONVERSION control statement:**

Character conversion is also referred to as conversion between specified CCSIDs. An application such as Db2 invokes the CUNLCNV function to convert characters between the

specified code pages. You must identify the conversions that are possible on the CONVERSION control statement.

**Important:** Specify CONVERSION statements for Db2 as follows:

```
CONVERSION xxx,yyy,ER;  
CONVERSION yyy,xxx,ER;
```

Many code page conversions are possible. However, when identifying the conversion that Db2 is to use, you need be concerned only with conversion for the national languages that you use and with conversion from these code pages to and from all Unicode CCSIDs.

**Example:** If you use an EBCDIC CCSID of 37 and an ASCII CCSID of 819, you need to use the following conversions:

```
CONVERSION 37,367,ER;  
CONVERSION 37,1208,ER;  
CONVERSION 37,1200,ER;  
CONVERSION 367,37,ER;  
CONVERSION 1208,37,ER;  
CONVERSION 1200,37,ER;  
  
CONVERSION 819,367,ER;  
CONVERSION 819,1208,ER;  
CONVERSION 819,1200,ER;  
CONVERSION 367,819,ER;  
CONVERSION 1208,819,ER;  
CONVERSION 1200,819,ER;
```

Multiple conversion tables might be available for converting one CCSID to another. A technique search order can be used to specify which table should be used. The technique search order consists of up to eight technique characters. If you specify more than one technique character, the image generator tries to find a matching table for the leftmost technique character in the sequence of the technique-search-order. If one is not found, the search continues with the second one, and so on. Especially for mixed conversion, use more than one technique character because one of the subconversions might exist only in round-trip mode, and one might exist only in an enforced subset. In this case, a technique search order of 'RE' or 'ER' would be required. Technique search order is optional. If you do not specify a technique search order, RECLM is used.

Language products such as Enterprise Cobol might use the RECLM technique search order, while Db2 uses the ER technique search order. Therefore, you might also need to add the RECLM conversions, such as these:

```
CONVERSION 1047,850,RECLM; /* EBCDIC -> ASCII */  
CONVERSION 850,1047,RECLM; /* ASCII -> EBCDIC */
```

The important technique characters for Db2 are E (enforced subset) and R (round-trip). Enforced subset conversions map only those characters from one CCSID to another that have a corresponding character in the second CCSID. All other characters are replaced by a substitution character. Round-trip conversions between two CCSIDs assure that all characters making the 'round trip' arrive as they were originally, even if the receiving CCSID does not support a given character. Round-trip conversions ensure that code points that are converted from CCSID A to CCSID B, and back to CCSID A are preserved, even if CCSID B is not capable of representing these code points.

After performing these steps, you should now have an updated CUNJIUTL JCL member.

3. Submit the batch job in the CUNJIUTL member.

At completion, the batch job writes its output to the SYSPRINT DD (that is, SYSOUT in this example). Expect a return code of zero from the CUNJIUTL program. If you receive anything other than return code zero, refer to [Return code meanings](#). This information helps you correct environmental, syntactical, and semantic errors that might occur.

4. After generating the conversion image, copy it to SYS1.PARMLIB or any other data set in the logical PARMLIB concatenation.

In this example, you copy *hlq.IMAGES(CUNIMG00)* to *SYS1.PARMLIB(CUNIMG00)*.

5. Calculate the storage that is needed for a conversion image.

When the conversion image is created on disk, you need to determine the amount of virtual storage that the image is to occupy. You specify this number as the number of pages on the *REALSTORAGE* parameter in the *CUNUNIxx PARMLIB* member that you create in the next step. The *REALSTORAGE* parameter protects the system from a shortage of main storage caused by loading a conversion image that exceeds the amount of available storage. The minimum value for the *REALSTORAGE* parameter depends on how the image is activated.

- If the image is activated during IPL, the needed storage is the size of the image plus one page.
- If the image is activated using the *SET UNI* command (*PARMLIB* member with keyword *IMAGE*), the needed storage is the size of the currently active image plus the size of the new conversion image.

If you set up a conversion environment before or if you are not activating a conversion environment during IPL, you must determine the amount of storage that the currently active image occupies. To do this, issue the following command:

```
D UNI,STORAGE
```

The system displays the number of active pages.

To determine the storage that the new conversion image occupies, find the *CUN1017I* message in the *SYSPRINT* log that was created in the previous step. This message indicates the number of pages that are required for the new conversion image. For example:

```
CUN1017I GENERATED IMAGE SIZE 291 PAGES.....
```

As an alternative, specify a *REALSTORAGE* value of zero, which indicates that unlimited storage is available. In this case, a value of 524 287 pages is used.

6. Create the *PARMLIB* member *CUNUNIxx* (*PARMLIB* member for activating a conversion environment).

Normally the member is created in *SYS1.PARMLIB*, but in this case, you create it in another data set in the logical *PARMLIB* concatenation. This example uses *SYS1.PARMLIB*.

The *xx* can be any two alphanumeric characters, or the special characters *@*, *#*, or *\$*. This example uses *00*. Here is the sample *PARMLIB* member in *SYS1.PARMLIB(CUNUNI00)*:

```
REALSTORAGE 292;  
IMAGE CUNIMG00;
```

Because *CUNMIUTL* requires 291 pages, and an additional page is required during IPL, the *REALSTORAGE* statement indicates that 292 pages of real storage are required.

The *IMAGE* parameter indicates that the system searches in *SYS1.PARMLIB* (or a data set in the logical concatenation) member *CUNIMG00* for the conversion image.

You can create a *PARMLIB* member to delete a current conversion environment.

7. Take one of the following actions:

- Edit *IEASYSxx*.

This parameter specifies one or more *CUNUNIxx PARMLIB* members that contain the keywords that configure the conversion environment. Each suffix *xx* identifies one *CUNUNIxx* member in the *PARMLIB* concatenation. If several *PARMLIB* members are specified, they are concatenated in the specified sequence. The concatenated contents is handled internally as a single member. This means that the lines are numbered consecutively, and error messages about syntax errors refer to the concatenated text. Restrictions for keywords apply for the entire concatenated text.

- Check parameter *MAXCAD* in *IEASYSxx*. It limits the amount of common data spaces in a system. If *MAXCAD* is specified, consider that z/OS support for Unicode creates up to two common data spaces.

8. Initialize the conversion environment with an IPL.

9. After the system is initialized, you can use the DISPLAY UNI system command to show the current z/OS Unicode status or use the SET UNI system command to change the conversion environment.

### Related concepts

[Calling the character conversion services \(z/OS: Unicode Services User's Guide and Reference\)](#)

### Related reference

[Creating a Unicode Services environment \(z/OS: Unicode Services User's Guide and Reference\)](#)

## EBCDIC and ASCII support

Db2 supports both EBCDIC and ASCII encoding of data.

If you specify MIXED DATA = NO on panel DSNTIPF, you can use any compatible SBCS CCSID in the EBCDIC CCSID and ASCII CCSID fields. The first table below lists a selection of common SBCS CCSIDs that might be used as source or target CCSIDs for EBCDIC or ASCII data. Db2 does not support the storing of data into all of these CCSIDs. That is, not all of the numbers listed in the first table below are supported as target CCSIDs in conversion. When you choose CCSIDs, you should choose an EBCDIC CCSID and an ASCII CCSID that are listed in the same row in the first table below.

To determine which combinations Db2 supports with SYSSTRINGS, issue the following SQL statement:

#### GUPI

```
SELECT * FROM SYSIBM.SYSSTRINGS;
```

#### GUPI

If you specify MIXED DATA=NO on installation panel DSNTIPF, specify an SBCS CCSID from the second table below in the EBCDIC CCSID field on DSNTIPF. You must specify a SBCS CCSID from the third table below in the ASCII CCSID field on DSNTIPF. Mixed character data and graphic data cannot be defined on a system when you specify MIXED DATA=NO.

If you specify MIXED DATA=YES on installation panel DSNTIPF, specify a mixed data CCSID from the second table below in the EBCDIC CCSID field on DSNTIPF. You must specify a mixed CCSID from the third table below in the ASCII CCSID field. The second and third tables below show the associated CCSIDs that Db2 assigns for SBCS and DBCS data when you specify a specific MCCSID.

Then specify a mixed CCSID from the third table in the ASCII CCSID field on DSNTIPF. By specifying a CCSID for mixed data (an MCCSID), you also receive system CCSIDs for SBCS and DBCS (graphic) data.

In the second and third tables, four CCSIDs are listed for Japanese to allow for all possible combinations of two single-byte code pages and two double-byte character sets. The difference between the single-byte code pages is in the code points for lowercase Latin letters and Katakana characters. In the code page for Japanese (Extended English, SCCSID 1027), lowercase letters have the same code points as other EBCDIC code pages.

In these tables, the terms are used as follows:

#### SCCSID

single-byte coded character set identifier

#### MCCSID

mixed coded character set identifier

#### GCCSID

graphic coded character set identifier

Table 139. Single-byte coded character set identifiers (CCSIDs)

Country or national language	EBCDIC	ASCII PC	ASCII AIX®	ASCII Windows
Australia (U.S. English)	37/1140*	437	819	1252/5348*
Austria (German)	273/1141*	850/858*	819	1252/5348*

Table 139. Single-byte coded character set identifiers (CCSIDs) (continued)

<b>Country or national language</b>	<b>EBCDIC</b>	<b>ASCII PC</b>	<b>ASCII AIX®</b>	<b>ASCII Windows</b>
Belarus (Cyrillic)	1025			1251/5347*
Belgium	500/1148*	850/858*	819	1252/5348*
Bosnia and Herzegovina (Cyrillic)	1025			1251/5347*
Bosnia and Herzegovina (Latin)	870	852	912	1250/5346*
Brazil (U.S. English)	37/1140*	850/858*	819	1252/5348*
Bulgaria (Cyrillic Multilingual)	1025			1251/5347*
Canada (U.S. English)	37/1140*	850/858*	819	1252/5348*
Croatia	870	852	912	1250/5346*
Czech Republic	870	852	912	1250/5346*
Denmark	277/1142*	850/858*	819	1252/5348*
Finland (Swedish)	278/1143*	850/858*	819	1252/5348*
France	297/1147*	850/858*	819	1252/5348*
Germany	273/1141*	850/858*	819	1252/5348*
Greece	875 or 423	869	813	1253/5349*
Hungary	870	852	912	1250/5346*
Iceland	871/1149*	850/858*	819	1252/5348*
International Latin-1	500/1148*			
Israel	424	862	916	1255/5351*
Italy	280/1144*	850/858*	819	1252/5348*
Latin America (Spanish)	284/1145*	850/858*	819	1252/5348*
FYR Macedonia	1025			1251/5347*
Netherlands (U.S. English)	37/1140*	850/858*	819	1252/5348*
New Zealand (U.S. English)	37/1140*	437	819	1252/5348*
Norway	277/1142*	850/858*	819	1252/5348*
Poland	870	852	912	1250/5346*
Portugal (U.S. English)	37/1140*	850/858*	819	1252/5348*
Russia (Cyrillic)	1025			1251/5347*
Serbia and Montenegro (Cyrillic)	1025			1251/5347*

Table 139. Single-byte coded character set identifiers (CCSIDs) (continued)

Country or national language	EBCDIC	ASCII PC	ASCII AIX®	ASCII Windows
Serbia and Montenegro (Latin)	870	852	912	1250/5346*
Spain	284/1145*	850/858*	819	1252/5348*
Sweden	278/1143*	850/858*	819	1252/5348*
Switzerland	500 /1148*	850/858*	819	1252/5348*
Thailand	838			
Turkey (Latin 5)	1026	857	920	1254/5350*
United Kingdom	285/1146*	850/858*	819	1252/5348*
U.S.A. (U.S. English)	37/1140*	437	819	1252/5348*

Note: \* This number represents the equivalent CCSIDs using the euro symbol.

Table 140. EBCDIC double-byte coded character set identifiers (CCSIDs)

National language	MCCSID	SCCSID	GCCSID	User-defined characters
Japanese (Extended Katakana)	930	290	300	4370
Japanese (Katakana-Kanji)	1390	8482	16684	6205
Japanese (Extended Katakana)	5026	290	4396	1880
Japanese (Extended English)	939	1027	300	4370
Japanese (Latin-Kanji)	1399	5123	16684	6205
Japanese (Extended English)	5035	1027	4396	1880
Korean	933	833	834	1880
Korean	1364	13121	4930	1880
Simplified Chinese	935	836	837	1880
Simplified Chinese	1388	13124	4933	1880
Traditional Chinese	937	28709	835	6204
Traditional Chinese	1379	28709	1378	628
Traditional Chinese	5475	28709	5474	628
Traditional Chinese	1371	1159	9027	6204

Table 141. ASCII double-byte coded character set identifiers (CCSIDs)

National language	MCCSID	SCCSID	GCCSID	User-defined characters
Japanese	932	897	301	1880
Japanese (Extended)	942	1041*	301	1880
Japanese (Open environment)	943	1041*	941	1880
Japanese (HP)	5039	1041*	1351	940
Korean	949	1088	951	1880
Korean (EUC)	970	367	971	1880
Korean	1363	1126	1362	1880
Simplified Chinese	1381	1115	1380	1880
Simplified Chinese (EUC)	1383	367	1382	
Simplified Chinese	1386	5210	1385	1880
Traditional Chinese	938	904	927	6204
Traditional Chinese	948	1043	927	6204
Traditional Chinese (IBM Big-5)	950	1114	947	

Note: \* The SCCSID 1041 is a superset of SCCSID 897.

