

IBM i  
7.4

*IBM i and related software  
Maintaining and managing IBM i and  
related software*



**Note**

Before using this information and the product it supports, read the information in [“Notices” on page 73.](#)

This edition applies to IBM i 7.4 (product number 5770-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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# Maintaining and managing IBM i and related software

This topic indicates how you can manage and maintain IBM® i licensed programs and fixes in your network. It also describes how you and IBM can manage the usage, documentation, and the maintenance of software license information for certain IBM i licenses and packaged products

If you are looking for information about software installation, go to the [Installing, upgrading, or deleting IBM i and related software](#) in the information center. Managing these areas is so important for several key reasons:

## **The time it takes to operate a system**

Regardless of how big or small a computer system or network is, it can take a significant amount of time to perform the daily operations, such as upgrading software, managing fixes, and resolving system problems. Time spent fixing a problem with a resource is a direct expense. Time spent operating without that resource contributes to lost revenue or increased overhead expense. Time spent upgrading software around the network is time that could have been better spent.

## **The costs associated with managing a system**

Money spent managing the system is money that does not produce revenue. It has been estimated that the cost of implementing a distributed computing environment is far less than the cost for the management and support of that environment. Companies who find ways to reduce or eliminate these expenses are the companies who have a better chance of surviving in today's business environment.

## **The distribution of data**

In the past, if you had a question about your company's operation, you walked down the hall and talked to the person who had the answer. However, with the globalization of industry and the proliferation of computers, information is no longer centralized but is distributed in nature, making it more difficult to obtain and requiring more people to control and manage it.

To help you manage these areas, IBM Navigator for i provides an easy to use interface for the web-enabled IBM i management tasks. This interface includes managing software and PTFs under the Configuration and Service section in Navigator for i. In addition to Navigator for i, there are other tools that can help you manage your PTFs, and also automate this process. These tools include IBM Administration Runtime Expert for i and Ansible.

## **IBM Administration RunTime Expert for i - 5733-ARE**

The ARE product can be used to automate the ability to understand what fixes are on an endpoint IBM i by comparing the endpoint system to Fix Central or comparing to a 'Central' system. Additionally, the sending and installing of PTFs can be automated against any number of IBM i endpoints. Details on how to leverage ARE can be found at <https://www.ibm.com/support/pages/ibm-administration-runtime-expert-i>.

## **Ansible**

Ansible is a very powerful tool for automating the management, setup and day to day activities of virtually any compute endpoint, including IBM i. There are playbooks that have been created specially for helping with the automation of PTF management on IBM i. Details can be found at <https://www.ibm.com/support/pages/ansible-support-ibm-i>.

In addition to using these tools, you can develop an effective strategy for managing and maintaining software.

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## What's new for IBM i 7.4



Read about new or significantly changed information for the Maintaining and managing IBM i and related software topic collection.

## **What's new as of April 2021**

Management Central documentation was removed because this function is no longer supported.

## How to see what's new or changed

To help you see where technical changes have been made, this information uses:

- The  image to mark where new or changed information begins.
- The  image to mark where new or changed information ends.

In PDF files, you might see revision bars (|) in the left margin of new and changed information.

To find other information about what's new or changed this release, see the [Memo to users](#).

## PDF file for Maintaining and managing IBM i and related software

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You can view and print a PDF file of this information.

To view or download the PDF version of this document, select [Maintaining and managing IBM i and related software](#).

You can view or download these related topic PDFs:

- [Basic system operations](#)

This topic introduces some of the key concepts and tasks required for IBM i basic operations.

- [Logical partitions](#)

The system offers you the ability to partition one system into several independent systems. If you want to use logical partitions, it is essential that you understand the concepts behind this type of system configuration.

- [Installing, upgrading, or deleting IBM i and related software](#)

Use the information in this topic to successfully plan for and complete an installation or upgrade of the IBM i release on your system or logical partition. This topic also contains information to help you install software other than the IBM i release and to delete licensed programs that you no longer need.

- [Distributing software](#)


You might want to duplicate some or all of a system's programs, including the operating system, to another system. You can also duplicate some or all of a logical partition's programs to another logical partition.

### Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF link in your browser.
2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you want to save the PDF.
4. Click **Save**.

### Downloading Adobe Reader

You need Adobe Reader installed on your system to view or print these PDFs. You can download a free copy from the [Adobe Web site](#) .

### Related reference

[Related information for Maintaining and managing IBM i and related software](#)

Product manuals, Web sites, and other information center topic collections contain information that relates to the Maintaining and managing IBM i and related software topic collection. You can view or print any of the PDF files.

## Using software fixes

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Keep your IBM i operating system and other software current with fixes (or program temporary fixes, PTFs). Fixes play an important part in your system's maintenance strategy. Your maintenance strategy can reduce system downtime, add functionality, and provide optimal availability.

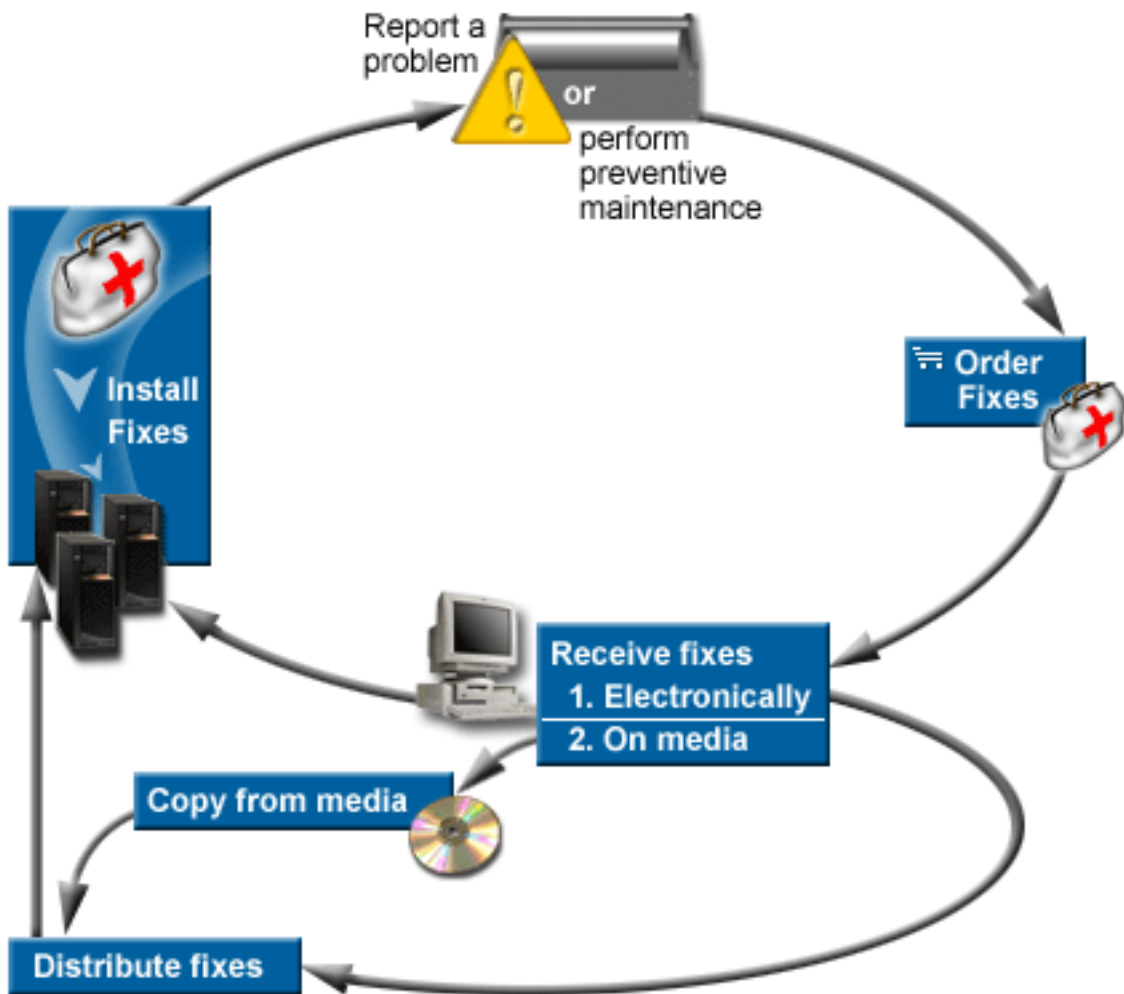
Periodically, problems are discovered in IBM i programs. IBM issues a fix (also known as a PTF, or program temporary fix) to correct the problem. Multiple fixes are bundled together to form a cumulative PTF package, which contains certain recommended fixes. Cumulative PTF packages should be installed twice a year in dynamic environments, and less frequently in stable ones. Cumulative PTF packages should also be considered when you make major hardware or software changes to your environment.

Fixes, fix groups, cumulative packages, and high-impact pervasive (HIPER) fixes play an important part in your system's maintenance strategy. Your maintenance strategy can reduce system downtime, add functionality, or provide optimal availability.

The IBM Navigator for i web based tool contains technology for doing system management tasks across one or more systems at the same time. IBM Navigator for i provides wizards that simplify fix management. The wizards allow you to easily send, install, and uninstall fixes on multiple systems. You can also use the compare and update wizard to compare a model system to multiple target systems to find missing or extra fixes. Additionally tools like IBM Administration Runtime Expert for i and Anisble can be used to not only compare, but automate this process.

The following figure shows the life cycle of a fix and includes the following tasks:

1. **Report a problem or perform maintenance.** You may have occasion to report a hardware or software problem, which can result in a PTF being created to fix your problem. Typically, as part of your preventive maintenance strategy, you will identify fixes that are needed to keep your business running smoothly.
2. **Order.** As part of your normal fix strategy, you will order fixes to keep your software current. Once you have identified which fixes you need, the next task is to order them.
3. **Receive fixes.** After you order them, you receive the fixes either electronically or on media.
4. **Install.** When you receive the fixes, you can install them.
5. **Redistribute (optional).** If you received them on media and you want to distribute the fixes, you need to copy your save files from media before you can send and install the fixes to target systems.



#### Related tasks

[Analyzing and reporting system problems](#)

## Fixes concepts and terms

Use this information to learn about IBM i software fixes, which includes the fixes that are available to you, how to find out about current fixes, and what a fix status means.

Many concepts and terms are associated with program temporary fixes (PTFs) or fixes. In fact, throughout these topics you will see the terms program temporary fix (PTF) and fix used interchangeably. The PTF terminology existed long before the system, and today it is associated mainly with the character-based interface (“green screen interface”). Its presence is seen in control language (CL) commands such as Display PTF (DSPPTF), Send PTF Order (SNDPTFORD), and Display PTF Cover Letter (DSPPTFCVR). The fix terminology was introduced with the graphical user interface of IBM Navigator for i. Both terms mean the same.

### Types of fixes

IBM provides you with a variety of fixes: cumulative program temporary fix (PTF) packages, fix groups, High Impact PERvasive (HIPER) fixes, and others.

Each fix has its own purpose. This topic introduces you to the different kinds of fixes and discusses when each type is available.



## Single fixes

Single PTFs (fixes) are applied to correct specific reported problems.


A single fix is tested by IBM and is made available to all IBM customers. Single fixes are capable of being downloaded with electronic customer support or from the Internet and might also be available on media. Single fixes can identify other single fixes as prerequisite, corequisite, technology refresh requisite, or distribution requisite fixes.

## HIPER PTFs

A *HIPER (High Impact PErvasive) PTF* resolves a problem that might have a high impact on IBM i operations or a pervasive problem that affects most systems.

HIPER PTFs correct severe problems that occur on your system. HIPER PTFs represent two types of problems: *high impact or pervasive* and *high impact and pervasive*. Examples of these situations include the following:

- Your system might crash or hang and require a restart or IPL (initial program load) to recover.
- Your system might be stuck in a looping condition.
- Your system's data integrity might be threatened.
- Your system may experience a severe performance degradation, or the problem involves usability of a product's major function.

If any of the fixes are needed to address these situations for your system, order and install the HIPER fixes. To help you manage HIPER fixes, IBM maintains a HIPER PTF group that contains a list of all current HIPER fixes for each supported IBM i release. For a complete listing of HIPER fixes, see the preventive service planning information at the [Support for IBM i](#)  Web site.

## Technology refresh PTFs

A *technology refresh PTF* is used to deliver a significant amount of new function between major releases. Beginning in IBM i 7.1, technology refresh PTFs replace modification releases.

For Licensed Internal Code, a technology refresh PTF contains new hardware-related function. The Technology Refresh PTF group contains the latest technology refresh PTF and additional PTFs. These PTFs provide the new functions contained in the latest technology refresh for the current release. To install a technology refresh PTF, you should order the [“Technology Refresh PTF group”](#) on page 8.

## Prerequisite fix

A *prerequisite fix* is a fix that must be installed on your system before or at the same time as the fix that you want to install.

The system will prevent you from installing your fixes if you do not have the prerequisite fixes. Your fix cover letter or PSP information can identify other fixes that must be installed before or at the same time as the fix that you want to install.

## Corequisite fix

A *corequisite fix* must be installed at the same time as the fix that you are requesting to install.

Your fix cover letter or PSP information can identify other fixes that must be installed before or at the same time as the fix that you want to install. In addition, system error messages can notify you that the fix that you are attempting to install has requisite fixes. The system checks that the corequisite fixes are installed at the same time. In this case, you need to verify that your fixes installed successfully.

## Technology refresh requisite fix

A *technology refresh requisite fix* is a fix that must be permanently applied on your system before the fix you are installing is loaded.

The system prevents you from loading your fix if you do not have the technology refresh requisite fix permanently applied. Your fix cover letter or PSP information can identify other fixes that must be installed before or at the same time as the fix that you want to install.

## Distribution requisite fix

A *distribution requisite fix* is required only for distribution purposes. The system does not require you to apply distribution requisite fixes, but it is recommended that they be applied with the dependent PTF. If you are sending a fix using IBM Navigator for i, distribution requisite fixes are not sent.

## Delayed and immediate fixes

Some PTFs (fixes) can be applied without requiring an IPL and other fixes can be applied only during an IPL. The cover letter tells you if the PTF is immediate or delayed.

### Delayed fixes

Delayed fixes can be applied only during an IPL. Delayed fixes that affect the Licensed Internal Code can be applied immediately when the system is running on the A storage area.

### Immediate fixes

Immediate fixes can be applied without requiring an IPL if the objects that they affect are not in use and if all requisite fixes can be applied immediately. Immediate fixes can also be applied when you do the next IPL. Use the Display PTF Apply Information (DSPPTFAPYI) command to determine if the selected PTFs can be applied immediately based on the state of all requisite PTFs.

## Related concepts

### Fix groups

A *PTF group* or *fix group* is a name that is used to order and manage a group of logically related PTFs.

## Related tasks

### Step 5: Verifying fix installation

To verify that your IBM i fix installation is successful, follow these procedures.

## Cumulative PTF packages

Cumulative program temporary fix (PTF) packages contain fixes for a given release of the IBM i operating system. The fixes contained in a cumulative PTF package are for the Licensed Internal Code, and most licensed programs that can be installed on that operating system release.

As the name implies, each package is cumulative; that is, it contains all of the fixes from the previous package plus additional fixes released since the previous package. Many, but not all, new fixes are included in cumulative packages. The fixes that are not included are typically applicable only to a specific user's situation or application. These fixes are not included for general availability to avoid introducing unwanted change and potential programming errors into a cumulative package where code quality has the highest priority. When you order the cumulative PTF package, you also receive the most recent database PTF group and the HIPER PTF group.

How often a cumulative package is available depends on the stage of the IBM i release life cycle. During the first year or so of general availability for a new release, a cumulative package can be available as often as every four to six months. After the IBM i release has been available for a period of time, the frequency might decrease. The frequency of availability depends on the number of new fixes to be added to the package.

You should install cumulative PTF packages twice a year in dynamic environments and less frequently in stable ones. Also consider installing cumulative fix packages before making major hardware or software changes to your environment.

## Related tasks

### Installing cumulative PTF packages

To install a cumulative PTF package from a physical or virtual device, follow these steps.

## Fix groups

A *PTF group* or *fix group* is a name that is used to order and manage a group of logically related PTFs.

A PTF group or fix group consists of a list of PTFs that are defined for the purpose of managing those PTFs as one entity. A PTF group can identify other PTF groups called *related PTF groups*. A *related fix group* is a fix group that is listed in another fix group. The fixes in the fix group as well as the fixes in all related fix groups are used to determine the overall status of the fix group. The level of the related PTF groups used to resolve the status of the PTF group is the highest level of the related PTF group that has a status of Installed or Apply at next IPL. If no levels of the related PTF group have a status of Installed or Apply at next IPL, the latest level of the related PTF group that exists on the system will be used.


## Fix group levels

Multiple levels are allowed for each PTF group on the system. The number of levels kept for each PTF group is controlled by the PTF group levels service attribute. Use the Display Service Attributes (DSPSRVA) command to display the current PTF group levels value. The default for the PTF group levels service attribute is 2, which indicates that the system keeps the previous level of a group when a new PTF group is downloaded or installed. Specify the PTF group levels (PTFGRPLVL) parameter on the Change Service Attributes (CHGSRVA) command to set the maximum number of levels of a PTF group to keep on the system. When the number of levels of the PTF group on the system exceeds this value, the lowest levels of the PTF group are deleted, leaving only the specified number of levels of the PTF group on the system.

## Fix groups for a specific release

PTF groups can contain a target release field that indicates if a PTF group is associated with a specific IBM i release. A PTF group is automatically deleted if the PTF group does not contain a target release or if the target release is less than the current release and the PTF group does not contain PTFs for any installed or supported licensed programs. PTF groups are automatically deleted during IBM i install and during Operational Assist (OA) cleanup. The Target release field, displayed on the Work with PTF groups (WRKPTFGRP) command panels, can be specified on the QpzCreatePtfGroup API, and is returned on the QpzListPtfGroups and QpzListPtfGroupDetails APIs.

## IBM fix groups

IBM creates and maintains a set of PTF groups for certain functions on the system. PTF groups are available for each supported IBM i release and are updated periodically. For a complete listing of PTF groups, see the Group PTFs information at the [Fixes](#)  Website.

## Cumulative PTF package

The cumulative PTF package is shown as a PTF group on the Work with PTF Groups (WRKPTFGRP) display and in the IBM Navigator for i PTF groups under Program Temporary Fixes. The cumulative PTF package is identified as a PTF group named in the format *SF99vrm* where *vrm* stands for version, release, and modification of the operating system.

**Note:** It is recommended that your systems be at the same level of the cumulative PTF package before using the Compare and Update function.

Order the latest level of the cumulative PTF package for the release of the operating system that is installed on the system by using Fix Central or SNDPTFORD \*CUMPKG from each endpoint system. Select GO PTF option 8 (Install program temporary fix package) or the Install PTF (INSPTF) command to install the cumulative PTF package and maintain the correct PTF group information for the cumulative PTF package. Then use the Compare and Update wizard to work with a smaller number of differences. By following this recommendation, you ensure that the special instructions that accompany the cumulative PTF package are followed.

## Technology Refresh PTF group

The Technology Refresh PTF group contains the latest technology refresh PTF and additional PTFs to provide all of the new function contained in the latest Technology Refresh for the current release. This PTF group replaces modification releases starting in IBM i 7.1, and contains new hardware-related function.