## Implications of character conversions

Some character conversions have implications that you should be aware of. For example, when a character string is converted to another encoding scheme, the converted string might have a different length from the source string. In this case, the conversion is an *expanding conversion* or a *contracting conversion*.

**Expanding conversions:** An *expanding conversion* occurs when the length of the converted string is greater than that of the source string. For example, an expanding conversion occurs when an ASCII mixed data string that contains DBCS characters is converted to EBCDIC mixed data. Because of the addition of shift characters, an error occurs when an expanding conversion is performed on a fixed-length input host variable that requires conversion from ASCII mixed data to EBCDIC mixed data. The solution is to use a varying-length string variable with a maximum length that is sufficient to contain the expansion. Expanding conversions also can occur when string data is converted to or from Unicode.

**Contracting conversions:** A *contracting conversion* occurs when the length of the converted string is smaller than that of the source string. For example, a contracting conversion occurs when an EBCDIC mixed data string that contains DBCS characters is converted to ASCII mixed data due to the removal of shift characters. Contracting conversions also can occur when string data is converted to or from Unicode.

## Euro symbol support

Db2 enables users to migrate to CCSIDs that support the euro symbol. This support is limited to conversion from specific CCSIDs that do not define the euro symbol to specific CCSIDs that define the euro symbol.



**Attention:** If you want to migrate to CCSIDs that support the euro symbol, contact IBM Software Support. Altering CCSIDs without specific guidance from IBM Support is strongly discouraged.

The tables below list the ASCII and EBCDIC CCSIDs that can be converted to CCSIDs that support the euro symbol. In most cases, the euro symbol replaces an existing code point, such as the International

Currency Symbol (ICS). Unicode UTF-8 (1208) and UTF-16 (1200) support the euro symbol. Unicode SBCS data (367) does not support the euro symbol.

The CCSIDs that you can modify are listed according to the encoding scheme. The first table below lists the EBCDIC CCSIDs, and the second table below lists the ASCII CCSIDs.

*Table 142. EBCDIC CCSID values that convert to euro CCSIDs*

<b>CCSIDs without euro symbol</b>	<b>CCSIDs with euro symbol</b>
37	1140
273	1141
277	1142
278	1143
280	1144
284	1145
285	1146
297	1147
500	1148
871	1149

*Table 143. ASCII CCSID values that convert to euro CCSIDs*

<b>CCSIDs without euro symbol</b>	<b>CCSIDs with euro symbol</b>
850	858
1250	5346
1251	5347
1252	5348
1253	5349
1254	5350
1255	5351
1256	5352
1257	5353
874	4970

You cannot convert other CCSIDs to CCSIDs that support the euro symbol. All databases and all table spaces within an encoding scheme should be altered at the same time.

If you migrate to a euro-enabled CCSID on Db2 and you have Db2 Connect clients, you should set the DB2CONNECT\_ENABLE\_EURO\_CODEPAGE environment variable on the client side.

### **Related tasks**

[Updating subsystem parameter and application default values](#)



You can dynamically update the value of some subsystem parameters while Db2 is running. For other subsystem parameters, you must stop and restart Db2 to change the values.

## How an entry in **SYSIBM.SYSSTRINGS** works with character conversion

---

The catalog table SYSIBM.SYSSTRINGS contains information about character conversion. Each row in the table describes a conversion from one coded character set to another.

The following columns in SYSSTRINGS are relevant to character conversion.

### **INCCSID**

The source CCSID of a character conversion.

### **OUTCCSID**

The target CCSID of a character conversion.

### **TRANSTYPE**

The type of conversion:

#### **SS**

SBCS data to SBCS data

#### **SM**

SBCS data to EBCDIC MIXED data

#### **MS**

EBCDIC MIXED data to SBCS (EBCDIC and ASCII) data

#### **PS**

ASCII MIXED data to SBCS (EBCDIC and ASCII) data

#### **GG**

GRAPHIC data to GRAPHIC data

#### **PM**

ASCII MIXED data to EBCDIC MIXED data

#### **MM**

EBCDIC MIXED data to EBCDIC MIXED data

#### **MP**

EBCDIC MIXED to ASCII MIXED data

#### **PP**

ASCII MIXED to ASCII MIXED data

#### **SP**

SBCS (ASCII and EBCDIC) to ASCII MIXED data

### **ERRORBYTE**

Specifies the byte that is used in the conversion table (TRANSTAB) as an error indicator. For example, if ERRORBYTE is X'3E', that byte is used in the conversion table to indicate that no conversion is defined for code points that map to X'3E'. Null indicates the absence of an error indicator.

### **SUBBYTE**

Specifies the byte that is used in the conversion table (TRANSTAB) as a substitution character. For example, if SUBBYTE is X'3F', that byte is used in the conversion table as a substitute for code points that map to X'3F'. A warning occurs when a code point maps to the value of SUBBYTE. Null indicates the absence of a substitution character.

### **TRANSPROC**

The name of a module or a blank string. If IBMREQD is N, a non-blank value of TRANSPROC is the name of a user-provided conversion procedure. If IBMREQD is Y, a non-blank value of TRANSPROC is the name of a Db2 module that contains DBCS conversion tables.

### **IBMREQD**

Y indicates that the row is provided by IBM. N indicates that the row has been inserted by the user.

## TRANSTAB

A 256-byte conversion table or an empty string.

Each row of SYSSTRINGS contains information about the conversion of character strings from the coded character set that is identified by INCCSID to the coded character set that is identified by OUTCCSID. The conversion function is automatically invoked when a conversion from the coded character set that is identified by the INCCSID column to the coded character set that is identified by the OUTCCSID column is required.

For example, the row of SYSSTRINGS in which the value of INCCSID is 500 and the value of OUTCCSID is 37 describes the conversion from CCSID 500 to CCSID 37. The row in which the value of INCCSID is 37 and the value of OUTCCSID is 500 describes the conversion from CCSID 37 to CCSID 500.

Db2 enforces a distinction between IBM-supplied rows and user-provided rows with the following constraints:

- Rows with IBMREQD=Y cannot be updated or deleted.
- Rows with IBMREQD=N can be inserted, updated, and deleted.
- The same pair of CCSIDs can be in two rows, if one is in an IBM-supplied row and the other is in a user-provided row. In this case, the user-provided row is used for the character conversion.

The following table lists the types of rows that are possible in SYSSTRINGS.

Table 144. Types of rows in SYSSTRINGS

The value of TRANSPROC is	The value of TRANSTAB is	The value of IBMREQD is	The result is
blank	an empty string	–	No conversion is performed.
not blank	–	NO	Conversion is performed by the conversion procedure module name identified in the TRANSPROC column
blank	not empty	–	Conversion is performed by the Db2 module using the conversion table identified in TRANSTAB

Be aware of the following rules for SYSSTRINGS entries:

- An INSERT, UPDATE, DELETE, or LOAD is allowed only if IBMREQD=N.
- The values in the INCCSID and OUTCCSID columns must be in the range 1–65533.
- For any given row, the INCCSID and OUTCCSID columns cannot contain the same value.
- The value in the TRANSTYPE column must be SS, SM, MS, PS, MM, PM, GG, MP, PP, or SP.
- For any given row, the ERRORBYTE and SUBBYTE columns cannot contain the same nonnull value.
- The TRANSPROC column must either be blank or contain a string that conforms to the rules for z/OS program names.
- The length that is specified in the TRANSTAB column must be either 0 or 256.

### Related reference

[z/OS XL C Support for the double-byte character set \(XL C/C++ Programming Guide\)](#)

## Conversion-related changes that require remote packages to be rebound

Certain conversion-related changes at the local DBMS or at a remote DBMS might force the rebinding of a package.

These include the following changes:

- The system CCSID at the remote DBMS was changed. In this case, always rebound the package.

- The system CCSID at the local DBMS was changed. This could happen, for example, if the wrong system CCSID was specified during installation. If so, string constants in static SQL statements might have been converted incorrectly during the binding of the package. Rebinding corrects the conversion. Other problems might also arise as a result of the change. In most cases, you should rebind the package.
- The subtype of a character column is changed at the remote DBMS. The pertinent changes are from BIT to either SBCS or MIXED, and from SBCS or MIXED to BIT. The change was probably made by modifying the FOREIGNKEY column of the SYSIBM.SYSCOLUMNS table in the remote system catalog. Alternatively, the change might have occurred if the table was dropped and re-created with a different subtype (BIT to either SBCS or MIXED, or either SBC or MIXED to BIT) after the application was bound. A statement that refers to a column with a modified subtype might fail with an SQLCODE of -333. If this occurs, rebind the package containing the statement.

## Locales for uppercase and lowercase conversion of EBCDIC data

Rules for uppercase and lowercase usage vary according to language and country. A *locale* defines the subset of a user's environment that depends on language and cultural conventions.

Db2 uses the information that is associated with a locale to execute UPPER, LOWER, and TRANSLATE functions in a culturally correct manner. A locale consists of two components: the first component represents a specific language and country, and the second component is a CCSID.

**Example:** In the locale, Fr\_CA.IBM-1047, Fr\_CA represents the language and country (French Canadian), and IBM-1047 is the associated CCSID.

The symbol for euro currency is supported through the modifier @EURO.

**Example:** To display results in euro dollars instead of French Francs, specify Fr\_FR@EURO.

Db2 uses the SCEELKED and SCEERUN Language Environment (LE) libraries. Both libraries are PDS libraries and are for non-XPLINK linkage only. If you need to customize the locales using Language Environment libraries, see [Internationalization: Locales and Character Sets \(XL C/C++ Programming Guide\)](#).

The following table shows a partial list of locales that are supplied with z/OS C/C++. For a more complete list of locales, see [Compiled locales \(LE locales\) \(XL C/C++ Programming Guide\)](#).

*Table 145. Examples of locales supplied with z/OS C/C++. Excerpt of table from z/OS C/C++ Programming Guide*

Locale	Language	Country	Code set	Load module name
De_CH.IBM-500	German	Switzerland	IBM-500	EDC\$DCEO
De_CH.IBM-1047	German	Switzerland	IBM-1047	EDC\$DCEY
De_DE.IBM-273	German	Germany	IBM-273	EDC\$DDEB
De_DE.IBM-1047	German	Germany	IBM-1047	EDC\$DDEY
Fr_CA.IBM-037	French	Canada	IBM-037	EDC\$FCEA
Fr_CA.IBM-1047	French	Canada	IBM-1047	EDC\$FCEY
It_IT.IBM-280	Italian	Italy	IBM-280	EDC\$ITEG
It_IT.IBM-1047	Italian	Italy	IBM-1047	EDC\$ITEY
Ja_JP.IBM-290	Japanese	Japan	IBM-290	EDC\$JAEL
Ja_JP.IBM-930	Japanese	Japan	IBM-930	EDC\$JAEU
Ja_JP.IBM-939	Japanese	Japan	IBM-939	EDC\$JAEV
Ja_JP.IBM-1027	Japanese	Japan	IBM-1027	EDC\$JAEX

# Setting up z/OS to allow uppercase and lowercase conversion of Unicode and ASCII data

---

If you want to use the UPPER or LOWER built-in functions to process Unicode and ASCII data, you must complete additional setup. You must also complete additional setup if you want to use uppercase or lowercase conversions for characters other than A–Z or a–z.

## Procedure

Add control statements to the configuration of z/OS Support for Unicode services.

## Example

Assume that your EBCDIC CCSID is 37 and your ASCII CCSID is 819, and that you have defined the following conversions:

```
CONVERSION 37,367,ER;
CONVERSION 37,1208,ER;
CONVERSION 37,1200,ER;
CONVERSION 367,37,ER;
CONVERSION 1208,37,ER;
CONVERSION 1200,37,ER;
CONVERSION 819,367,ER;
CONVERSION 819,1208,ER;
CONVERSION 819,1200,ER;
CONVERSION 367,819,ER;
CONVERSION 1208,819,ER;
CONVERSION 1200,819,ER;
```

Modify your conversion image as follows:

```
CASE NORMAL; /* normal casing */
CASE SPECIAL; /* additional locale-independent casing */
CASE LOCALE; /* additional locale-dependent casing */
CONVERSION 37,367,ER;
CONVERSION 37,1208,ER;
CONVERSION 37,1200,ER;
CONVERSION 367,37,ER;
CONVERSION 1208,37,ER;
CONVERSION 1200,37,ER;
CONVERSION 819,367,ER;
CONVERSION 819,1208,ER;
CONVERSION 819,1200,ER;
CONVERSION 367,819,ER;
CONVERSION 1208,819,ER;
CONVERSION 1200,819,ER;
```

The three additional CASE statements provide the necessary infrastructure for the UPPER and LOWER functions to process Unicode data according to the Unicode Standard.

---

## Appendix A. Db2 application provisioning, development, and deployment (DevOps) solutions

Application developers can use these solutions to use DevOps practices to provision, develop, test, and deploy Db2 for z/OS database applications, with automation based on business rules.

With these solutions, you can enable application developers to provision a database schema with or without data on development and test environments, and use templates to roll out the database schema changes for the application changes to one or more target environments in parallel. You can also enable them to use continuous integration and continuous delivery for application changes on the Db2 for z/OS platform.