For more information about the Technology Refresh PTF group, see the Group PTFs information at the [Fixes Website](#).

## PTF group tasks

In IBM Navigator for i, you can perform these tasks for fix groups: send, send and install, or install. When you select a fix group to send and install, the fixes from all related fix groups are also sent and installed.

In addition, see the following items for information about the tasks that you can perform with PTF groups:

### Order PTF groups

You can order PTF groups through several different methods. To determine the best way for you, refer to [“Ordering fixes”](#) on page 21.

### Manage PTF groups

Manage your PTF groups with the Work with PTF Groups (WRKPTFGRP) command, the Copy PTF Group (CPYPTFGRP) command, or the fix group function that is available from IBM Navigator for i

### Display properties for fix groups

Use IBM Navigator for i to display properties for fixes and fix groups. Refer to [“Displaying properties of a fix”](#) on page 50.

### Create PTF groups

Create your own fix group with the Create PTF Group (QpzCreatePtfGroup) API.

## Related concepts

### [Single fixes](#)

Single PTFs (fixes) are applied to correct specific reported problems.

### [Ordering fixes](#)

A variety of methods such as traditional CL commands, electronic support, or Web downloads can be used to order fixes for your individual IBM i business environment.

### [Installing fixes](#)

Use this topic to find applicable scenario information about installing IBM i fixes and then follow the steps required to install the fixes successfully.

## Related reference

[Work with PTF Groups \(WRKPTFGRP\) command](#)

[Display PTF Group \(DSPPTFGRP\) command](#)

[Copy PTF Group \(CPYPTFGRP\) command](#)

[Create PTF Group \(QpzCreatePtfGroup\) API](#)

[Delete PTF Group \(QpzDeletePtfGroup\) API](#)

[List PTF Groups \(QpzListPtfGroups\) API](#)

[List PTF Group Details \(QpzListPtfGroupDetails\) API](#)

## Fix cover letters

Cover letters provide information about the IBM i fixes that they accompany. They explain the contents of a fix, the problem that the fix resolves, special instructions that are associated with the fix, and prerequisites, corequisites, and technology refresh requisites that must also be installed on your system for the fix to function properly.

You can view your cover letters with any of the following methods:

- Display PTF Cover Letter (DSPPTFCVR) command
- Display PTF (DSPPTF) command

- View the PTF cover letters with special instructions on the web for PTF groups. For more information, see the Group PTFs information at the [Fixes Website](#).

You receive cover letters electronically as physical file members or on the particular media with the fixes. The cover letters are stored in members of file QAPZCOVER in library QGPL and are named Q pppppppxx, where ppppppp is the fix ID or a timestamp depending on what the fix save file was named. The xx are the last two digits of the language code of the cover letter. For cover letters in English, the last two digits of the language code do not appear, and the member name is the same as the corresponding fix save file name. For a list of tasks associated with fix cover letters, see [“Working with fix cover letters”](#) on page 53.

### Related reference

[Display PTF Cover Letter \(DSPPTFCVR\) command](#)

[Display PTF \(DSPPTF\) command](#)

### Sample fix cover letter and description of fields

This figure shows an example of the contents of a typical IBM i fix cover letter.

The table, [“Description of fields”](#) on page 10, follows.

```
PTF/FIX #: SIxxxxx - IBM i
LICENSED PROGRAM: 5770SS1

-----
: SYSTEM   : RELEASE : LEVEL   : RECOMPILE : LIBRARY  : MRI     : APAR    :
:          :         : MIN/MAX :           :          :         : FEATURE :
:          :         :         :           :          :         :         :
: System i : VxRxMx  : 00/00   : N         : QSYS    : NONE   : SExxxxx :
-----

PRE/CO-REQUISITE PTF/FIX LIST
-----
REQ  LICENSED  PTF/FIX  LEVEL
TYPE PROGRAM  REL  NUMBER  MIN/MAX  OPTION
-----
PRE  5770SS1  xxx  SIxxxxx  NONE     0000
PRE  5770999  xxx  MFxxxxx  NONE     0000
CO   5770SS1  xxx  SIxxxxx  NONE     0000
DIST 5770SS1  xxx  SIxxxxx  NONE     0000
DIST 5770SS1  xxx  SExxxxx  NONE     0000 (SEE MRI PTF/FIX LIST BELOW)

MRI PTF/FIX LIST
-----

APAR SExxxxx AFFECTS THESE LANGUAGES. IF YOU HAVE ANY OF THESE LANGUAGES
INSTALLED, INSTALL THE CO-REQUISITE MRI PTF THAT CORRESPONDS TO THE LANGUAGE(S)
INSTALLED ON YOUR SYSTEM.
-----

FEATURE                                LICENSED  PTF/FIX
CODE   LANGUAGE                        PROGRAM  NUMBER
-----
2924   ENGLISH UPPER/LOWER CASE         5770SS1  SIxxxxx
2938   ENGLISH UPPERCASE DBCS              5770SS1  SIxxxxx
2984   ENGLISH U/L DBCS                    5770SS1  SIxxxxx

DESCRIPTION OF PROBLEM FIXED FOR APAR SExxxxx :
-----
USERS CANNOT RECEIVE PTFS FOR PRODUCTS NOT INSTALLED
ON THEIR SYSTEMS.

CORRECTION FOR APAR 9959319 :
-----
ELECTRONIC CUSTOMER SUPPORT PROGRAM CODE WILL BE CHANGED SO THAT PTFS WILL
BE REQUESTED EVEN IF THE CORRESPONDING PRODUCTS ARE NOT INSTALLED ON THE
REQUESTING SYSTEM.

CIRCUMVENTION FOR APAR SExxxxx :
-----
None.

ACTIVATION INSTRUCTIONS :
-----
None.
```

SPECIAL INSTRUCTIONS :

-----  
None.

DEFAULT INSTRUCTIONS :

-----  
THIS PTF MUST BE APPLIED AT IPL TIME.

SUPERSEDES

PTF/FIX NO(S). APAR TITLE LINE

-----  
SIxxxxx OSP-RSTS36F-MSGCPA2C6C RESTORING ALL FILES FROM SYSTEM/34

## Description of fields

Field name	Description
<b>PTF/Fix #</b>	The alphanumeric identifier for the fix or Licensed Internal Code fix.
<b>Licensed Program</b>	The alphanumeric identifier for the licensed program.
<b>System</b>	The IBM system for which this fix is valid.
<b>Level Min/Max</b>	The lowest and highest level of the product that this fix can be installed on.
<b>Release</b>	The version, release, and modification number of the system for which this fix is valid. The format for version, release, and modification number is VxRxMx where x is a number between 0 and 9.
<b>Recompile</b>	Y (Yes) means a recompile of affected objects is necessary after this fix is applied. N (No) means a recompile is not necessary after this fix is applied.
<b>Library</b>	The library the fix is intended for.
<b>MRI Feature</b>	The numeric identifier for the language feature of the language sensitive object affected by the fix. None means language sensitive object is not affected.
<b>APAR Fixed</b>	The number of the authorized program analysis report (APAR) for which this fix was created.

Field name	Description
<b>Requisite Type (REQ TYPE):</b>	<p><b>PRE</b> Prerequisite PTF: The information about the fixes that must be applied on the system before this fix can be applied.</p> <p><b>CO</b> Corequisite PTF: The information about other fixes that must be installed along with this fix. The system will check to ensure all corequisite fixes are applied together.</p> <p><b>TR</b> Technology refresh requisite: The information about other fixes that must be permanently applied on the system before this fix can be loaded.</p> <p><b>DIST</b> Distribution requisite: The information about other fixes that must be installed at the same time as this fix. The system will not verify that distribution requisites are applied together.</p> <p><b>MRI</b> MRI Requisite PTF: The information about other fixes that must be installed at the same time as this fixes. Select the fixes that correspond to the languages that you have installed on your system.</p>
<b>Description of Problem Fixed</b>	A brief description of the problem this fix fixes.
<b>Correction</b>	A brief description of what has been done to correct the problem.
<b>Circumvention</b>	A description, if applicable, of how to work around the problem and continue your operation without applying the fix.
<b>Activation Instructions</b>	Actions you must perform in order to activate fixes without an IPL (initial program load) of the system. Activation instructions are limited to actions that would normally be accomplished by an IPL of the system, such as stopping and restarting a subsystem, varying devices offline and back online.
<b>Special Instructions</b>	Any special information pertaining to this fix.
<b>Default Instructions</b>	Tells when the fix can be applied; either at the next IPL (delayed) or immediately.
<b>Supersedes PTF/Fix No(s)</b>	The numbers of the fixes that this fix replaces or supersedes.
<b>APAR Title Line</b>	The title of the authorized program analysis report (APAR) for the superseded fix.

## Fix save files

Save files allow you to distribute IBM i fixes to other systems in your network and therefore allow you to keep your systems current with the latest fixes.

A *save file* is a file that contains data in a form that is correct for transportation to another system. For software fixes (PTFs), a save file contains all the data needed to install (load and apply) the fix, or send it to other systems. In this case, the actions are performed against the save file for the fix, without requiring the original physical media on which the fix was originally delivered. If you want to distribute your fixes electronically, you must have the save files.

The Copy PTFs (CPYPTF) service attribute specifies whether to copy PTF save files and cover letters into \*SERVICE when PTFs are loaded from a tape or optical device. PTF save files must be in \*SERVICE when distributing PTFs to other systems or when using the Save System Information (SAVSYSINF) command. If you want to copy PTF save files and cover letters when PTFs are loaded from media, use the Change Service Attributes (CHGSRVA) command and specify CPYPTF(\*YES).

If the CPYPTF service attribute is set to \*NO, you can copy all or selected PTFs for installed and supported products from a device into PTF save files. You can use the Copy Program Temporary Fix to Save File (QPZCPYSV) API, or the Copy PTFs (CPYPTF) command. You must perform a copy function for PTFs that are received on media; otherwise, you cannot send your fixes to other systems.

Over time, save files and cover letters for fixes tend to accumulate. By cleaning up your save files and cover letters, you can make room on your system for other files. Consider deleting your save files after the fix has been permanently applied, the system has been saved (SAVSYS), and you no longer want to distribute the save file to another system. Use the Delete PTF (DLTPTF) command or the IBM Navigator for i **Clean up PTFs** action. For instructions, see [“Cleaning up fixes” on page 54](#).

### Related information

[Copy Program Temporary Fix to Save File \(QPZCPYSV\) API](#)

## Fix status information

The status of a PTF or fix indicates the activity of that PTF or fix within an IBM i product.

This topic shows you the descriptions of the statuses for fixes on your system, both from the perspective of IBM Navigator for i and the Display PTF (DSPPTF) command.

**Note:** To help you decide whether to use the IBM Navigator for i interface or the command interface to work with your fixes, go to [“Determining which interface to use” on page 20](#).

### Related concepts

[Where to find information about fixes](#)

Stay informed about IBM i fixes: which ones are available to you, what particular fixes can do in your environment, and which fixes may not be necessary for you. Use this information to find out where you can get the latest updates about fixes.

### Fix group status descriptions

The status of a fix group can be viewed from the Work PTF Groups (WRKPTFGRP) command or IBM Navigator for i.

The following table describes the fix and fix group statuses.

Description	WRKPTFGRP status
All fixes that are identified by the fix group and all its related fix groups are for products that are not installed and not supported on this system. No actions for the identified fixes are available.	Not applicable



Table 1. Status for fix groups (continued)

Description	WRKPTFGRP status
The fix group does not have any fixes for licensed programs installed or supported on the system. However, the fix group is identified in another fix group as a related fix group. If you delete a fix group in this status, the dependent fix group shows a status of unknown.	Related group
No fixes that are identified by the fix group or any of its related fix groups are for products that are installed on this system. However, at least one fix is for a product, release, option, and load ID that is supported on this system.	Supported
At least one fix in the group is on order and has not yet been installed on the system. This fix is delivered on either physical or virtual media.	On order
At least one fix that is identified by the fix group or at least one of its related fix groups is for a product that is installed on this system, and neither the fix nor a superseding fix is installed or permanently installed.	Not installed
One or more fixes in the group are set to be applied at the next IPL. All other PTFs for the installed products on the system are already installed or permanently installed.	Apply at next IPL
All the fixes that are identified by the fix group or any of its related fix groups for a product that is installed on this system are installed, permanently installed, or superseded. If a fix is superseded, the superseding fix is either installed or permanently installed.	Installed
The fix group information is in error. Either delete the fix group with the Work with PTF Group (WRKPTFGRP) command or replace the fix group information that is currently on the system.	Error
Indicates that the related fix group identified by the fix group that you are displaying properties for is not found on the system. This status is shown only when you are viewing the properties of a related fix group. You will not see this status when you view the fixes inventory.	Not found
The fix group status cannot be resolved because the fix group identifies one or more related fix groups that either are not found on the system or are in error. No actions for the identified fixes are available because the action will not succeed for all of the fixes identified by the fix group.	Unknown

## Fix status descriptions

The Display PTF (DSPPTF) command and IBM Navigator for i show IBM i fix status descriptions.

You can manage your PTFs with the options available from the GO PTF menu. Option 5 (Display Program Temporary Fix) shows you the status of your PTFs. In addition to the status of a PTF, you can also find out general information about a PTF. To determine which PTFs are not installed, use the DSPPTF SELECT(\*NOTAPY) option. This displays all PTFs that are not already applied or superseded for the specified product.

The possible fix statuses are described in the table that follows. Note that the pending and action status indicate that additional actions need to be taken to make the PTF active or inactive. PND means the PTF status will be updated after the actions are taken. ACN means the PTF status will not be updated until the next IPL as no exit program was provided to verify that the actions were actually performed. Temporarily applied - ACN does not mean that the fix is not in effect. It means that the system cannot verify that it is in effect.

Status	Description
On order	Ordered but not received by the system.
Cover letter only	Indicates only the cover letter for the PTF has been received.
Save file only	PTF exists in a save file in library QGPL. The PTF has never been loaded, or has been permanently removed.
Not applied	PTF has been loaded but not applied, or has been temporarily removed.
Temporarily applied	A temporary fix that can either be removed from the system or permanently applied. The PTF is not a permanent part of the system.
Temporarily applied - PND	The PTF is applied temporarily, but an action is necessary to make the PTF active. This field is updated when the PTF details are displayed.
Temporarily applied - ACN	The PTF is applied temporarily, but an action is necessary to make the PTF active. This field is not updated until the next IPL. If you have done the actions necessary to make the PTF active, it is not necessary to do an IPL at this time. This action pending field will be cleared on the next IPL.
Permanently applied	PTF is a permanent part of the system.
Permanently applied - PND	The PTF has been applied permanently, but an action is necessary to make the PTF active. This field is updated when the PTF details are displayed.
Permanently applied - ACN	The PTF has been applied permanently, but an action is necessary to make the PTF active. This field is not updated until the next IPL. If you have done the actions necessary to make the PTF active, it is not necessary to do an IPL at this time. This action pending field will be cleared on the next IPL.
Temporarily removed	Removed temporarily

Status	Description
Temporarily removed - PND	The PTF has been removed, but an action is necessary to make the old code active. This field is updated when the PTF details are displayed.
Temporarily removed - ACN	The PTF has been removed, but an action is necessary to make the old code active. This field is not updated until the next IPL. If you have done the actions necessary to make the PTF active, it is not necessary to do an IPL at this time. This action pending field will be cleared on the next IPL.
Permanently removed - PND	The PTF has been removed permanently, but an action is necessary to make the old code active. This field is updated when the PTF details are displayed.
Permanently removed - ACN	The PTF has been removed permanently, but an action is necessary to make the old code active. This field is not updated until the next IPL. If you have done the actions necessary to make the PTF active, it is not necessary to do an IPL at this time. This action pending field will be cleared on the next IPL.
Superseded	A later PTF exists on the system, but it may not be applied. If this PTF has been superseded, display the PTF details to determine the PTF number that supersedes this PTF, and then display that PTF to determine its status.
Damaged	A PTF object cannot be found (perhaps accidentally removed). The PTF must be loaded again before you can apply it or remove it.

### **Fix order status**

You might have an occasion to report a hardware or software problem, which can result in an IBM i PTF being created to fix your problem. Alternatively, you might have ordered a PTF directly. Either way, you can track the status of your PTF order.

For PTF orders that resulted from a reported problem, you can use the Work with Problem (WRKPRB) command to track the status of your problem. Follow these steps:

1. On any command line, type WRKPRB. Press Enter.
2. All fixes that you requested and have been sent (either electronically or through the mail) are identified in the Problem Description column as Fix Request on the Work with Problems display.
3. Use option 5 (Display details) for the problem with the problem description Fix Request.
4. Press F9 (Display PTFs) on the Display Problem Details display. All fixes related to the problem you selected are shown on the Display PTF information display. This includes the fixes you ordered, in addition to any others requested that are not already on your system.


For PTFs that were ordered using the Send PTF Order (SNDPTFORD) command, you can use the Work with PTF Order (WRKPTFORD) command to show the status of the order.

### **Related tasks**

[Reporting problems](#)

## Where to find information about fixes

Stay informed about IBM i fixes: which ones are available to you, what particular fixes can do in your environment, and which fixes may not be necessary for you. Use this information to find out where you can get the latest updates about fixes.

As a system administrator, one of your responsibilities is to maintain your system. Part of that task involves knowing where to find information about fixes. You need to find out if there are any special instructions that relate to installing your fixes. You can avoid problems if you follow a fix maintenance strategy. Preventive service planning information, which is at the [Support for IBM i](#)  Web site, should be reviewed regularly as part of your fix management strategy. The PSP information is under the Technical Databases category.

### Related concepts

[Fix status information](#)

The status of a PTF or fix indicates the activity of that PTF or fix within an IBM i product.

### Related tasks

[Installing cumulative PTF packages](#)

To install a cumulative PTF package from a physical or virtual device, follow these steps.

### Fix summary lists

IBM service sends you only the fix that you ordered. If that fix is superseded by another fix, you need to know which superseded fix to order. To make that identification, use the fix summary list .

A fix summary list is a cover letter that contains a list of fixes that are available by IBM licensed program category. The fix summary list identifies the current fix package and what package each fix was included in. The IBM software support center updates the summary list regularly.

You should be aware that when you order a fix, IBM service does not search through the fixes to determine which one is the latest level. For example, if you order a fix that is superseded by another fix, IBM service will send you only the fix that you ordered instead of the superseding fix. You need to use the summary list to identify the fix you need to order. Scan the summary list for fixes that replace the fix in question and then order the fix.

To order the fix summary list, enter the following command:

```
SNDPTFORD SF97vrm
```

The term *vrm* is the version, release, and modification level. For version 7 release 4 modification 0, use 740.

### Fix cross-reference summary lists

Use this summary list to make sure you order any fixes for the new IBM i release that you had at the previous release.

The *fix cross-reference summary list* itemizes fixes from an earlier release that are included in the current release. Use this list to make sure you order any fixes for the new release that you had at the previous release, but are not included in the list. These fixes will not have the same number, but they correct the same problem.

To order this list electronically, select the version and release of the operating system you are moving from and use the corresponding command. See the Send PTF Order (SNDPTFORD) command table for the fix cross-reference summary in [“Ordering fixes using the Send PTF Order command”](#) on page 22.