Some capabilities in these solutions require other IBM offerings, such as Db2 DevOps Experience for z/OS, UrbanCode® Deploy (UCD), and z/OS Management Facility (z/OSMF). These solutions are delivered in separate parts that support different user roles and activities.

### Related reference

[IBM z/OS Management Facility Online Help](#)

### Related information

[IBM Db2 DevOps Experience for z/OS](#)

[IBM DevOps Deploy](#)

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## Creating services for provisioning Db2 for z/OS (DBaaS)

You can use the sample Db2 software services template to create a service that rapidly provisions multiple Db2 for z/OS subsystems or data sharing groups, and deprovision them later.

### Before you begin

Various administrators must provide information and prepare the z/OS environment for the Db2 software service template. For a list of these tasks, see "Preparing the environment for the Db2 software service template" in the readme file in GitHub.

Configure z/OSMF Version 2.3 with APAR PH09130 or higher.

### About this task

The sample runs as a *software service template* in IBM Cloud Provisioning and Management for z/OS. For an overview, see [IBM Cloud Provisioning and Management for z/OS](#).

You can use the sample Db2 software service template, to build your own Db2 software service template to provision multiple stand-alone Db2 12 for z/OS subsystem instances, or an *n*-way data sharing group (cluster), in a "typical Db2 configuration" based on the latest best practices. For details, see "About the sample Db2 software service template" in the readme file in GitHub.

The sample Db2 software service template also makes the following actions available in the service, for the provisioned Db2 subsystems:

- Start Db2.
- Stop Db2.
- Display DDF information.
- Display group information.
- Enable optional features ( Db2 REST services, ODBC, and JDBC).
- Deprovision the provisioned Db2 subsystem.

**Tip:** An alternative to using the sample Db2 software service template is to run the installation CLIST to generate the required artifacts. This approach supports more customization of the provisioned Db2 subsystems than the sample Db2 software service template. For more information, see [“Creating artifacts for provisioning Db2 by running the installation CLIST”](#) on page 371.

## Procedure

To create services for provisioning Db2 subsystems or data sharing groups:

1. Download and prepare the sample template:

- a) Obtain the artifacts for the sample template by downloading the appropriate pax file from GitHub at <https://github.com/IBM/Db2ZTools/tree/master/DevOps/Db2SystemServices/Db2ProvisionSystemNonDS>.

Db2 system type	Artifacts pax file
Db2 data sharing	Db2ProvisionSystemDS.pax
Stand-alone Db2	Db2ProvisionSystemNonDS.pax

- b) Upload the file by using FTP in binary mode to a directory in z/OS UNIX System Services.  
c) Extract the pax file into the directory of your choice.

Db2 system type	Example command
Db2 data sharing	<code>pax -rvf Db2ProvisionSystemDS.pax</code>
Stand-alone Db2	<code>pax -rvf Db2ProvisionSystemNonDS.pax</code>

- d) If you are using the sample artifacts before building your own template, you must update the `dsntiv.in` input variable file, and the `dsntivia` file for data sharing, with values for your installation, as described in the "Specifying input properties" section of the Readme file.
2. Test the provisioning template, verify the provisioned Db2 system, and test the deprovisioning process.  
3. Publish the template to make it available to consumers.

### Related information

[IBM Cloud Provisioning and Management for z/OS  
Cloud provisioning services](#)

## Creating standalone Db2 subsystem provisioning services

With the Db2 software services template, you can create services that rapidly provision from scratch one or multiple standalone Db2 subsystems, in IBM Cloud Provisioning and Management for z/OS. For information about cloud provisioning, including a description of the roles involved, see [Cloud provisioning services](#).

The sample Db2 software service template is built on top of z/OSMF cloud provisioning service infrastructure. For more information about how to load and use the service in z/OSMF, see [Software Services task overview](#).

The sample Db2 software service template exploits the Network Resource Pool under the z/OSMF Cloud Provisioning Resource Management. For more information, see [Resource authorizations for the Configuration Assistant plug-in](#). For a tutorial that walks you through the steps that are needed, see [Getting Started Tutorial – Cloud](#).

This readme is intended for the service provider, who configures and makes the Db2 subsystem provisioning service available to consumers in your shop.

## About the sample Db2 software service template

You can use the sample Db2 software service template, to build your own Db2 software service template to provision multiple standalone Db2 12 for z/OS subsystem instances in a “typical Db2 configuration” with the following attributes:

- The subsystem name (ssid) is based on two characters that you specify, and a two-digit numeric value that indicates the unique instance. The examples throughout this readme assume that you specify DY and that you specify five instances, so that Db2 subsystems are provisioned with the following names for ssid: DY00, DY01, DY02, DY03, and DY04.
- Other names within provisioned Db2 subsystems are based on a standard [naming convention](#).
- Accepts only TCP/IP connections.
- Subsystem parameter (zPARMS) settings, as recommended by the latest best practices.
- Three dual sets of active logs.
- Archive logs and images copies to DASD only.
- The following work files:
  - For sort work, one 4K and one 32K work file, with PRIQTY 20MB and SEGSIZE 16
  - For declared global temporary tables (DGTT), one 4K and one 32K workfile, with PRIQTY 20MB and SEGSIZE 16
- The following default buffer pools for user data, with 5000 buffers for each:
  - BP1 for table spaces with 4 KB pages
  - BP8K1 for table spaces with 8 KB pages
  - BP16K1 for table spaces with 16 KB pages
  - BP32K1 for tables spaces with 32 KB pages
  - BP32K2 for LOB data
  - BP16K2 for XML data
  - BP2 for indexes
- All Db2-supplied stored procedures installed and verified.
- Optionally, the following features enabled and verified:
  - Db2 REST services
  - ODBC connectivity
  - JDBC type-2 and type-4 connections

Later, you can also use the sample Db2 software service template to deprovision the provisioned Db2 subsystems.

## Setting up the sample Db2 software service template

The files of the service are stored in a directory in z/OS UNIX System Services, and the directory and files must be accessible to z/OSMF. All required files are compressed into the Db2ProvisionSystemNonDS.pax file.

1. Download the Db2ProvisionSystemNonDS.pax file.
2. Use FTP in binary mode to upload the Db2ProvisionSystemNonDS.pax file to the directory where you want to store the service in z/OS UNIX System Services. The maximum length for the directory name is 40 characters.
3. Extract the file into the directory of your choice, for example:

```
pax -rvf Db2ProvisionSystemNonDS.pax
```

Inside the directory that you specified, the extracted directory <service-base-dir> has the following structure:

File	Description
dsntiwin.xml, dsnopent.xml	Workflows to provision a Db2 standalone subsystem and enable optional features (Db2 REST services, ODBC, JDBC)
actions.xml	A workflow for actions of the service
dsndepriv.xml	A workflow to deprovision a Db2 standalone subsystem
dsnstart.xml	A workflow for starting the Db2 subsystem
dsnstop.xml	A workflow for stopping the Db2 subsystem
dsndddf.xml	A workflow for displaying DDF details for the Db2 subsystem
dsndgrpd.xml	A workflow for issuing the -DISPLAY GROUP DETAIL command
dsnoptft.xml, dsnopent.xml	Workflows for enabling optional features (Db2 REST services, ODBC, JDBC)
dsnti*	Several JCL templates used by the dsntiwin.xml, dsnopent.xml, dsnstart.xml, dsnstop.xml, and dsndepriv.xml workflows
dsnte*	Several JCL templates used by the dsntiwin.xml and dsnopent.xml workflows
dsntivin	The input property file used by the workflows

In addition, copy `db2provision.jar` in binary into your installation's `DB2BASE/classes` directory. This jar file is installed by default in the directory specified by the DDDEF created for SDSNACLS.

4. Update the files in the template for changes to subsystem parameters in the following APARs. For instructions, see the following readme files:

- [ph24358\\_readme.md](#)
- [ph26317\\_readme.md](#)

## Preparing the environment for the Db2 software service template

Before building your own template based on the sample, verify with the following administrators that their prerequisite tasks are complete:

### **Cloud provisioning administrator tasks**

- Enable Cloud Provisioning Software Services in the z/OSMF server.
- Enable a network resource pool (NRP) in the z/OSMF server, with a port allocation range enough for the number of instances provisioned. Each Db2 subsystem requires two ports, a port for DRDA and REST services and a RESYNC port.

### **System programmer tasks**

- Provide the SMP/E Db2 product target libraries, with the the following Db2 12 APARs applied: PI85657, PI97635, PI99403, PH02971, PH05259, and PH06733; and if Db2 REST services will be enabled on the provisioned Db2 subsystems, APARs PI70652 and PI96649.
- Certify that the SMP/E Db2 product target libraries for SDSNEXIT, SDSNLINK, SDSNLOAD, SDSNLOD2 and IRLM RESLIB are APF-authorized **Note:** SDSNLOD2 is a PDSE data set, which contains JDBC and SQLJ DLLs. Although DB2 does not require that SDSNLOD2 be APF-authorized, be aware that if this



data set is in a STEPLIB data set concatenation of an address space that does need APF authorization, SDSNLOD2 must also be APF-authorized. The provisioning template concatenates SDSNLOD2 when verifying JDBC local connection (Type-2) in Optional Features.

- Provide data set names, including for host languages (see Section 7: Host language data sets, in the dsntivin file.)
- Provide directories for the following installed FMIDs:
  - **JDBCC12** for Db2 JDBC/SQLJ. All variables must be set in Section 6: Db2 Java properties, in the dstnivin file.
  - **JDBCC17** for Db2 ODBC. The following variables must be set in Section 7: Host language data sets, in the dstnivin file: CCOMP, CPPAUTCL, LELKED, LEPLMSG, and LERUN.
  - **HDDA211** for z/OS Application Connectivity.
- Verify installation, and provide directories where indicated, for the following installed FMIDs:
  - **JDBCC12** for Db2 JDBC/SQLJ. All variables must be set in Section 6: Db2 Java properties, in the dstnivin file.
  - **JDBCC17** for Db2 ODBC. The following variables must be set in Section 7: Host language data sets, in the dstnivin file: CCOMP, CPPAUTCL, LELKED, LEPLMSG, and LERUN.
  - **HDDA211** for z/OS Application Connectivity.
  - **HDBCC1K** for Db2 Utilities Suite for z/OS.

### **Network administrator tasks**

- Provide a range of TCP/IP ports to be used under the Network Resource Pool (NRP). The ports in this range cannot be part of the TCP/IP Profile.

### **Security administrator tasks**

- Provide the Db2 authorization IDs in the following table for Section 4: Db2 authorization IDs in the dsntivin file:

<b>Field or ID</b>	<b>Input variable</b>	<b>Remarks</b>
Executor ID for workflow steps	AGEXECID	This ID requires authority to generate RACF Passtickets and UPDATE access to the MVSADMIN.WLM.POLICY facility class, if the RACF facility class is active.
CONSOLE NAME	CONSNAME	This ID must have z/OS console operator authority, to issue Db2 START/STOP commands.
ROUTINES CREATOR	AUTHID	The CURRENT SQLID when creating, configuring, and validating Db2-supplied stored procedures. This ID requires the following authorities:- READ access to the MVSADMIN.WLM.POLICY facility class, if the RACF facility class is active- READ access to the MVS.MCSOPER.DSNTRVY opercmds class, if the RACF opercmds class is active.

Field or ID	Input variable	Remarks
SEC DEF CREATOR	SECDEFID	The CURRENT SQLID when creating, configuring, and validating Db2-supplied stored procedures, that are created with the SECURITY DEFINER option.
INSTALL SQL ID	INSSQLID	
INSTALL GRANTEE(S)	INSGRLST	
INSTALL PKG OWNER	INSPKOWN	
IVP SQL ID	IVPSQLID	
IVP PACKAGE OWNER	IVPPKOWN	
IVP GRANTEE(S)	IVPGRLST	
SYSTEM ADMIN 2	PROTADM2	
SYSTEM ADMIN 1	PROTADMN	
SYSTEM OPERATOR 1	PROTOPR1	
SYSTEM OPERATOR 2	PROTOPR2	
SECURITY ADMIN 1	SECADMN1	
SECURITY ADMIN 2	SECADMN2	
PACKAGE OWNER	RTM05PK0	The ID to own the package for the Db2-supplied SYSPROC.DSNAHVPM stored procedure.

- Define RACF STARTED class profiles to all potential provisioned Db2 subsystem instances associating an ID to be used by each Db2 address space.
- Define RACF DSNR class profiles to control access to any provisioned Db2 subsystem from another environment, such as CICS, IMS, TSO, RRS, BATCH, DDF and REST services.
- Define RACF SERVER class profiles to control access to any provisioned Db2 subsystem because they will use stored procedures in a WLM-established address space.