To make sure that you order any fixes for the new release that you had at the previous release, review the fix cross-reference summary list.

## Preventive service planning information

Preventive service planning (PSP) information contains the latest information that is applicable to your hardware or software. PSP information should be reviewed before you install an IBM i licensed program, a cumulative PTF package, or hardware.

Effective use of PSP information is an important element of your fix management strategy. PSP information is provided by the IBM software support center for you to use when installing a licensed program, cumulative PTF packages, or hardware. You should review this information before you do any software installations to stay informed about potential conditions that could impede your software installation process. You can also use the PSP information to order preventive service planning information and review the recommended High Impact PERvasive (HIPER) fixes periodically or you can order the HIPER PTF group. The HIPER PTF group is updated every other week. Be sure to use the most recent edition of the PSP information as the IBM software support center provides frequent updates.

To print PSP information that you have ordered and downloaded to your system, use the instructions in “[Displaying and printing fix cover letters](#)” on page 54. The PSP information is placed in QAPZCOVER when it is sent to you.

### Related information


[PSP Web site](#)

[Support for IBM System i](#)

#### Obtaining preventive service planning information

You can obtain IBM i preventive service planning (PSP) information by using any of these methods.

- **Obtain PSP information on the Web**

PSP information is at the [Support for IBM i](#)  Web site. The PSP information is under the Technical Databases category.

- **Order PSP information with scheduled cumulative PTF packages**

Cumulative PTF packages are released on a scheduled basis for those users who want to install fixes for preventive purposes, in other words, to minimize potential problems. If you choose to order and install the cumulative PTF package on a regular basis, the recommended time is twice a year. To order PSP information that is associated with the current cumulative PTF package, use the following commands:

**For licensed programs:** Enter `SNDPTFORD SF98vrm`

The letters *vrm* indicate the version, release, and modification level. For version 7 release 4 modification 0, use 740. You can also use the following:

PSP document	Command to order PTF
V7R2M0 software installation	SNDPTFORD SF98720
V7R3M0 software installation	SNDPTFORD SF98730
V7R4M0 software installation	SNDPTFORD SF98740

**For Licensed Internal Code:** `SNDPTFORD MF98vrm`

The letters *vrm* indicate the version, release, and modification level. For version 7 release 4 modification 0, use 740.

- **Obtain PSP information by using electronic customer support**

You can download PSP information to your system using electronic customer support.

- **Obtain PSP information from your software service provider**

If you do not have access to the Internet and do not have electronic customer support on your system, contact your software service provider for the latest PSP information.

### *Contents of PSP information*

Preventive service planning information is available for these aspects of Licensed Internal Code and IBM i maintenance.

- Licensed program installation
- Licensed Internal Code
- System equipment
- Cumulative PTF packages
- PTFs (fixes) in error (PE)
- High impact or pervasive (HIPER) problems
- General information
- Pre-HIPER text

PSP documents are categorized by topic as shown below. Review at least the software installation document and the general document for the release of the operating system that applies to you. The general document lists topics that are covered in other preventive service planning information documents that you may want to order if they apply to your system. PSP topics include the following:

#### **Installation information**

Information concerning upgrade and new installation, including information about cumulative PTF package installation. For more information, see [“Cumulative PTF packages” on page 6](#).

#### **General information**

Hints or tips for working with fix packages or products. Typically, this information is not documented in other places. The information provided here was discovered after the release became available.

#### **PTFs in error**

Information about all fixes found to have a problem, the users that will be affected by the problem, and recommendations on how to avoid the problem. This section contains a list of fixes that are included on this cumulative package that, since shipment, have been found to be defective. You have two options: install the cumulative package without applying the fixes in error, or you can install the corrective fixes for the PTFs in error, if available. This section lists the defective fix, the users affected, the reason the fix is defective, and the recommended action to take.

#### **Service recommendations**

Detailed information about critical fixes you need to install. This section lists those High Impact Pervasive (HIPER) problems that have been discovered in the base code since shipment and not included in this cumulative package. As before, these recommendations should be reviewed based on your system's setup and configuration. For more information, see the information on HIPER PTFs in the topic [“Single fixes” on page 5](#).

The PSP information also contains a list of fix identifiers to order PSP information for Licensed Internal Code and system equipment, licensed programs installation, and PSP documents for older cumulative packages.

### ***Authorized program analysis reports***

Authorized program analysis reports (APARs) are used to find out what problems have been identified that might result in potential problems. You can view APARs by component, by release, or by the complete list.

An *authorized program analysis report (APAR)* is a request for the correction of a defect in a current release of an IBM-supplied program. It contains information about the problem from the problem record, any associated spooled files, the error log entry, and any available vital product data that exists for the licensed program. Vital product data is a structured description of a device or program. In this case the vital product data includes:

- The name of the licensed program, Licensed Internal Code group, or product
- The release and modification, and the program module names
- The national languages selected
- Other information can be included about the failing program.

One type of APAR is an *information APAR*. Information APARs are created when there is a need to provide worldwide access to information. Typically, information APARs are created to describe pervasive user errors, provide recovery actions for non-defect situations, or explain system operation.

The IBM Software Support Center updates the APAR list regularly.

### Related information

[APAR list](#)

## Planning your fix management strategy

Use this information to establish a maintenance strategy to reduce the impact to IBM i operations that result from unplanned outages or program failures.

To most people, preventive maintenance means changing the oil in your car every 3000 miles, rotating the tires every 10 000 miles, and getting major maintenance done every 30 000 miles. This is the standard maintenance strategy automobile manufacturers suggest for new vehicles to prevent expensive problems.

IBM has similar guidelines to help you develop an effective program maintenance strategy. These guidelines are intended to provide basic program maintenance definitions, information, and direction for new users or for those who currently do not have a program maintenance strategy in place.

### Why an IBM i maintenance strategy is recommended

Unplanned outages have a tremendous impact on employee productivity, business operations, and revenue. Three out of four defect-related problems that are reported are rediscoveries of previously reported problems. Many users could have avoided the problem or outage if the available fix had been applied to their system.

### Recommendations for setting up an effective maintenance strategy

Unfortunately, there is no single recommendation for fix maintenance. Each system or environment must be assessed individually. Use the Fix Maintenance Advisor to help you determine a strategy for preventive maintenance that is based on your system environment and applications. As you develop your strategy, here are some questions that you need to consider:

- What are you doing to prevent unexpected failures associated with IBM i licensed programs, including interruptions to communications networks or unscheduled outages on your systems?
- Is your standard approach to program maintenance reactive, that is, you apply corrective fixes when failures occur?
- Do you have a preventive maintenance strategy in place for your systems?
- Is your system in a 24x7 production environment that requires maximum availability, or is it limited to testing new applications and used only during prime shift Monday through Friday by a limited set of programmers?
- Is your system on a new software release or on a release that has proven stable in your environment?
- What would be the tolerance and cost to the business of an unexpected system outage?

Your preventive maintenance schedule might resemble the following tasks:

Time frame	Tasks
Daily	<ul style="list-style-type: none"><li>• Run backup procedure</li><li>• Apply individual fixes as needed</li></ul>
Weekly	<ul style="list-style-type: none"><li>• Order and review Preventive Service Planning (PSP)</li><li>• Order and apply necessary HIPER PTFs</li><li>• Print and review hardware error log (PRTERLOG)</li></ul>

Time frame	Tasks
Monthly for a changing system or quarterly for a stable system	<ul style="list-style-type: none"> <li>Order current cumulative PTF packages (SF99vrm) or PTF Group packages (SF99nnn) and apply</li> <li>Do a complete system save</li> <li>Perform system cleanup functions</li> </ul>
<p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>In a stable environment, think about installing the most recent cumulative PTF package twice a year.</li> <li>Consider installing the most recent cumulative PTF package before making major changes to your system (hardware or software).</li> </ol>	

When you establish a maintenance strategy, you can reduce the effect on the IBM i operations that result from unplanned outages or program failures. When you use a program maintenance strategy that is appropriate for your environment, you can provide optimal system performance and availability.

### Related information

[Guide to fixes](#)

[PTF Maintenance Strategy](#)

## Determining which interface to use

The system offers you many ways to connect to and communicate with the systems in your IBM i environment, and different methods exist to perform the tasks related to managing your fixes. To perform these tasks, you need to know whether it is best to use the character-based interface, web-based IBM Navigator for i, or IBM Administration Runtime Export for i.

You may be performing your fix management tasks with the IBM i commands and menus available. You may prefer a graphical user interface to manage and administer your systems. Supported graphical interfaces include IBM Navigator for i, IBM Administration Runtime Export for i, and Ansible.

Refer to the following table for more information about determining which interface to use for a particular task.

Task	Character-based interface	IBM Navigator for i
Order fixes and fix groups <sup>1</sup>	Yes, Send PTF Order (SNDPTFORD) command.	Not available.
Install fixes from media	Yes, GO PTF option 8 or Install PTF (INSPTF) command, which allows you to install cumulative PTF packages and single fixes. If you need to distribute your fixes, use the Change Service Attributes (CHGSRVA) command to change the Copy PTFs service attribute to *YES.	Yes, with the Install PTFs action.
Install fixes received as save files	Yes, GO PTF option 8 or Install PTF (INSPTF) command. Specify *SERVICE for the device name.	Yes, as part of the send, install, and send and install actions for selected fixes or for fix group fixes.
Display fix status	Yes, Display PTF (DSPPTF) command.	Yes, perform Display PTFs action and view the Properties page of the fix.