### **Storage administrator tasks**

- Define SMS constructs, such as SMS classes and storage groups, for Db2 provisioning. The SMS storage groups can be per instance or shared by all potential provisioned Db2 instances. The storage administrator can decide if image copy data sets and archive log data sets are to share the SMS storage groups with other Db2 data sets.
- Together with the security administrator, provide access authorization to all prefixes in the following table to the Db2 IDs, including the ID that executes the steps of the Db2 provisioning workflow.
- Define ACS routines to be used to determine the SMS classes and storage groups for data sets allocation during a Db2 subsystem provisioning.
- Define USERCATs and ALIASes, associating them to their specific SMS storage group. **Important:** The provisioning process determines the ssid value. You must do the definition work for all potential instances. If you are allowing 5 instances, then you must have 5 sets of definitions below corresponding to the 5 ssid (s) that can be generated. For example: DY00SYS, DY01SYS, and so on.

prefix	to be used for
a) ssidSYS	Db2 catalog, directory, and IVP data sets

prefix	to be used for
b) ssidLOG	Db2 BSDS, active logs, and archive logs data sets
c) ssidUSR	Db2 User data
d) ssidCP1	Db2 Image Copy data sets
e) HLQ	Aliases for the SMP/E libraries and Db2 non-SMP/E data sets. <sup>(1)</sup>

(1) The HLQ here will be concatenated with the instantiated ssid and used as the prefix in all aliases and non SMP/E Db2 data sets.

## Naming conventions for the sample Db2 software service template

The template uses the following naming conventions. The naming conventions are very important for coordination of the IBM Cloud Provisioning and Management register between provision and deprovision processes.

Named item	Name format and description
Db2 subsystem identifier – (ssid)	ssid - two characters provided when building the template plus a two-character sequential number. Throughout this information, ssid refers to this value. The template enforces that ssid is 4 characters. For example, if you specify DY, ssid is DY00. <b>Recommendation:</b> Start with “D” and another character to identify the set of Db2 subsystems. Do not use the letter “I” as the first character.
IRLM subsystem identifier	Isid - The template builds the name by replacing the first character of the provisioned Db2 subsystem by the letter “I.” For example: DY00 and IY00`
Db2 SMP/E TLIB data set	HLQ.ssid.SDSN*
IRLM SMP/E TLIB data set	HLQ.ssid.SDXRRESL
Db2, IRLM, and WLM address space startup procedures	ssidMSTR, ssidDBM1, ssidDIST, ssidIRLM, and ssidWLMx
Db2 command prefix	-ssid
Db2 location	ssid
Db2 IPNAME	ssid
Db2 ZPARM	ssidZPRM
Db2 BSDS	ssidLOG.ssid.BSDSnn
Db2 active Logs	ssidLOG.ssid.LOGCOPYn.DSmm
Db2 archive Logs	ssidLOG.ssid.ARCLGn
Db2 catalog and directory	ssidSYS.*
Db2 image copy template	ssidCP1.&DB..&SN..&IC..D&JU..T&TI.
Db2 flash copy template	ssidCP1.&DB..&SN..N&DSNUM..&UQ.
Db2 non-VSAM data sets	HLQ.ssid.*

Named item	Name format and description
Compression Dictionary Data Set (CDDS) prefix	ssidSYS
Db2 WLM application environments for supplied stored procedures – (*)	ssidWLM_GENERALssidWLM_PGM_CONTROLssidWLM_UTILssidWLM_NUMTCB1ssidWLM_XMLssidWLM_JAVAssidWLM_REXXssidWLM_DEBUGGERSsidWLM_DSNACICS ssidWLM_MQSERIES ssidWLM_WEBSERVICES
Java runtime options (JAVAENVV, JVMPROPS)	\${DB2BASE}/classes/ssidenvfile.txt and \${DB2BASE}/classes/ssidjvmsp
Db2 program preparation and utilities invocation JCL procedures	HLQ.ssid.PRIVATE.PROCLIB - The template allocates a “private.proclib” data set, to add the Db2 program preparation and utilities invocation JCL procs per each provisioned Db2 subsystem

## Specifying input properties

The dsntivin input variable file defines and describes more than 1200 input properties that define the Db2 subsystem. At provisioning time, values are set for about 200 of these variables based on the Db2 subsystem instance name being provisioned. The remaining variables are defined with default values from the sample template, or the values entered in the install CLIST panel. Review these values carefully before you publish the template.

If you are using the sample artifacts before building your own template, you must edit the dsntivin input variable file, and update it according to your installation as follows:

1. In Section 1: Variables to support provisioning instantiation, you do not need to change anything, unless you want to use a COMMAND PREFIX (AGSSIDPX) to use other character than – (hyphen)
2. In Section 2: Db2 function level, no changes are required. The sample template is built on top of Db2 12 function level 502.
3. You must update the values in each of the following sections for your environment in:
  - Section 3: Db2 install data sets prefix/HLQ
  - Section 4: Db2 authorization IDs
  - Section 5: Db2 product SMP/E target libraries
  - Section 6: Db2 Java properties
  - Section 7: Host language data sets
  - Section 8: Other data sets
1. In Section 9: Variables whose values will be generated at provisioning time, do not change anything. The values of the variables in this section are built at provisioning time according to the subsystem instance name (ssid) being provisioned and the naming convention rules for provisioning.
2. In Section 10: Variables with default values for provisioning a typical Db2 configuration, you do not need to change any of these variables if you want the recommended configuration. The following table lists variables that use different default values than are used by the Db2 installation CLIST.

Variable name (parameter name if different)	Db2 CLIST default	Template default
ABIND	YES	COEXIST
ACCUMACC	10	NO

Variable name (parameter name if different)	Db2 CLIST default	Template default
ADMTPROC	ssidADMT	blank
ARCHDEVT (UNIT)	TAPE	SYSDA
ARCHDEV2 (UNIT2)	blank (no value)	SYSDA
ARCHTS (TSTAMP)	NO	YES
ASCSSID	blank (no value)	819
BP1	0	5000
BP2	0	5000
BP8K0	2000	5000
BP8K1	0	5000
BP16K0	500	5000
BP16K1	0	5000
BP16K2	0	5000
BP32K	250	5000
BP32K1	0	5000
BP32K2	0	5000
BSACP (ALTERNATE_CP)	blank	NO
CHKTYPE	MINUTES	SINGLE
CMPSP01 (COMPRES_SPT01)	NO	YES
CQAC (QUERY_ACCELERATION)	1	NONE
DDFSTART (DDF)	NO	AUTO
DEFCCSID	blank (no value)	37
EDMDBDC	23400	40960
EDMSKP (EDM_SKELETON_POOL)	51200	81920
EDMSTMTC	113386	122880
IDXBPOOL	BP0	BP2
LBACKOUT	AUTO	LIGHTAUTO
MNSU(MATERIALIZE_NODET_SQ LTUDF)	YES	NO
MON	NO	YES
NUMCONBT (IDBACK)	50	200
NUMCONTS (IDFORE)	50	200
OPSMFSTA (SMFSTAT)	YES	*
OPNDS (DSMAX)	calculated value	20000
OPTHINTS	NO	YES
OPTRCSIZ (TRACTBL)	16	25

Variable name (parameter name if different)	Db2 CLIST default	Template default
(OTC_LICENSE)	blank (no value)	NO
PARAMDEG	0	16
PALK (PREVENT_ALERTTB_LIMITKEY)	NO	YES
PFUP (PCTFREE_UPD)	0	AUTO
PCLOSEN	10	15
SMFCOMP	OFF	ON
SYNCVAL	NO	0
TBSBPOOL	BP0	BP1
TBSBP8K	BP8K0	BP8K1
TBSBP16K	BP16K0	BP16K1
TBSBP32K	BP32K0	BP32K1
TBSBPLOB	BP0	BP32K2
TBSBXML	BP16K0	BP16K2
UTO (UTILITY_OBJECT_CONVERSION)	NONE	EXTENDED
WFDBSEP	NO	YES

After your input properties file is updated with your installation values, you can create your own template under the z/OSMF Cloud Provisioning Software Services.

## Preparing and publishing the Db2 software service template

1. In z/OSMF Cloud Provisioning Software Services, add a standard template. For general instructions for this process, see [Prepare and publish a template](#) and [Add a template and resource pool](#).
  - a. When you create the template, specify the following file names, where <service-base-dir> is the directory where you unboxed the Db2ProvisionSystemNonDS.pax file:
    - For the workflow file, specify: <service-base-dir>/dsntiwin.xml
    - For the actions file, specify: <service-base-dir>/actions.xml
    - For the workflow variable input file, specify: <service-base-dir>/dsntivin
  - b. Associate the template with a tenant. When you associate the tenant, specify two leading characters for the subsystem name (ssid), and the number of instances to provision. For example, if you specify DY and you specify five instances, Db2 subsystems are provisioned with the following names for ssid: DY00, DY01, DY02, DY03, and DY04.
  - c. Use the network configuration assistant to specify the port ranges to use for the provisioned Db2 subsystems. Two ports must be provided for each instance being provisioned, a DRDA and REST services port, and a RESYNC port.
  - d. Test the provisioning template and verify the provisioned Db2 subsystems.
  - e. Publish the template to make it available to consumers.

## ***Steps in the provisioning workflow (dsntiwin.xml)***

When you execute the provisioning workflow, you are prompted to specify whether you want to execute the optional features.

To provision a standalone Db2 subsystem, the sample template completes the following steps:

1. Instantiates the Db2 subsystem ID (ssid) being provisioned
2. Sets the variables (section 9 of DSNTIVIN) according to the name convention rules
3. Acquires Db2 ports from the NRP
4. Defines aliases for the Db2 SMP/E target libraries for the instantiated Db2 subsystem
5. Allocates private proclib for instantiated Db2 subsystem
6. Assigns IRLM SSID based on the instantiated Db2 subsystem name
7. Dynamically defines Db2 and IRLM subsystems to z/OS
8. Executes all mandatory steps to install and verify a standalone Db2 subsystem, including: Java definitions, all Db2-supplied stored procedures, SQL Install Verification, Db2 storage groups for user data (ssidUSG), and optionally DDF REST services, ODBC, and JDBC connections (Type-2 and Type-4)

## ***Actions for the provisioned Db2 subsystems***

The following actions are available from z/OSMF Cloud Provisioning Software Services for the provisioned Db2 subsystem:

- Start the Db2 subsystem
- Stop the Db2 subsystem
- Display DDF information
- Display group information
- Enable the optional features (ODBC, JDBC, and REST services)
- Deprovision the Db2 subsystem

## ***Steps in the deprovision workflow (dsndeprv.xml)***

The deprovision workflow removes all definitions and data sets related to the deprovisioned Db2 subsystem. To deprovision a Db2 subsystem, the sample template completes the following high-level actions:

1. Issues a STOP DB2 command; this step will not fail the workflow execution if Db2 is already stopped
2. Releases DRDA/REST services TCP/IP port
3. Releases RESYNC TCP/IP port
4. Deletes IVP and non-VSAM data sets
5. Deletes JAVAENV data set and the Java environment files
6. Deletes Image Copy data sets
7. Deletes Db2 catalog, directory, BSDS, active & archive log data sets, Db2 user data sets
8. Deletes Db2 start up and WLMENV procedures
9. Deletes the Db2 ZPARM module
10. Deletes WLM application environments
11. Deletes aliases defined against Db2 and IRLM SMP/E target libraries
12. Deletes Db2 and IRLM subsystem definitions from z/OSMF

## **Security considerations for the sample Db2 software service template**

The “workflow executor” of the provisioning service must have RACF authority to execute the service, and must also have the following authority:

- Authority to allocate data sets with the HLQ assigned to that Db2 instance, as well as z/OS UNIX System Services files
- Read/write authority for the system PROCLIB and WLM application environment definition
- Authority to generate RACF PassTickets to others executing steps where a password would be required

Db2 itself requires specific authorities when executing some of the installation and provisioning steps, and some workflow steps are executed under user IDs other than the workflow executor, by using the runAsUser ID. For details, see the tables in [Authorizations for workflows](#).

Also, the enablement steps for the optional features have special requirements.

### **Using RACF PassTickets for optional features**

The JDBC enablement optional feature requires connection to the provisioned Db2 subsystem to perform the BIND for the JDBC packages as well as to verify a remote connection (JCC-Type-4).

When connecting, a user ID and password must be passed to the connection statement. Instead of sending clear text passwords, the sample template uses generated RACF PassTickets. Users of the application can then use the PassTickets to authenticate within a RACF-secured network. This procedure prevents the need to store password credentials within the z/OSMF environment.

You must certify that the ID used to execute the workflows has the RACF authority to generate PassTickets to others.

To enable the usage of RACF PassTicket by the sample template, take the following actions:

1. Activate the RACF PassTicket class, by issuing the following commands:

```
SETROPTS CLASSACT(PTKTDATA) RACLIST(PTKTDATA) SETROPTS GENERIC(PTKTDATA)
```

1. Define RACF profiles for the application in PTKTDATA, by issuing the following commands:

```
RDEFINE PTKTDATA <applName> SSIGNON(KEYMASKED(<key>))
APPLDATA('NO REPLAY PROTECTION')
```

In the preceding example: <applName> is the name of the application that requests and uses the PassTickets. Provisioned Db2 subsystems accept TCP/IP connections only, therefore we should use the value of the the IPNAME as <applName>.

<key> is a session key with the value of 16 hexadecimal digits (for an 8-byte or 64-bit key). The session key must be identical to the key in the PassTicket definition in each RACF instance. The key for each application must be the same on all subsystems in the configuration.

APPLDATA('NO REPLAY PROTECTION') is the option that you can use to permit reuse of the same PassTicket multiple times.