Task	Character-based interface	IBM Navigator for i
Remove or uninstall fixes	Yes, Remove PTF (RMVPTF) command.	Yes, with Remove action on a fix or Remove PTFs on a product.
Distribute fixes	No	Yes, with the Compare and Update wizard or send and install action.
Compare and update fixes	No	Yes, with the Compare and Update wizard or send and install action.
Manage fix groups <sup>3</sup>	Yes, Work PTF Group (WRKPTFGRP) command allows you to list, display, and delete fix groups.	Yes, with the Display PTF Groups action. However, you cannot delete fix groups from IBM Navigator for i.
Load and apply PTFs	Yes, Load PTF (LODPTF) command, Apply PTF (APYPTF) command, and Install PTF (INSPTF) command.	Yes, with the Load and Apply actions. The Install PTFs action also performs a load and apply if you install fixes by specifying a list of PTF IDs.
Create custom package	Yes, Copy PTF (CPYPTF) and Copy PTF Group (CPYPTFGRP) commands.	Not available.
Display cover letters	Yes, Display PTF Cover Letter (DSPPTFCVR) command and Display PTF (DSPPTF) command.	Yes, from the Properties page of a fix, select <b>Cover Letter</b> .
Compare and update fixes	Not available.	Yes, with the Compare and Update wizard.
Clean up save files and cover letters	Yes, Delete PTF (DLTPTF) command.	Yes, with the Clean Up action on a fix or Clean Up PTFs action on a product.
<p><sup>1</sup>In addition to ordering fixes with the SNDPTFORD command, you can also order fixes from the Internet, by voice, or through electronic customer support.</p> <p><sup>2</sup>The Create Program Temporary Fix (QPZCRTFX) API allows you to create fixes for your own products.</p> <p><sup>3</sup>Many of these tasks can also be done using the Software Product APIs.</p>		

To read about fix status descriptions, see [Fix status descriptions](#).

### Related reference

[Software Product APIs](#)

## Ordering fixes

A variety of methods such as traditional CL commands, electronic support, or Web downloads can be used to order fixes for your individual IBM i business environment.

Before you begin ordering fixes, you should order and apply the latest cumulative PTF package. When you apply cumulative PTF packages, you reduce the number of fixes that you need to order and distribute later.

Some fix orders require special handling when received at an IBM i service provider from a service requester. The following list identifies these special fix packages and indicates what they are:

- MF98vrn: Hardware Service Planning package

- SF98vrm: Preventive Service Planning package
- SF99vrm: Cumulative PTF package
- SF99xxx: PTF group
- SF97vrm: PTF Summary package

The *vrm* identifier stands for the version, release, and modification level of the operating system for which you are ordering the PTF package. You can order these PTF packages individually or as a part of a list. You can order most PTFs as part of a mixed list. A mixed list PTF order can contain operating system fixes, most licensed program fixes, and Licensed Internal Code fixes. Only fixes that begin with the prefix SH are not included in the mixed list. Order these fixes separately. Information APARs are coded with the *II* prefix and are not considered fixes. You must order those separately.

Several methods exist that allow you to order your fixes: voice support, Fix Central, and the SNDPTFORD command. Details are provided here for Fix Central and the SNDPTFORD command. You can find more information about the other methods from the Ordering PTFs page under the Support for IBM i Web page.

**Note:** In some special circumstances, you may want to create your own custom fix package for sending, loading, and applying fixes on systems in your network. For more information, see [“Advanced fix installation: Building a custom fix package”](#) on page 39.

### Related concepts

[Fix groups](#)

A *PTF group* or *fix group* is a name that is used to order and manage a group of logically related PTFs.

### Related information

[Ordering PTFs](#)

## Ordering fixes using the Internet

Fix Central from IBM allows you to select, order, and download PTFs over the Internet. To use this facility, you must have an IBM user ID and password.

The quickest method to receive PTFs is through the Internet. To receive PTFs from the Internet, connect at least one workstation to the system that is set up to use the Internet. Do not wait until an emergency occurs and you need to request a PTF quickly, only to find you need to register and set up this function. Be prepared: register, set up, and request a PTF to test the process.

Fix Central offers different ways for you to download or order PTFs for your system. For more details, go to the Fix Central Web site.

### Related information

[Fix Central](#)

## Ordering fixes using the Send PTF Order command

If you prefer the IBM i command interface, use the Send PTF Order (SNDPTFORD) command to order individual fixes, multiple fixes, PTF groups, a PTF summary, or cover letters.

The SNDPTFORD command is used primarily to order and receive IBM-supplied fixes (or program temporary fixes, PTFs) for the IBM i environment and IBM-supplied applications. You can use this command over the electronic customer support configuration that uses TCP/IP connectivity through Universal Connection.

**Note:** To use Universal Connection, the Remote control point parameter must be set to \*IBMSRV. For information about Universal Connection, see [Setting up a connection to IBM](#).

### Related information

[Set User Policy \(QPDETPOL\) API](#)

[Retrieve Policy Data \(QPDETRTV\) API](#)

## Fixes and information you can order with the SNDPTFORD command

You can use the SNDPTFORD command to order the following types of fixes and related information.

- Separate or accompanying cover letters
- Individual fixes
- Multiple fixes
- Cumulative PTF packages
- PTF groups
- PTF summary
- Cross-reference summary list
- Preventive service planning tips

Table 2 on page 23 shows how to use the SNDPTFORD command to order the different types of fixes and fix information. You might want to print and use this table as a reference when you order fixes.

Fix information	Command	
Specific fixes and cover letters	SNDPTFORD nnnnnnn <sup>1</sup>	
Fix cover letter only	SNDPTFORD nnnnnnn <sup>1</sup> PTFPART(*CVRLTR)	
Cumulative PTF packages	SNDPTFORD SF99vrm <sup>2</sup> or SNDPTFORD *CUMPKG <sup>3</sup>	
PTF group	SNDPTFORD SF99nnn <sup>4</sup> or one of these: SNDPTFORD *ALLGRP SNDPTFORD *HIPERGRP SNDPTFORD *DB2GRP SNDPTFORD *BRSGRP SNDPTFORD *HTTPGRP SNDPTFORD *JVAGRP SNDPTFORD *PFRGRP	
PTF summary list	SNDPTFORD SF97vrm <sup>2</sup>	
Fix cross-reference summary list	V7R2M0 to V7R4M0	SNDPTFORD SF97068
	V7R3M0 to V7R4M0	SNDPTFORD SF97069
PSP information for licensed programs	SNDPTFORD SF98vrm <sup>2</sup>	
PSP information for Licensed Internal Code and hardware devices	SNDPTFORD MF98vrm <sup>2</sup>	
<b>Notes:</b>		
<sup>1</sup> nnnnnn is the fix identifier. You can order up to 20 fixes at a time.		
<sup>2</sup> v is the version, r is the release, and m is the modification level of the system. For version 7 release 4 modification 0, type 740.		
<sup>3</sup> When *CUMPKG is specified, the latest level of the cumulative PTF package for the release of the operating system that is installed on the system is ordered.		
<sup>4</sup> nnn is the fix identifier, which can be any number.		

## Using the Send PTF Order command

When you use the Send PTF Order (SNDPTFORD) command, the following process takes place:

1. From the IBM i command interface, enter the **SNDPTFORD nnnnnnn** command, where *nnnnnnn* is the number of the individual fix you want to order. If you are managing multiple partitions, you may want to use the SNDPTFORD command from the system that you will use as your source system when you compare and update fix levels.
2. To process your PTF order in batch, use the Submit Job (SBMJOB) command. For example, you can specify the SNDPTFORD command for the CMD parameter.
3. Your order is then sent to IBM where the decision is made whether to distribute the fixes electronically or on media. If the fix files are too large to be delivered electronically, they are delivered on media.
4. The PTFs are sent electronically or put on media. If the fixes are placed on media, the media is packaged and the order is sent to the user.
5. When fixes are delivered electronically on your service support communications line, you have the option to receive the fixes either as save files or as optical image files. The type of file is determined by what you specify on the Delivery format (DLVRYFMT) parameter.

Save files are placed in library QGPL. In most cases, the save file name is the fix identifier prefixed with a Q. For example, the save file for fix identifier SInnnnn is QSInnnnn. Optical image files contain PTFs and cover letters and are stored in the directory specified by the Image directory (IMGDIR) parameter.

**Note:** DLVRYFMT(\*IMAGE) is supported only when your system is configured to use a Universal Connection.

To order a cumulative PTF package with the SNDPTFORD command, do the following:

1. Type either SNDPTFORD \*CUMPKG or SNDPTFORD SF99VRM, where *VRM* is the version, release, and modification level of your licensed program. For example, for version 7 release 4 modification 0, type SNDPTFORD SF99740.
2. Verify the shipping information on the Verify Contact Information display. If any of the information is incorrect, change it and press Enter.
3. Select option 1 (Send service request now) on the Select Reporting Option display. This places the fix order.

## Specifying media for shipping a fix

You can specify the media for any fixes that will be shipped instead of delivered electronically by doing the following:

1. On any command line, type WRKCNTINF.
2. Press Enter. The Work with Support Contact Information display appears.
3. Select **Option 2**.
4. Press Enter. The Work with Local Service Information display appears.
5. Select **Option 2**.
6. Press Enter. The Change service contact information display appears.
7. Page down to the last display.
8. Specify the fix medium type.
9. Press Enter.

The WRKCNTINF command is used in conjunction with the DELIVERY parameter on the SNDPTFORD command. If you specify DELIVERY(\*ANY), fixes are sent by any available method. If you specify DELIVERY(\*LINKONLY), you may not receive your order if the size of your fixes exceeds the transmit limit of the service link.

## Additional considerations when ordering fixes

Keep these points in mind when using the SNDPTFORD command.