The following example shows these commands for provisioning five Db2 subsystems. As described in the [Naming Convention](#) section, the name of the subsystem being provisioned (ssid) is used for the IPNAME value. Because we expect five instances to be provisioned, you can activate them all in one single job, considering that they will be all under the same RACF database.

```
//STEP01 EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
RDEL PTKTDATA (DY00)
RDEL PTKTDATA (DY01)
RDEL PTKTDATA (DY02)
RDEL PTKTDATA (DY03)
RDEL PTKTDATA (DY04)
RDEL PTKTDATA (IRRPTAUTH.DY*.*)
RDEF PTKTDATA DY00 -
  SSIGNON(KEYMASKED(E001193519561977)) -
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')
RDEF PTKTDATA DY01 -
  SSIGNON(KEYMASKED(E001193519561977)) -
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')
RDEF PTKTDATA DY02 -
  SSIGNON(KEYMASKED(E001193519561977)) -
```



```

UACC(NONE) APPLDATA('NO REPLAY PROTECTION')
RDEF PTKTDATA DY03 -
SSIGNON(KEYMASKED(E001193519561977)) -
UACC(NONE) APPLDATA('NO REPLAY PROTECTION')
RDEF PTKTDATA DY04 -
SSIGNON(KEYMASKED(E001193519561977)) -
UACC(NONE) APPLDATA('NO REPLAY PROTECTION')
RDEFINE PTKTDATA IRRPTAUTH.DY*.*
PERMIT IRRPTAUTH.DY*.* CLASS(PTKTDATA) ID(WFexecutorID) ACCESS(UPDATE)
SETROPTS RACLIST(PTKTDATA) REFRESH

```

### **Authorizations for the sample Db2 software service template workflows**

The following tables show the authorizations required for certain steps of the sample template. All other steps run under the authorization ID that executes the workflow. You can specify the authorization ID that executes the workflow in the AGEXECID variable in section 4 of the DSNTIVIN input variable file. If the AGEXECID value is blank, the sign-on ID executes the steps.

*Authorizations for the provisioning workflow (dsntiwin.xml)*

<b>Step name</b>	<b>Job name</b>	<b>Run as user</b>	<b>Job description</b>	<b>RACF authorization</b>
s00DEFSS	DSNTIJMD	SYSADM1/\$ {PROTADMN}	Defines Db2 and IRLM to z/OS by SETSSI	A console that has master authority, or a console operator with sufficient RACF authorization.
step15	DSNTIJTC	SYSADM1/\$ {PROTADMN}	CATMAINT	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
step16	DSNTIJTM	SYSADM1 /\$ {PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
step17	DSNTIJSG	SYSADM1/\$ {PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.

Step name	Job name	Run as user	Job description	RACF authorization
step20b	DSNTIJRT	\${AUTHID}		Db2 authorization: DSNTRIN accepts two auth parms (1) AUTHID ... the authorization ID to use to create most objects specified in ROUTINES CREATOR field of DSNTIPG (2) SECDEFID ... the authorization ID to use to create routines that require SECURITY DEFINER, specified in SEC DEF CREATOR field of DSNTIPG. The user ID needs to be able to SET CURRENT SQLID to these secondary IDs

Step name	Job name	Run as user	Job description	RACF authorization
step20c	DSNTIJRV	\${AUTHID}		<p>RACF auth: - If CLASS(FACILITY) is active and the profile MVSADMIN.WLM.POLICY exists then the user ID needs READ access to the profile. - If CLASS(OPERCMD) is active and the profile MVS.MCSOPER.* exists then the user ID needs READ access to the profile. For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. - AUTHID ... used as the CURRENT SQLID when issuing SQL statements and as the owner of the package and plan for program DSNTRVFY. Specified in ROUTINES CREATOR field of DSNTIPG.</p>
step22b	DSNTEJ1	\${IVPSQLID}		<p>For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.</p>

Step name	Job name	Run as user	Job description	RACF authorization
step22c	DSNTEJ1L	\${IVPSQLID}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.
step22d	DSNTEJ2A	\${IVPSQLID}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.
stepJTU	DSNTIJTU	\${INSSQLID}	Creates and grants usage on STOGROUP for user data TO \${INSGRLST}	

*Authorizations for the START DB2 action (dsnstart.xml)*

Step name	Job name	Run as user	Job description	RACF authorization
stepJMD	DSNTIJMD	SYSADM1/\${PROTADMN}	Defines Db2 & IRLM to z/OS by SETSSI	A console that has master authority, or a console operator with sufficient RACF authorization.

Step name	Job name	Run as user	Job description	RACF authorization
stepJSA	DSNTIJSA	SYSADM1/\$ {PROTADMN}		RACF authorization: If CLASS(OPERCMDSDS) is active and the profile MVS.MCSOPER.* exists then the user ID needs READ access to the profile. Db2 Authorization: None. However, the command can be executed only from a z/OS console with the START command capability.

Authorizations for the STOP DB2 action (dsnstop.xml)

Step name	Job name	Run as user	Job description	RACF authorization
stepJSO	DSNTIJSO	SYSADM1/\$ {PROTADMN}		Db2 Authorization: The user ID must use a privilege set of the process that includes one of the following privileges or authorities: STOPALL privilege SYSOPR authority SYSCTRL authority SYSADM authority Db2 commands that are issued from a logged-on z/OS console or TSO SDSF can be checked by Db2 authorization using primary and secondary authorization IDs. A logged-on z/OS user ID must be defined in RACF or a similar security server.

*Authorizations for the deprovisioning workflow (dsndeprv.xml)*

<b>Step name</b>	<b>Job name</b>	<b>Run as user</b>	<b>Job description</b>	<b>RACF authorization</b>
stepJSO	DSNTIJSO	SYSADM1/\$ {PROTADMN}		Db2 Authorization: The user ID must use a privilege set of the process that includes one of the following privileges or authorities: STOPALL privilege SYSOPR authority SYSCTRL authority SYSADM authority Db2 commands that are issued from a logged-on z/OS console or TSO SDSF can be checked by Db2 authorization using primary and secondary authorization IDs. A logged-on z/OS user ID must be defined in RACF or a similar security server.
stepDJMD	DSNTDJMD	SYSADM1/\$ {PROTADMN}		A console that has master authority, or a console operator with sufficient RACF authorization.

*Authorizations for the optional features enablement action (dsnopent.xml)*

<b>Step name</b>	<b>Job name</b>	<b>Run as user</b>	<b>Job description</b>	<b>RACF authorization</b>
stepJRP	DSNTIJRP	SYSADM1/\$ {PROTADMN}	Enables Db2 REST services	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepODBCBIND	DSNTIJCL	SYSADM1/\$ {PROTADMN}	Bind and grants usage of PKG/PLAN TO \${INSGRLST}	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.

Step name	Job name	Run as user	Job description	RACF authorization
stepODBCVerify	DSNTEJ8	SYSADM1/{PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepJDBCBIND	Shell-JCL inline	Workflow executor	Uses DB2Binder utility, which binds the Db2 packages that are used at the data server by the IBM Data Server Driver for JDBC and SQLJ into the NULLID collection, and grants EXECUTE authority on the packages to PUBLIC.	1) The workflow executor ID MUST have RACF privilege to generate PassTickets for others 2) The BIND will be performed under SYSADM1/{JCCSID} ID, using a generated PASSTICKET instead of sending clear text passwords to connect to the Db2 subsystem. See more details in <a href="#">Using RACF PassTickets for optional features</a>
stepJDBCVerifyT2	Shell-JCL inline	Workflow executor	Performs local connection (JCC Type-2) to the provisioned Db2 subsystem and perform SQL queries against the Db2 sample database. Records the output into /tmp/db2-ssid-tej91t2	

Step name	Job name	Run as user	Job description	RACF authorization
stepJDBCVerifyT4	Shell-JCL inline	Workflow executor	Performs remote connection (JCC Type-4) to the provisioned Db2 subsystem and perform SQL queries against the Db2 sample database. Records the output into /tmp/db2-ssid-tej91t4	The connection and verification is performed under SYSADM1/{PROTADMN} ID, using a generated PASSTICKET instead of sending clear text passwords to connect to the Db2 subsystem. See more details in <a href="#">Using RACF PasTickets for optional features</a>

## Creating Db2 for z/OS data sharing group provisioning services

With the Db2 data sharing software services template, you can create services that rapidly provision from scratch one or multiple Db2 data sharing groups, in IBM Cloud Provisioning and Management for z/OS. For information about cloud provisioning, including a description of the roles involved, see [Cloud provisioning services](#).

The sample Db2 data sharing software service template is built on top of z/OSMF cloud provisioning service infrastructure. For more information about how to load and use the service in z/OSMF, see [Software Services task overview](#).

The sample Db2 data sharing software service template uses a z/OSMF *composite template*, which uses a single workflow definition file that contains all steps required to run multiple sequences. It runs sequence 1 to install the originating data sharing member and then repeats sequence 2 as necessary to install the specified number of additional data sharing members software instances to add to the cluster.

The sample Db2 data sharing software service template exploits the Network Resource Pool under the z/OSMF Cloud Provisioning Resource Management. For more information, see [Resource authorizations for the Configuration Assistant plug-in](#). For a tutorial that walks you through the steps that are needed, see [Getting Started Tutorial – Cloud](#).

This readme is intended for the service provider, who configures and makes the Db2 data sharing group provisioning service available to consumers in your shop.

### About the sample Db2 data sharing software service template

You can use the sample Db2 software service template, to build your own Db2 software service template to provision multiple Db2 12 for z/OS data sharing group instances in a “typical Db2 configuration” with the following attributes:

- The data sharing group name, group attach name, member names (Db2 subsystems), and all other names are based on the cluster prefix character that you specify when building the template, according to the rules described in the [naming convention](#). Throughout this information, all examples assume that Z is specified for the cluster prefix character.
- Accepts only TCP/IP connections.
- Subsystem parameter (zPARMS) settings, as recommended by the latest best practices.
- Three dual sets of active logs, and dual archive logs with timestamp.
- Images copies to DASD only.



- The following work files:
  - For sort work, one 4K and one 32K work file, with PRIQTY 20MB and SEGSIZE 16
  - For declared global temporary tables (DGTT), one 4K and one 32K workfile, with PRIQTY 20MB and SEGSIZE 16
- The following default buffer pools for user data, with 5000 buffers for each:
  - BP1 for table spaces with 4 KB pages
  - BP8K1 for table spaces with 8 KB pages
  - BP16K1 for table spaces with 16 KB pages
  - BP32K1 for tables spaces with 32 KB pages
  - BP32K2 for LOB data
  - BP16K2 for XML data
  - BP2 for indexes
- All Db2-supplied stored procedures installed and verified.
- Optionally, the following features enabled and verified:
  - Db2 REST services
  - ODBC connectivity
  - JDBC type-2 and type-4 connections

You can also use the sample Db2 software service template for actions against the provisioned data sharing group, and later to deprovision the provisioned Db2 data sharing groups.

## Setting up the sample Db2 software service template

The files of the service are stored in a directory in z/OS UNIX System Services, and the directory and files must be accessible to z/OSMF. All required files are compressed into the Db2ProvisionSystemDS.pax file.

1. Download the Db2ProvisionSystemDS.pax file.
2. Use FTP in binary mode to upload the Db2ProvisionSystemDS.pax file to the directory where you want to store the service in z/OS UNIX System Services. The maximum length for the directory name is 40 characters.
3. Extract the file into the directory of your choice, for example:

```
pax -rvf Db2ProvisionSystemDS.pax
```

Inside the directory that you specified, the extracted directory <service-base-dir> has the following structure:

File	Description
dsntiwpc.xml, dsnopent.xml	Workflows to provision a Db2 data sharing group and enable optional features (Db2 REST services, ODBC, JDBC)
actions.xml	A workflow for actions of the service
dsndeprc.xml	A workflow to deprovision the Db2 data sharing group
dsnstart.xml	A workflow for starting specific Db2 data sharing members
dsnstop.xml	A workflow for stopping specific Db2 data sharing members

File	Description
dsndddf.xml	A workflow for displaying DDF details for the Db2 data sharing group
dsndgrp.xml	A workflow for displaying details of the Db2 data sharing group
dsnoptft.xml, dsnopent.xml	Workflows for enabling optional features (Db2 REST services, ODBC, JDBC)
dsntivin	The input property file for the originating member
dsntivia	The input property file for additional members
dsnti*	Several JCL templates used by the dsntiwpc.xml, dsnopent.xml, dsntstart.xml, dsntstop.xml, dsndddf.xml, dsndgrp.xml, and dsndepc.xml workflows
dsnta*	Several JCL templates used by the dsntiwpc.xml workflow, specific to additional members
dsnte*	Several JCL templates used by the dsntiwpc.xml and dsnopent.xml workflows
dsntd*	Several JCL templates used by dsndepc.xml workflow
dsntx*	Several JCL templates used by dsndepc.xml workflow, specific to additional members

Also, copy `db2provision.jar` in binary into your installation's `DB2BASE/classes` directory. This jar file is installed by default in the directory specified by the DDDEF created for SDSNACLS.