- When you order a fix that has been replaced (superseded) with another fix, you receive the ordered fix, not the replacement fix. To identify fixes that have been replaced (superseded), consult the fix summary list.
- When you order a fix for a product that is installed on your system, you will receive the ordered fix and its requisite fixes.
- If you order a fix for a product that is not installed on your system, you will receive only the fix that you ordered. If you use the Display Program Temporary fix (DSPPTF) command on the fix you just ordered, you will receive the following message: PTF 5770xxx-SIxxxxx is not found. This message means that the fix is for a release of the product that is not installed on your system. Contact your service provider for the correct fix number. To avoid this situation, you can add support for a product using the Add or Remove Product Support (QSZSPTPR) API.
- Use the Set User Policy (QPDETPOL) and Retrieve Policy Data (QPDETRTV) APIs to set and retrieve the maximum PTF order size. This policy is used only when your system is configured to use a Universal Connection.
- If you specify \*SAVF delivery format and the corresponding save file is already on the system, a PTF is not reordered.
- PTFs that are too large for the service link are sent on the selected medium when delivery method (DELIVERY) is \*ANY. If the PTFs are too large to use service link only (\*LINKONLY), the command fails.

For information about ordering PTFs through IBM Support, see [“Ordering fixes using the Internet”](#) on page 22.

## Automatic ordering of PTF groups

You can set up your system to automatically download selected PTF groups by using service attributes.

To enable this support, specify \*YES for the Order PTFs automatically (ORDPTFAUTO) parameter on the Change Service Attributes (CHGSRVA) command. This attribute schedules the QORDPTFGRP job to automatically order PTF groups at midnight the start of each month. The frequency, scheduled day, and scheduled time of job QORDPTFGRP can be changed with the Change Job Schedule Entry (CHGJOBSCDE) command. The Send PTF Order (SNDPTFORD) command is used to order the latest level of the PTF groups when the scheduled job is run. The PTF groups are downloaded as save files and the list of PTF groups to order are retrieved from the Order PTF groups (ORDPTFGRP) service attribute.

**Note:** PTF groups can only be ordered automatically if the universal connection is configured. Use the Send Service Request (SNDNRVRS) command with ACTION(\*TEST) to verify the communications link to the remote service support system. For information about the Universal Connection, see [Setting up a connection to IBM](#).

Use the Display Service Attributes (DSPSRVA) command to display the Order PTF groups (ORDPTFGRP) value to indicate which PTF groups to order automatically. The default for Order PTF groups is \*CUMPKG and \*ALLGRP. These values download the latest level of the cumulative PTF package and the latest level of all PTF groups that are applicable to your partition. You can change the list of PTF groups that are ordered by specifying a list of PTF groups for the Order PTF groups (ORDPTFGRP) parameter on the Change Service Attributes (CHGSRVA) command.

Each time the QORDPTFGRP job runs to order PTF groups, the PTFs and their requisites are downloaded as save files. PTFs that are already loaded, applied, or on order are not reordered. Also, PTFs in the requested PTF groups are ordered only if the PTF product is installed or supported. PTF groups that were ordered are updated to the latest available level on your partition.

To disable this support, specify \*NO for the Order PTFs automatically (ORDPTFAUTO) parameter on the Change Service Attributes (CHGSRVA) command. If the QORDPTFGRP job is scheduled to order PTF groups, it is removed.

To install the PTFs that were automatically downloaded, see [Installing fixes received as save files](#).

## Installing fixes

Use this topic to find applicable scenario information about installing IBM i fixes and then follow the steps required to install the fixes successfully.

Each of these tasks describes a specific part of the process for installing fixes. This topic is based on the use of the Install PTF (INSPTF) command or option 8 from the GO PTF menu.

The Power Down System (PWRDWNSYS) command can also be used to install PTFs. Specify the Install PTF device (INSPTFDEV) parameter to install PTFs from \*SERVICE or a device before the system is powered down. After the PTFs are loaded, all PTFs are marked for delayed apply and will be applied during the next normal unattended IPL.

Whether you are installing fixes on single systems, remote systems, or systems with logical partitions, you must follow a series of steps to effectively install your fixes.

### Related concepts

#### Fix groups

A *PTF group* or *fix group* is a name that is used to order and manage a group of logically related PTFs.

## Step 1: Reviewing fix cover letters prior to fix installation

Determine if there are any special instructions that you should be aware of before you install your fixes.

You should always review your cover letters to determine if there are any special instructions. If you are installing a cumulative PTF package, you should read the instructions that come with that package. If it is not a cumulative package, you should display and print your fix cover letters because they can contain special instructions. For PTF Groups, you can view the PTF cover letters with special instructions on the web. See the Group PTFs information at the Fixes Website. If you read your cover letters, you can avoid problems that could result in time-consuming recovery.

If there are any preinstallation special instructions in any of the cover letters, follow those instructions first.

### Related concepts

#### Step 2: Preparing the system to install fixes

To ensure a successful installation of IBM i fixes on your system, perform these preparation steps.

## Step 2: Preparing the system to install fixes

To ensure a successful installation of IBM i fixes on your system, perform these preparation steps.

Read the special instructions to determine how to install your fixes. Some fixes can be applied without requiring an IPL. These fixes are called *immediate fixes*. Some fixes can be applied only during an IPL. These fixes are called *delayed fixes*. Immediate fixes can also be applied during an IPL. You need to determine if you are installing any delayed fixes and when it is convenient for you to IPL your system to apply the fixes. The cover letter tells you if the fix is immediate or delayed. Use the Display PTF Apply Information (DSPPTFAPYI) command to determine if selected PTFs or a PTF group can be applied immediately based on the state of all requisite PTFs.

Before you begin to install fixes, complete these tasks:

- Have a current backup of your user data, operating system, and licensed programs. If you backed up the operating system and licensed programs since the last time you applied fixes, that backup is acceptable.
- Have all users sign off the system only if you are doing an IPL when you install the fix.
- Before you apply a fix to the primary partition of a system with primary and secondary logical partitions, power down the secondary partitions. For more information, see [“Installing fixes on systems with logical partitions” on page 34](#) . For information about POWER® models, see the [Customer service, support, and troubleshooting](#) and the [“Installing server firmware fixes” on page 35](#) topics.
- Be sure that you have security officer (\*SECOFR) user class authority. You need it to do the rest of the install steps.

- To ensure a successful installation of PTFs for immediate apply or during an IPL, the following settings are recommended for those system values that affect the PTF processing:

<i>Table 3. Recommended settings for system values that affect PTF processing</i>	
<b>System value</b>	<b>Recommended setting</b>
QALWOBJRST	*ALL or *ALWPTF
QFRCCVNRST	1 or 0
QIPLTYPE	0
QVFOBJRST	3 or lower

- Verify that your system is running on the B storage area. Your system maintains two copies of all Licensed Internal Code: a permanent copy and a temporary copy. Instructions for this are included in [“Determining the storage area before installing fixes”](#) on page 27.

### **Related concepts**

#### Step 3: Choosing your fix installation scenario

You can install many types of fixes, which include cumulative PTF packages, HIPER fixes, IBM i and other licensed program fixes, and fixes for the Licensed Internal Code.

### ***Determining the storage area before installing fixes***

This information defines system storage areas A and B and describes how to determine which one to use when you install IBM i fixes.

The system maintains two copies of all Licensed Internal Code on the system. One copy is considered the permanent copy and is stored on system **storage area A**. The other copy is considered the temporary copy and is stored on system **storage area B**. When the system is running, it uses the copy that was selected before the last IPL (initial program load).

#### *System storage areas A and B*

A B in the Data display on the front panel of the system unit indicates that the next system IPL will be made from the B or temporary storage area. The B storage area contains any Licensed Internal Code fixes that have been temporarily or permanently applied. Temporarily applied Licensed Internal Code fixes can be applied permanently (copied to the A storage area) or be permanently removed.

For the system to use the latest Licensed Internal Code fixes that are temporarily applied, you must be using the B storage area. The B storage area is what you normally use. Select the A storage area if the IPL to the B storage area fails because of a temporarily applied Licensed Internal Code fix.

#### *Determining the storage area*

1. On any command line, type **dsptf 5770999** and press **Enter**.
2. On the Display PTF Status display, the storage area is identified in the IPL source field. ##MACH#A is the **A** storage area and ##MACH#B is the **B** storage area.
3. If you are not doing a release upgrade and are not running on the **B** storage area, type the following command on any command line and press **Enter: PWRDWSYS \*IMMED RESTART(\*YES) IPLSRC(B)**

#### *Selecting the A or B storage area*

You can change the storage area from the command line or the control panel:

1. On the command line, type **PWRDWSYS \*IMMED RESTART(\*YES) IPLSRC(X)**, where X is the storage area you want to select. If you are using the control panel, continue with step “3” on page 27.
2. If you are using Hardware Management Console (HMC), search for article [Changing the IPL type for an IBM i logical partition](#) in the IBM Systems Hardware Information Center for further instructions.
3. On the control panel, perform these tasks:

- a. For systems with a mode button, set the system to the **Manual** mode. For systems without a mode button, start at step [“3.b” on page 28](#).
- b. Press the Increment/Decrement buttons until 02 is displayed in the Function/Data display on the control panel.
- c. Press the Enter pushbutton on the control panel.
- d. For systems with a mode button, press the Increment/Decrement buttons until the character that represents the storage area you want to use for your IPL source (A or B) appears in the Function/Data display. For systems without a mode button, press the Increment/Decrement buttons until you see Normal (N) and the character (A or B) for the IPL storage area you want to appear in the Function/Data display.
- e. Press the Enter pushbutton on the control panel to save the IPL settings.
- f. For systems with a mode button, set the mode to **Normal**.
- g. Power off the system using option 4 (Power off the system and immediately power on) on the Power On and Off Tasks (POWER) menu. Wait for the system to power down and automatically start an IPL. You see the Sign On display when the IPL is complete. The storage area is now changed.