4. Update the files in the template for changes to subsystem parameters in the following APARs. For instructions, see the following readme files:

- [ph24358\\_readme.md](#)
- [ph26317\\_readme.md](#)

## Preparing the environment for the Db2 software service template

Before building your own template based on the sample, verify with the following administrators that their prerequisite tasks are complete:

### Cloud provisioning administrator tasks

- Enable Cloud Provisioning Software Services in the z/OSMF server, certifying that the domain to be used has enough systems (LPARs) for the number of members in the data sharing group. IBM Cloud Provisioning and Management currently does not support more than one member of the same data sharing group in the same LPAR.
- Enable a network resource pool (NRP) in the z/OSMF server, with sufficient dynamic virtual IP address (DVIPA) and port allocation ranges for the number of instances provisioned. For example, a two-way data sharing group requires 3 DVIPAs and 3 ports. That is, each n-way data sharing group requires the following network resources:
  - $n + 1$  DVIPAs: one distributed dynamic virtual IP address (DDVIPA) for the group and one specific DVIPA for each member.
  - $n + 1$  TCP/IP ports: one TCP/IP port for the group and one specific RESYNCH port for each member.

## System programmer tasks

- Provide the SMP/E Db2 product target libraries, with the the following Db2 12 APARs applied: PH09857; and if Db2 REST services will be enabled on the provisioned Db2 subsystems, APARs PI70652 and PI96649.
- Certify that the SMP/E Db2 product target libraries for SDSNEXIT, SDSNLINK, SDSNLOAD, SDSNLOD2 and IRLM RESLIB are APF-authorized **Note:** SDSNLOD2 is a PDSE data set, which contains JDBC and SQLJ DLLs. Although DB2 does not require that SDSNLOD2 be APF-authorized, be aware that if this data set is in a STEPLIB data set concatenation of an address space that does need APF authorization, SDSNLOD2 must also be APF-authorized. The provisioning template concatenates SDSNLOD2 when verifying JDBC local connection (Type-2) in Optional Features.
- Provide data set names, including for host languages (see Section 7: Host language data sets, in the dsntivin and dsntivia files.)
- Verify installation, and provide directories where indicated, for the following installed FMIDs:
  - **JDBCC12** for Db2 JDBC/SQLJ. All variables must be set in Section 6: Db2 Java properties, in the dstnivin file.
  - **JDBCC17** for Db2 ODBC. The following variables must be set in Section 7: Host language data sets, in the dstnivin file: CCOMP, CPPAUTCL, LELKED, LEPLMSGL, and LERUN.
  - **HDDA211** for z/OS Application Connectivity.
  - **HDBCC1K** for Db2 Utilities Suite for z/OS.
- Define sufficient coupling facility (CF) structures for all possible provisioned data sharing group instances, following the [naming conventions](#) and the sizing for a medium configuration, as described in [Coupling facility structure size allocation](#).

## Network administrator tasks

- Provide a range of DVIPAs and TCP/IP ports to be used under the Network Resource Pool (NRP).

## Security administrator tasks

- Provide the Db2 authorization IDs in the following table for Section 4: Db2 authorization IDs in the dsntivin file:

Field or ID	Input variable	Remarks
Executor ID for workflow steps	AGEXECID	This ID requires authority to generate RACF Passtickets and UPDATE access to the MVSADMIN.WLM.POLICY facility class, if the RACF facility class is active.
CONSOLE NAME	CONSNAME	This ID must have z/OS console operator authority, to issue Db2 START/STOP commands.

Field or ID	Input variable	Remarks
ROUTINES CREATOR	AUTHID	The CURRENT SQLID when creating, configuring, and validating Db2-supplied stored procedures. This ID requires the following authorities:- READ access to the MVSADMIN.WLM.POLICY facility class, if the RACF facility class is active- READ access to the MVS.MCSOPER.DSNTRVfy opercmds class, if the RACF opercmds class is active.
SEC DEF CREATOR	SECDEFID	The CURRENT SQLID when creating, configuring, and validating Db2-supplied stored procedures, that are created with the SECURITY DEFINER option.
INSTALL SQL ID	INSSQLID	
INSTALL GRANTEE(S)	INSGRLST	
INSTALL PKG OWNER	INSPKOWN	
IVP SQL ID	IVPSQLID	
IVP PACKAGE OWNER	IVPPKOWN	
IVP GRANTEE(S)	IVPGRLST	
SYSTEM ADMIN 2	PROTADM2	
SYSTEM ADMIN 1	PROTADMN	
SYSTEM OPERATOR 1	PROTOPR1	
SYSTEM OPERATOR 2	PROTOPR2	
SECURITY ADMIN 1	SECADMN1	
SECURITY ADMIN 2	SECADMN2	
PACKAGE OWNER	RTM05PK0	The ID to own the package for the Db2-supplied SYSPROC.DSNAHVPM stored procedure.

- Define RACF STARTED class profiles to all potential provisioned Db2 subsystem instances associating an ID to be used by each Db2 address space.
- Define RACF DSNR class profiles to control access to any provisioned Db2 subsystem from another environment, such as CICS, IMS, TSO, RRS, BATCH, DDF and REST services.
- Define RACF SERVER class profiles to control access to any provisioned Db2 subsystem because they will use stored procedures in a WLM-established address space.

### ***Storage administrator tasks***

- Define SMS constructs, such as SMS classes and storage groups, for Db2 provisioning. The SMS storage groups can be per instance or shared by all potential provisioned Db2 instances. The storage administrator can decide if image copy data sets and archive log data sets are to share the SMS storage groups with other Db2 data sets.

- Together with the security administrator, provide access authorization to all prefixes in the following table to the Db2 IDs, including the ID that executes the steps of the Db2 provisioning workflow.
- Define ACS routines to be used to determine the SMS classes and storage groups for data sets allocation during a Db2 subsystem provisioning.
- Define USERCATs and ALIASes, associating them to their specific SMS storage group. **Important:** The provisioning process determines the `groupname` value. You must do the definition work for all potential instances. If you are allowing 2 instances of a data sharing group, then you must have 2 sets of definitions below, corresponding to the 2 `groupname(s)` that can be generated. For example: DSNZ0SYS, DSNZ1SYS, and so on.

Aliases(prefixes)	to be used for
a) <code>groupnameSYS</code>	Db2 catalog, directory, and IVP data sets
b) <code>groupnameLOG</code>	Db2 BSDS, active logs, and archive logs data sets
c) <code>groupnameUSR</code>	Db2 User data
d) <code>groupnameCP1</code>	Db2 Image Copy data sets
e) <code>groupname</code>	Aliases for the SMP/E libraries and Db2 non-SMP/E data sets. <sup>(1)</sup>

(1) The `groupname` here precedes the following names:

- The instantiated member name, as the prefix in all aliases. For example: DSNZ0.DZ00.\*, where DSNZ0 is the `groupname`, and DZ00 is the instantiated member name.
- The group attach name, as the prefix for IVP data sets, which are allocated only when provisioning the originating member. For example DSNZ0.DZ0G.\*, where DSNZ0 is the `groupname`, and DZ0G is the group attach name.

## Naming conventions for the sample Db2 data sharing software service template

The template uses the following naming conventions. The naming conventions are very important for coordination of the IBM Cloud Provisioning and Management register between provision and deprovision processes. Throughout this information, all examples assume that Z is specified for the cluster prefix character.

In the table following characters have these meanings:

- c= Cluster instance name prefix
- n= cluster instance number – 0-n
- m= SW instance number – 0-m

Named item	Format	Example (originating)	Example (additional)
Group name	DSNcn	DSNZ0	DSNZ1
Group attach name	DcnG	DZ0G	DZ1G
Subsystem name & member name	Dcnm	DZ00, DZ01	DZ10, DZ11
IRLM SS name	Icnm	IZ00, IZ01	IZ10, IZ11
IRLM XES Group name	DXRcn	DXRZ0	DXRZ1
Subsystem load module	DcnmZPRM	DZ00ZPRM, DZ01ZPRM	DZ10ZPRM, DZ11ZPRM
Subsystem DECP	DcnGDECP	DZ0GDECP	DZ1GDECP
Location	DSNcn	DSNZ0	DSNZ1

Named item	Format	Example (originating)	Example (additional)
IPname	DSNcn	DSNZ0	DSNZ1
<b>Start up procedures</b>	See the following five rows		
-ssnmMSTR	DcnmMSTR	DZ00MSTR, DZ01MSTR	DZ10MSTR, DZ11MSTR
-ssnmDBM1	DcnmDBM1	DZ00DBM1, DZ01DBM1	DZ10DBM1, DZ11DBM1
-ssnmDIST	DcnmDIST	DZ00DIST, DZ01DIST	DZ10DIST, DZ11DIST
-ssnmIRLM	DcnmIRLM	DZ00IRLM, DZ01IRLM	DZ10IRLM, DZ11IRLM
-groupattachWLM*	DcnGWLM*	DZ0GWLM*	DZ1GWLM*
<b>WLMENV Db2 supplied SPs</b>	See the following row		
-groupattachWLM_ DcnGWLM_* DZ0GWLM_	DZ1GWLM_*		
<b>XCF Structures</b>	See the following three rows		
-groupname_LOCK1	DSNcn_LOCK1	DSNZ0_LOCK1	DSNZ1_LOCK1
-groupname_SCA	DSNcn_SCA	DSNZ0_SCA	DSNZ1_SCA
-groupname_GBPxx	DSNcn_GBPxx	DSNZ0_GBPx (GBP0, GBP1, GBP2, GBP8K0, GBP8K1, GBP16K0, GBP16K1, GBP16K2, GBP32K, GBP32K1, GBP32K2)	DSNZ1_GBPx
Catalog & Directory	DSNcnSYS	DSNZ0SYS.*	DSNZ1SYS.*
BSDS	DSNcnLOG.Dcnm.BSDS01	DSNZ0LOG.DZ00.BSDS01/ BSDS02DSNZ0LOG.DZ01.BSDS01/BSDS02	DSNZ1LOG.DZ10.BSDS01/ BSDS02DSNZ1LOG.DZ11.BSDS01/BSDS02
Active Logs	DSNcnLOG.Dcnm.LOGCOPY1.DS01	DSNZ0LOG.DZ00.LOGCOPY1.DS01/DS02/ DS03DSNZ0LOG.DZ00.LOGCOPY2.DS01/DS02/ DS03DSNZ0LOG.DZ01.LOGCOPY1.DS01/DS02/ DS03DSNZ0LOG.DZ01.LOGCOPY2.DS01/DS02/ DS03	DSNZ1LOG.DZ10.LOGCOPY1.DS01/DS02/ DS03DSNZ1LOG.DZ10.LOGCOPY2.DS01/DS02/ DS03DSNZ1LOG.DZ11.LOGCOPY1.DS01/DS02/ DS03DSNZ1LOG.DZ11.LOGCOPY2.DS01/DS02/ DS03
Archive Logs	DSNcnLOG.Dcnm.ARCH1.Dyyddd.Thhmsst.Axxxxxxx	DSNZ0LOG.DZ00.ARCH1.Dyyddd.Thhmsst.AxxxxxxxDSNZ0LOG.DZ00.ARCH2.Dyyddd.Thhmsst.AxxxxxxxDSNZ0LOG.DZ01.ARCH1.Dyyddd.Thhmsst.AxxxxxxxDSNZ0LOG.DZ01.ARCH2.Dyyddd.Thhmsst.Axxxxxxx	DSNZ1LOG.DZ10.ARCH1.Dyyddd.Thhmsst.AxxxxxxxDSNZ1LOG.DZ10.ARCH2.Dyyddd.Thhmsst.AxxxxxxxDSNZ1LOG.DZ11.ARCH1.Dyyddd.Thhmsst.AxxxxxxxDSNZ1LOG.DZ11.ARCH2.Dyyddd.Thhmsst.Axxxxxxx

Named item	Format	Example (originating)	Example (additional)
Image Copy	DSNcnCP1.&DB..&SN. .&IC.&JU..&UQ.	DSNZ0CP1.&DB..&SN.& IC.&JU..&UQ.	DSNZ1CP1.&DB..&SN.& IC.&JU..8UQ.
Flash Copy	DSNcnCP1.&DB..&SN. .N&DSNUM..&UQ.	DSNZ0CP1.&DB..&SN..N &DSNUM..&UQ.	DSNZ1CP1.&DB..&SN..N &DSNUM..&UQ.
non-VSAM data sets and Db2 SMP/E TLIBs aliases	DSNcn.Dcnm.*	DSNZ0.DZ00., DSNZ0.DZ01.	DSNZ1.DZ10., DSNZ1.DZ11.
User data	DSNcnUSR	DSNZ0USR.*	DSNZ1USR.*
Java runtime options	DSNcn.DcnGWLMJ.JAV AENV	DSNZ0.DZ0GWLMJ.JAV AENV	DSNZ1.DZ1GWLMJ.JAV AENV
Java environment files	dcngenvfile.txt and dcngjvmsp	dz0genvfile.txt and dz0gjvmsp	dz1genvfile.txt and dz1gjvmsp
Db2 program preparation and utilities invocation JCL procs	DSNcn. DcnG.PRIVATE.PROCL IB	DSNZ0.DZ0G.PRIVATE.P ROCLIB	DSNZ1.DZ1G.PRIVATE.P ROCLIB
Additional Db2 libraries created during provisioning	DSNcn.DcnG.\$ {AGNEWIDS}.SDSNCLS TDSNcn.DcnG.RUNLIB .LOADDSNcn.DcnG.SR CLIB.DATADSNcn.Dcn G.DBRMLIB.DATA	DSNZ0.DZ0G.NEW.SDS NCLSTDSNZ0.DZ0G.RU NLIB.LOADDSNZ0.DZ0G .SRCLIB.DATADSNZ0.DZ 0G.DBRMLIB.DATA	DSNZ1.DZ1G.NEW.SDS NCLSTDSNZ1.DZ1G.RU NLIB.LOADDSNZ1.DZ1G .SRCLIB.DATADSNZ1.DZ 1G.DBRMLIB.DATA

## Specifying input properties

The dsntivin and dsntivia input variable files define and describe many input properties that define the Db2 data sharing group and its members. At provisioning time, values are set for many of these variables based on the data sharing group and Db2 data sharing instance names being provisioned. The remaining variables are defined with default values from the sample template. Review these values carefully before you publish the template.

If you are using the sample artifacts before building your own template, you must edit the dsntivin and dsntivia input variable files, and update them according to your installation as follows:

1. In Section 1: Variables to support provisioning instantiation, you do not need to change anything, unless you want to use a COMMAND PREFIX (AGSSIDPX) to use other character than - (hyphen)
2. In The following sections, no changes are required. The sample template is built on top of Db2 12 function level 504.
  - Section 2: Db2 function level
  - Section 3: Db2 install data sets prefix/HLQ
    1. You must update the values in each of the following sections for your environment in:
      - Section 4: Db2 authorization IDs
      - Section 5: Db2 product SMP/E target libraries
      - Section 6: Db2 Java properties
      - Section 7: Host language data sets
      - Section 8: Other data sets
    1. In Section 9: Variables whose values will be generated at provisioning time, do not change anything. The values of the variables in this section are built at provisioning time

according to the data sharing group name ('groupname') and subsystem instance (ssid) being provisioned, and the naming convention rules for provisioning.

2. In Section 10: Variables with default values for provisioning a typical Db2 configuration, you do not need to change any of these variables if you want the recommended configuration. The following table lists variables that use different default values than are used by the Db2 installation CLIST.

<b>Variable name (parameter name if different)</b>	<b>Db2 CLIST default</b>	<b>Template default</b>
ABIND	YES	COEXIST
ACCUMACC	10	NO
ADMTPROC	ssidADMT	blank
ARCHDEVT (UNIT)	TAPE	SYSDA
ARCHDEV2 (UNIT2)	blank (no value)	SYSDA
ARCHTS (TSTAMP)	NO	YES
ASCCSID	blank (no value)	819
BP1	0	5000
BP2	0	5000
BP8K0	2000	5000
BP8K1	0	5000
BP16K0	500	5000
BP16K1	0	5000
BP16K2	0	5000
BP32K	250	5000
BP32K1	0	5000
BP32K2	0	5000
BSACP (ALTERNATE_CP)	blank	NO
CHKTYPE	MINUTES	SINGLE
CMPSP01 (COMPRES_SPT01)	NO	YES
CQAC (QUERY_ACCELERATION)	1	NONE
DDSTART (DDF)	NO	AUTO
DEFCCSID	blank (no value)	37
EDMDBDC	23400	40960
EDMSKP (EDM_SKELETON_POOL)	51200	81920
EDMSTMTC	113386	122880
IDXBPOOL	BP0	BP2
LBACKOUT	AUTO	LIGHTAUTO
MNSU(MATERIALIZE_NODET_SQ LTUDF)	YES	NO
MON	NO	YES



Variable name (parameter name if different)	Db2 CLIST default	Template default
NUMCONBT (IDBACK)	50	200
NUMCONTS (IDFORE)	50	200
OPSMFSTA (SMFSTAT)	YES	*
OPNDS (DSMAX)	calculated value	20000
OPTHINTS	NO	YES
OPTRCSIZ (TRACTBL)	16	25
(OTC_LICENSE)	blank (no value)	NO
PARAMDEG	0	16
PALK (PREVENT_ALERTTB_LIMITKEY)	NO	YES
PFUP (PCTFREE_UPD)	0	AUTO
PCLOSEN	10	15
SMFCOMP	OFF	ON
SYNCVAL	NO	0
TBSBPOOL	BP0	BP1
TBSBP8K	BP8K0	BP8K1
TBSBP16K	BP16K0	BP16K1
TBSBP32K	BP32K0	BP32K1
TBSBPLOB	BP0	BP32K2
TBSBPXML	BP16K0	BP16K2
UTO (UTILITY_OBJECT_CONVERSION)	NONE	EXTENDED
WFDBSEP	NO	YES

After your input properties file is updated with your installation values, you can create your own template under the z/OSMF Cloud Provisioning Software Services.

## Preparing and publishing the Db2 data sharing software service template

For general instructions adding standard templates in z/OSMF Cloud Provisioning Software Services, see [Prepare and publish a template and Add a template and resource pool](#)

1. Add a standard template for the originating Db2 data sharing member, and specify the following file names, where <service-base-dir> is the directory where you unboxed the Db2ProvisionSystemDS.pax file:
  - For the workflow file, specify: <service-base-dir>/dsntiwpc.xml
  - For the actions file, specify: <service-base-dir>/actions.xml
  - For the workflow variable input file, specify: <service-base-dir>/dsntivin
2. Add a standard template for adding Db2 data sharing members, and specify the following file names, where <service-base-dir> is the directory where you unboxed the Db2ProvisionSystemDS.pax file:

- For the workflow file, specify: <service-base-dir>/dsntiwpc.xml
  - For the actions file, specify: <service-base-dir>/actions.xml
  - For the workflow variable input file, specify: <service-base-dir>/dsntivia
3. Approve and publish the templates for the originating and additional members.
  4. Add a composite template for the data sharing group.
    - a. Add the **originating member** Published Template and specify 1 clustered instances to create from this template
    - b. Add the **adding member** Published Template and specify n clustered instances, where n is the number of additional members to add to the data sharing group. When adding the **adding member** template, you are prompted to a set of variables. Do the following:
      - In the Variables table, select variable AGFMRIN, and select the **originating member** template as the **Source Template**. Then click **Add** to add AGFMRIN as a connector variable.
      - In the Connector Variables table select registry-instance-name as **Source Variable Name** for AGFMRIN.
  5. Associate the template with a tenant. When you associate the tenant, specify two leading characters where subsystem name prefix must be D, and the cluster instance name prefix is any character of your choice.
  6. Use the network configuration assistant to specify the DVIPA and port ranges to use for the provisioned Db2 data sharing groups and members.
  7. Test the provisioning template and verify the provisioned Db2 data sharing groups, including the available actions, deprovisioning, and re-provisioning.
  8. Publish the template to make it available to consumers.

### **Steps in the provisioning workflow (dsntiwpc.xml)**

The following table indicates the steps that are executed by the provisioning workflow for the originating member and for additional members of the data sharing group.

<b>Originating member</b>	<b>Additional members</b>	<b>Action</b>
No	Yes	Obtain registryID of a DSG originating member (REST API)
No	Yes	Update IRLMISEQ in registry of DSG originating member (REST API and inline shell-JCL)
Yes	Yes	Instantiate and validate Db2 SSID (DSNTRSSN)
Yes	Yes	Set variables for provisioning (Instructions only - setVariable)
Yes	Yes	Acquire Db2 DVIPAs and ports from Network Resource Pool - NRP
Yes	No	Allocate private proclib for instantiated Db2 system (DSNTIJPP)
Yes	Yes	Define aliases for the instantiated Db2 system (DSNTIJDA)
Yes	Yes	Assign IRLM SSID based on the instantiated Db2 system (Inline shell-JCL)

Originating member	Additional members	Action
Yes	Yes	Define instantiated Db2 and IRLM systems to z/OS (DSNTIJMD)
Yes	No	Execute all mandatory steps to install the originating Db2 data sharing member, including creation of a storage group for user data, Java definitions, installation & verification of all Db2-supplied stored procedures, and run SQL install verification programs
No	Yes	Execute all mandatory steps to install additional Db2 data sharing members
Yes	Yes	Perform enablement of the optional features (REST services, ODBC, JDBC). Each optional feature can be invoked only one time in a data sharing group.

### ***Actions for the provisioned Db2 subsystems***

The following actions are available from z/OSMF Cloud Provisioning Software Services for the provisioned Db2 data sharing group:

*At the Db2 subsystem (Db2 data sharing member level):*

- START DB2 - Start the Db2 subsystem, including the SETSSI ADD command in an IPL)
- STOP DB2 - normal stop of the Db2 system
- DISPLAY DDF - display DDF information to the UI
- DISPLAY GROUP - display data sharing group information to the UI
- Enable optional features - (ODBC, JDBC, and REST services)

*At the cluster instance level (Db2 data sharing group level):*

- Deprovision the Db2 data sharing group - completely remove the provisioned Db2 data sharing system definitions including CF resources and all data sets in reverse order of provisioning, beginning with additional members followed by the originating member.

### ***Steps in the deprovision workflow (dsndeprc.xml)***

The deprovision workflow removes all definitions and data sets related to the deprovisioned Db2 data sharing group. To deprovision a data sharing group, the sample template completes the following high-level actions:

Additional members	Originating member	Action
Yes	Yes	Stop Db2 system (DSNTIJSC)
Yes	Yes	Release Db2 DVIPAs and ports back to Network Resource Pool – NRP (Rest)
No	Yes	Delete IVP and non-VSAM install data sets (DSNTDJ1)

<b>Additional members</b>	<b>Originating member</b>	<b>Action</b>
No	Yes	Delete environment files for the Db2-supplied Java WLM environment (DSNTDJMJ)
No	Yes	Delete Db2 image copy data sets (DSNTDJIC)
No	Yes	Delete Db2 catalog, directory, BSDS, active and archive log data sets (DSNTDJIN)
Yes	No	Delete Db2 BSDS, active and archive log data sets (DSNTXJIN)
No	Yes	Delete Db2 and Db2-supplied WLM environments start up procs (DSNTDJMA)
Yes	No	Delete Db2 start up procs (DSNTXJMA)
Yes	Yes	Delete Db2 subsystem parameter module (DSNTDJUZ)
No	Yes	Delete Db2 application defaults module (DSNTDJUA)
No	Yes	Delete Db2-supplied WLM application environments (DSNTDJRW)
Yes	Yes	Delete aliases defined when provisioning the Db2 system (DSNTDJDA)
Yes	Yes	Delete Db2 and IRLM subsystem definitions from z/OS (DSNTDJMD)
No	Yes	Release all Db2 CF resources (DSNTDJCF)

## Security considerations for the sample Db2 software service template

The “workflow executor” of the provisioning service must have RACF authority to execute the service, and must also have the following authority:

- Authority to allocate data sets with the aliases (HLQ) assigned to that Db2 instance, as well as z/OS UNIX System Services files
- Read/write authority for the system PROCLIB and WLM application environment definition
- Authority to generate RACF PassTickets to others executing steps where a password would be required

Db2 itself requires specific authorities when executing some of the installation and provisioning steps, and some workflow steps are executed under user IDs other than the workflow executor, by using the runAsUser ID. For details, see the tables in [Authorizations for workflows](#).

Also, the enablement steps for the optional features have special requirements.

## Using RACF PassTickets for optional features

The JDBC enablement optional feature requires connection to the provisioned Db2 subsystem to perform the BIND for the JDBC packages as well as to verify a remote connection (JCC-Type-4).

When connecting, a user ID and password must be passed to the connection statement. Instead of sending clear text passwords, the sample template uses generated RACF PassTickets. Users of the application can then use the PassTickets to authenticate within a RACF-secured network. This procedure prevents the need to store password credentials within the z/OSMF environment.

You must certify that the ID used to execute the workflows has the RACF authority to generate PassTickets to others.

To enable the usage of RACF PassTicket by the sample template, take the following actions:

1. Activate the RACF PassTicket class, by issuing the following commands:

```
SETROPTS CLASSACT(PTKTDATA) RACLIST(PTKTDATA) SETROPTS GENERIC(PTKTDATA)
```

1. Define RACF profiles for the application in PTKTDATA, by issuing the following commands:

```
RDEFINE PTKTDATA <applName> SSIGNON(KEYMASKED(<key>))  
APPLDATA('NO REPLAY PROTECTION')
```

In the preceding example: <applName> is the name of the application that requests and uses the PassTickets. Provisioned Db2 subsystems accept TCP/IP connections only, therefore we should use the value of the the IPNAME as <applName>.

<key> is a session key with the value of 16 hexadecimal digits (for an 8-byte or 64-bit key). The session key must be identical to the key in the PassTicket definition in each RACF instance. The key for each application must be the same on all subsystems in the configuration.

APPLDATA('NO REPLAY PROTECTION') is the option that you can use to permit reuse of the same PassTicket multiple times.

The following example shows these commands for provisioning two Db2 data sharing groups, each with two-way data sharing. As described in the [Naming Convention](#) section, the group name of the data sharing group being provisioned is used for the IPNAME value. Because we expect two data sharing group instances to be provisioned with two members each, you can activate them all in one single job, considering that they will be all under the same RACF database.

```
//STEP01 EXEC PGM=IKJEFT01  
//SYSTSPRT DD SYSOUT=*  
//SYSTSIN DD *  
RDEL PTKTDATA (DSNZ1)  
RDEL PTKTDATA (DSNZ0)  
RDEL PTKTDATA (DZ00)  
RDEL PTKTDATA (DZ01)  
RDEL PTKTDATA (DZ10)  
RDEL PTKTDATA (DZ11)  
RDEL PTKTDATA (IRRPTAUTH.DZ*.*)  
RDEF PTKTDATA DSNZ0 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEF PTKTDATA DSNZ1 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEF PTKTDATA DZ00 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEF PTKTDATA DZ01 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEF PTKTDATA DZ10 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEF PTKTDATA DZ11 -  
  SSIGNON(KEYMASKED(E001193519561977)) -  
  UACC(NONE) APPLDATA('NO REPLAY PROTECTION')  
RDEFINE PTKTDATA IRRPTAUTH.DZ*.*  
PERMIT IRRPTAUTH.DZ*.* CLASS(PTKTDATA) ID(WFexecutorID) ACCESS(UPDATE)
```

```

SETROPTS RACLIST(PTKTDATA) REFRESH
RDEFINE PTKTDATA IRRPTAUTH.DSNZ*.*
PERMIT IRRPTAUTH.DSNZ*.* CLASS(PTKTDATA) ID(WFexecutorID) ACCESS(UPDATE)
SETROPTS RACLIST(PTKTDATA) REFRESH

```

### **Authorizations for the sample Db2 software service template workflows**

The following tables show the authorizations required for certain steps of the sample template. All other steps run under the authorization ID that executes the workflow. You can specify the authorization ID that executes the workflow in the AGEXECID variable in section 4 of the dsntivn and dsntivia input variable files. If the AGEXECID value is blank, the sign-on ID executes the steps.

#### *Authorizations for the provisioning workflow (dsntiwpcc.xml)*

<b>Step name</b>	<b>Job name</b>	<b>Run as user</b>	<b>Job description</b>	<b>RACF authorization</b>
s00DEFSS	DSNTIJMD	SYSADM1/\$ {PROTADMN}	Defines Db2 and IRLM to z/OS by SETSSI	A console that has master authority, or a console operator with sufficient RACF authorization.
stepJTC	DSNTIJTC	SYSADM1/\$ {PROTADMN}	CATMAINT	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepIJTMstepAJTM	DSNTIJTMSNTAJ TM	SYSADM1 /\$ {PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepJSG	DSNTIJSG	SYSADM1/\$ {PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.

Step name	Job name	Run as user	Job description	RACF authorization
stepJRT	DSNTIJRT	\${AUTHID}		Db2 authorization: DSNTRIN accepts two auth parms (1) AUTHID ... the authorization ID to use to create most objects specified in ROUTINES CREATOR field of DSNTIPG (2) SECDEFID ... the authorization ID to use to create routines that require SECURITY DEFINER, specified in SEC DEF CREATOR field of DSNTIPG. The user ID needs to be able to SET CURRENT SQLID to these secondary IDs

Step name	Job name	Run as user	Job description	RACF authorization
stepJRV	DSNTIJRV	\${AUTHID}		<p>RACF auth: - If CLASS(FACILITY) is active and the profile MVSADMIN.WLM.POLICY exists then the user ID needs READ access to the profile. - If CLASS(OPERCMD) is active and the profile MVS.MCSOPER.* exists then the user ID needs READ access to the profile. For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. - AUTHID ... used as the CURRENT SQLID when issuing SQL statements and as the owner of the package and plan for program DSNTRVFY. Specified in ROUTINES CREATOR field of DSNTIPG.</p>
stepEJ1	DSNTEJ1	\${IVPSQLID}		<p>For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.</p>



Step name	Job name	Run as user	Job description	RACF authorization
stepEJ1L	DSNTEJ1L	\${IVPSQLID}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.
stepEJ2A	DSNTEJ2A	\${IVPSQLID}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority. IVPSQLID is specified in the IVP SQL ID field of DSNTIPG.
stepJTU	DSNTIJTU	\${INSSQLID}	Creates and grants usage on STOGROUP for user data TO \${INSGRLST}	

Authorizations for the START DB2 action (*dsnstart.xml*)

Step name	Job name	Run as user	Job description	RACF authorization
stepJMD	DSNTIJMD	SYSADM1/\${PROTADMN}	Defines Db2 & IRLM to z/OS by SETSSI	A console that has master authority, or a console operator with sufficient RACF authorization.

Step name	Job name	Run as user	Job description	RACF authorization
stepJSA	DSNTIJSA	SYSADM1/\$ {PROTADMN}		RACF authorization: If CLASS(OPERCMDSDS) is active and the profile MVS.MCSOPER.* exists then the user ID needs READ access to the profile. Db2 Authorization: None. However, the command can be executed only from a z/OS console with the START command capability.

*Authorizations for the STOP DB2 action (dsnstop.xml)*

Step name	Job name	Run as user	Job description	RACF authorization
stepJSC	DSNTIJSC	SYSADM1/\$ {PROTADMN}		Db2 Authorization: The user ID must use a privilege set of the process that includes one of the following privileges or authorities: STOPALL privilege SYSOPR authority SYSCTRL authority SYSADM authority Db2 commands that are issued from a logged-on z/OS console or TSO SDSF can be checked by Db2 authorization using primary and secondary authorization IDs. A logged-on z/OS user ID must be defined in RACF or a similar security server.

Authorizations for the deprovisioning workflow (*dsndeprc.xml*)

Step name	Job name	Run as user	Job description	RACF authorization
stepJSC	DSNTIJSC	SYSADM1/\$ {PROTADMN}		Db2 Authorization: The user ID must use a privilege set of the process that includes one of the following privileges or authorities: STOPALL privilege SYSOPR authority SYSCTRL authority SYSADM authority Db2 commands that are issued from a logged-on z/OS console or TSO SDSF can be checked by Db2 authorization using primary and secondary authorization IDs. A logged-on z/OS user ID must be defined in RACF or a similar security server.
stepDJCF	DSNTDJCF	SYSADM1/\$ {PROTADMN}		Authority to issue SETXCF FORCE, CONNECTION and SETXCF FORCE, STRUCTURE commands.

Authorizations for the optional features enablement action (*dsnopent.xml*)

Step name	Job name	Run as user	Job description	RACF authorization
stepJRP	DSNTIJRP	SYSADM1/\$ {PROTADMN}	Enables Db2 REST services	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepODBCBIND	DSNTIJCL	SYSADM1/\$ {PROTADMN}	Bind and grants usage of PKG/PLAN TO \${INSGRLST}	For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.

Step name	Job name	Run as user	Job description	RACF authorization
stepODBCVerify	DSNTEJ8	SYSADM1/{PROTADMN}		For Db2 authorization, the user ID must have primary or secondary installation SYSADM authority.
stepJDBCBIND	Shell-JCL inline	Workflow executor	Uses DB2Binder utility, which binds the Db2 packages that are used at the data server by the IBM Data Server Driver for JDBC and SQLJ into the NULLID collection, and grants EXECUTE authority on the packages to PUBLIC.	1) The workflow executor ID MUST have RACF privilege to generate PassTickets for others 2) The BIND will be performed under SYSADM1/{JCCSID} ID, using a generated PASSTICKET instead of sending clear text passwords to connect to the Db2 subsystem. See more details in <a href="#">Using RACF PassTickets for optional features</a>
stepJDBCVerifyT2	Shell-JCL inline	Workflow executor	Performs local connection (JCC Type-2) to the provisioned Db2 subsystem and perform SQL queries against the Db2 sample database. Records the output into /tmp/db2-ssid-tej91t2	

Step name	Job name	Run as user	Job description	RACF authorization
stepJDBCVerifyT4	Shell-JCL inline	Workflow executor	Performs remote connection (JCC Type-4) to the provisioned Db2 subsystem and perform SQL queries against the Db2 sample database. Records the output into /tmp/db2-ssid-tej91t4	The connection and verification is performed under SYSADM1/{JCCSID} ID, using a generated PASSTICKET instead of sending clear text passwords to connect to the Db2 subsystem. See more details in <a href="#">Using RACF PasTickets for optional features</a>

## Db2 DevOps Experience for z/OS UCD plugin

The Db2 DevOps Experience for z/OS UCD plugin adds steps in UCD to for using the capabilities of Db2 DevOps Experience for z/OS and to integrate with deployment flows in UCD.

The Db2 DevOps Experience for z/OS UCD plugin requires Db2 DevOps Experience for z/OS V1.1.0 with APARs PH1159 and PH11598, or higher. For an overview of its capabilities, see [Db2 DevOps Experience features and benefits](#).

The Db2 DevOps Experience for z/OS UCD plugin for UCD includes the following steps for applications that are defined in Db2 DevOps Experience for z/OS.

- Provision a Db2 schema instance of an application
- Deprovision a Db2 schema instance of an application
- Analyze schema changes on a Db2 schema instance
- Apply schema changes on a Db2 schema instance of an application
- Promote schema changes from a Db2 schema instance to the golden master copy of an application
- Sync up schema changes from the golden master copy to a Db2 schema instance of an application

To download the plugin, see [Db2 DevOps Experience for z/OS UCD plugin](#).

### Related information

[IBM Db2 DevOps Experience for z/OS](#)

## Db2 for z/OS UCD template

The Db2 for z/OS UCD template shows examples of Db2 application provisioning and deployment, including deployment of database schema and stored procedure changes, Db2 native REST services, packages and DBRMs, invoking of Db2 utilities and commands, and integrating with the Db2 DevOps Experience for z/OS UCD plugin in UCD.

The template contains sample artifacts, processes to prepare the artifacts, environments, and an application which associates the artifacts, which demonstrate how you can use UrbanCode Deploy (UCD) to provision and deploy Db2 for z/OS database applications.

The Db2 for z/OS UCD template requires Db2 DevOps Experience for z/OS V1.1.0 with APARs PH1159 and PH11598, or higher and the Db2 DevOps Experience for z/OS UCD plugin to enable the following activities in UCD.

- Provisioning a database schema instance for an application
- Deprovisioning a database schema instance for an application
- Deploying database schema changes, including the following tasks:
  - Comparing and analyzing the data objects in the committed schema changes against those in the target environments to derive the delta and to generate deployment plan with all necessary operations required to apply the changes.
  - Reviewing and approval of deployment plans, which is optional and can be skipped.
  - Applying the changes to the target environments.
  - Notifying users of events and schema changes through UCD capability.

You can also use the Db2 for z/OS UCD template to enable the following activities in UCD.

- Running Db2 utilities and commands, such as for binding packages, unloading and loading data, and so forth.
  - Accepting the input of existing bind cards for binding packages.
  - Supporting default bind options with the ability to overwrite the default bind options on certain target environments
- Provisioning a database schema with DDL input
- Deploying Db2 native REST services with executable SQL text, bind options, and grant statements as inputs
- Dropping deployed REST services
- Running SQL statements including CALL statements and CLP commands in batch mode, with the Db2 command line processor with RACF passticket

To download the Db2 for z/OS UCD template which includes a white paper that contains detailed configuration and usage instructions, see [Db2 for z/OS Package UCD](#).

#### **Related reference**

[IBM z/OS Management Facility Online Help](#)

#### **Related information**

[IBM Db2 DevOps Experience for z/OS](#)

[IBM DevOps Deploy](#)

## **z/OSMF templates for Db2 schema provisioning**

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You can use the z/OSMF templates for Db2 schema provisioning to provision and deprovision Db2 for z/OS schemas for database as a service (DBaaS) in private cloud environments.

The z/OSMF templates for Db2 schema provisioning support the following database schema provisioning as a service activities:

- Provisioning an empty database.
- Provisioning a sample database schema.

When used with IBM Db2 DevOps Experience for z/OS V1.1 with APAR UI63018, or later versions, the z/OSMF templates for Db2 schema provisioning also support the following activities:

- Provisioning a database schema like an existing source environment without data.
- De-provisioning to destroy the provisioned database schema.

When used with Db2 Administration Tool for z/OS V11.2 with APARs PI67731, PI72396, and PI76054 or later versions, and Db2 Cloning Tool for z/OS V3.2 with APAR PH00169, or later versions, the z/OSMF templates for Db2 schema provisioning also support the following activities.

- Provisioning a database schema like an existing source environment, with or without data, with support for the following activities:

- Refreshing data in a schema by copying it from the source environment.
- Taking snapshots of the provisioned database schema, with or without data.
- Restoring the provisioned database schema to a previous snapshot.
- De-provisioning to destroy the provisioned database schema and snapshots.

To download the z/OSMF templates for Db2 schema provisioning and customization instructions, see <https://github.com/IBM/Db2ZTools/tree/master/DevOps/Db2SchemaServices>.

**Related reference**

[IBM z/OS Management Facility Online Help](#)





## Information resources for Db2 for z/OS and related products

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You can find the online product documentation for Db2 12 for z/OS and related products in IBM Documentation.

For all online product documentation for Db2 12 for z/OS, see [IBM Documentation \(https://www.ibm.com/docs/en/db2-for-zos/12\)](https://www.ibm.com/docs/en/db2-for-zos/12).

For other PDF manuals, see [PDF format manuals for Db2 12 for z/OS \(https://www.ibm.com/docs/en/db2-for-zos/12?topic=zos-pdf-format-manuals-db2-12\)](https://www.ibm.com/docs/en/db2-for-zos/12?topic=zos-pdf-format-manuals-db2-12).



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## Programming interface information



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This information is intended to help you to plan for and administer Db2 12 for z/OS. This information also documents General-use Programming Interface and Associated Guidance Information and Product-sensitive Programming Interface and Associated Guidance Information provided by Db2 12 for z/OS.

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# Glossary

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The glossary is available in IBM Documentation

For definitions of Db2 for z/OS terms, see [Db2 glossary \(Db2 Glossary\)](#).





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