### Step 3: Choosing your fix installation scenario

You can install many types of fixes, which include cumulative PTF packages, HIPER fixes, IBM i and other licensed program fixes, and fixes for the Licensed Internal Code.

Factors that can influence the method you choose include your environment (such as logical partitions), how you received your fixes (electronically or on media), or the type of device that you want to use (image catalog, for example).

#### Related tasks

##### [Step 4: Completing fix installation](#)

To complete your IBM i fix installation, follow these procedures.

#### ***Installing cumulative PTF packages***

To install a cumulative PTF package from a physical or virtual device, follow these steps.

If you received a cumulative PTF package as save files, see [“Installing fixes received as save files” on page 30](#).

You need to order and install the current cumulative PTF package to keep your system at the most current fix level. Do this on a periodic basis according to your fix maintenance strategy or when you install a new release of a licensed program.

#### Notes:

1. The cumulative PTF package automatically includes the most recent Database PTF group and HIPER PTF group.
2. In an effort to simplify the process for installing a cumulative PTF package from media, some special instructions might be automated during installation when possible.

It is important that you thoroughly read the installation instructions received with your package. The information provides any special instructions that you should be aware of before you install your cumulative PTF package. The steps that follow step [“1” on page 28](#) are part of the letter also. They are provided here as an overview of some of the steps that you need to do. To install cumulative PTF packages, follow these steps:

1. Read the installation instructions thoroughly and follow the instructions contained in it.
2. Select the storage area if you have not already done so. You should be running on the B storage area (B side) when installing the cumulative PTF packages.
3. If you received your cumulative PTF package as an image, see [“Installing IBM i fixes from an image catalog” on page 35](#).
4. Type GO PTF from any command line.



5. Type option 8 (Install program temporary fix package) and press Enter. The Install Options for Program Temporary Fixes display is shown.
  - Type `optyy`, where `optyy` is name of the optical device (for example, `opt01`) where you loaded the fix media.
  - If you want to automatically IPL your system after loading the fixes, type a Y (Yes) in the Automatic IPL field.
  - If you are not using an image catalog and have additional fixes to install at this time, type a 2 (Multiple PTF volume sets) in the Prompt for media field, and install the additional fixes.
  - Type Y for Other options. The Other Install Options display is shown.
  - Type 1 for Apply Type.
  - Type 1 for the PTF type.

**Note:** To prevent someone from unintentionally performing an IPL on your system when using the GO PTF option 7 or option 8, use the Change Service Attributes (CHGSRVA) command. Specify \*DLYALL for the PTFINSTYPE parameter to override the Automatic IPL field and the Apply type field on the GO PTF option 7 and option 8.

### **Related concepts**

#### Cumulative PTF packages

Cumulative program temporary fix (PTF) packages contain fixes for a given release of the IBM i operating system. The fixes contained in a cumulative PTF package are for the Licensed Internal Code, and most licensed programs that can be installed on that operating system release.

#### Where to find information about fixes

Stay informed about IBM i fixes: which ones are available to you, what particular fixes can do in your environment, and which fixes may not be necessary for you. Use this information to find out where you can get the latest updates about fixes.

#### Scheduling a system shutdown and restart

#### *Omitting individual fixes when you install a cumulative PTF package*

The omit function allows you to specify individual fixes that you do not want to install from the cumulative package. A situation might exist where you received the latest cumulative package from IBM, and the preventive service planning (PSP) information indicates that the package contains two defective PTFs. In this situation you do not want to install the defective PTFs. To omit any PTFs, follow these steps:

1. Type `G0` PTF on any command line.
2. Select option 8 (Install Program Temporary Fix package) and press Enter.
3. On the Install Options for Program Temporary Fixes display, specify Y for the Other options field, and press Enter. The Other Install Options display is shown
4. Specify Y for the Omit PTFs field, and a value for the Apply Type field, and then press Enter. The Omit Program Temporary Fixes display is shown.
5. In the Opt Column, type a 1 next to each product and release for which you want to omit specific fixes from being installed, and press Enter. The PTFs to Omit display is shown for each product that was selected on the previous display. This display shows the list of fixes that are to be omitted from being loaded for the specified product and release.
6. To add fixes to the list on the PTFs to Omit display, type a 1 on the first line of the Opt column and specify the fix ID in the PTF ID column. Press Enter.
7. Repeat step “6” on page 29 until you have specified all of the fixes you want to omit from being installed for the product and release. Press Enter again and repeat the procedure for the next product and release you selected on the Omit Program Temporary Fixes display. When you are done with the last product and release you have selected, the Omit Program Temporary Fixes display is shown again. The > symbol next to the product and release indicates that you have specified fixes to be omitted. Press Enter. The Confirm to Omit PTFs display is shown.

8. The Confirm to Omit PTFs display lists each of the fixes that have been specified to be omitted from being installed. If the list is correct, press Enter. Normal fix installation process continues from this point.

Remember, you can install fixes by scheduling a time to shut down and restart the system.

*Your next step*

Complete the fix installation. See [“Step 4: Completing fix installation”](#) on page 37.

### ***Installing fixes received as save files***

Fixes are either sent to your system over the electronic customer support service link or they are received on distribution media such as CD-ROM, depending on the size and number of fixes that you ordered. Use this information to understand how to install IBM i fixes that are received as save files.

If the fixes are sent over the electronic customer support service link, you can select to receive them as save files or as images. If you receive them as save files, they are stored in library QGPL. You can use either IBM Navigator for i or the GO PTF menu to install fixes that you received as save files. For fixes received as images, refer to [“Installing IBM i fixes from an image catalog”](#) on page 35.

**Note:** If you receive PTF save files by any other method, you can use either the Update PTF Information (UPDPTFINF) command or the Log Program Temporary Fix Information (QPZLOGFX) API to log the fix information. The fix information must be logged to install the fix or distribute it to remote systems.

#### *Installing fixes with IBM Navigator for i*

To install fixes, follow below steps:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service**.
2. Expand **All Tasks > Program Temporary Fix** and select Install PTFs, or navigate to a fix you want to install, right-click and select Load then Apply.

#### *Installing fixes with GO PTF menu*

1. Type GO PTF on any command line.
2. Select option 8 (Install program temporary fix package) on the Program Temporary Fix (PTF) display. The Install Options for Program Temporary Fixes display is shown.
  - Type \*SERVICE for the device.
  - If you do not want to install certain fixes, you can omit them by using the procedure identified in the [“Installing cumulative PTF packages”](#) on page 28 topic.

#### *Notes*

- You must be running on the B storage area to use any temporarily applied Licensed Internal Code fixes. Temporarily applied Licensed Internal Code fixes can be applied permanently (copied to the A storage area). To permanently apply delayed or immediate Licensed Internal Code fixes, you must be running from the B storage area. These fixes can be permanently applied without an IPL.
- When running on the A storage area, the system will automatically apply the Licensed Internal Code fixes immediately. For Licensed Internal Code fixes that will be applied immediately without an IPL, you can find more information in the [“Advanced fix installation: Applying fixes”](#) on page 44.
- For immediate IBM i fixes that will be applied immediately without an IPL (initial program load), see the instructions in [“Advanced fix installation: Applying Licensed Internal Code fixes without an IPL”](#) on page 47.
- To prevent someone from unintentionally performing an IPL on your system when using the GO PTF option 7 or option 8, use the Change Service Attributes (CHGSRVA) command. Specify \*DLYALL for the PTFINSTYPE parameter to override the Automatic IPL field and the Apply type field on the GO PTF option 7 and option 8.

*Your next step*

Complete the fix installation. See [“Step 4: Completing fix installation” on page 37.](#)

### ***Installing fixes from media***

Fixes are either sent to your system over the electronic customer support service link or received on distribution media such as CD-ROM. To install IBM i from media, follow these steps.

When you receive fixes on physical media or as an image, you can use either IBM Navigator for i or the GO PTF menu to install the fixes. Both methods can install fixes from an image or physical media easily. However, IBM Navigator for i provides a more friendly graphical interface.

#### **Related reference**

[Log Program Temporary Fix Information \(QPZLOGFX\) API](#)

#### *Installing fixes with IBM i Navigator*

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fix**.
2. Click **Actions**, click **Install PTFs**.
3. In the Install PTFs wizard, specify a tape or optical device from which fixes will be installed.

#### *Installing fixes with GO PTF menu*

1. Type GO PTF from any command line.
2. Select option 8 (Install program temporary fix package) and press Enter. The Install Options for Program Temporary Fixes display is shown.
  - Type optyy, where *optyy* is the name of the optical device (for example, opt01) where you loaded the fix media.
  - If you do not want to install certain fixes, you can omit them by using the procedure identified in the [“Installing cumulative PTF packages” on page 28](#) topic.

#### *Notes*

- You must be running on the B storage area to use any temporarily applied Licensed Internal Code fixes. Temporarily applied Licensed Internal Code fixes can be applied permanently (copied to the A storage area). To permanently apply delayed or immediate Licensed Internal Code fixes, you must be running from the B storage area. These fixes can be permanently applied without an IPL.
- When running on the A storage area, the system will automatically apply the Licensed Internal Code fixes immediately. For Licensed Internal Code fixes that will be applied immediately without an IPL, you can find more information in the [“Advanced fix installation: Applying fixes” on page 44](#) topic.
- For immediate IBM i fixes that will be applied immediately without an IPL (initial program load), see the instructions in [“Advanced fix installation: Applying fixes without an IPL” on page 46](#).
- To prevent someone from unintentionally performing an IPL on your system when using the GO PTF option 7 or option 8, use the Change Service Attributes (CHGSRVA) command. Specify \*DLYALL for the PTFINSTYPE parameter to override the Automatic IPL field and the Apply type field on the GO PTF option 7 and option 8.

*Your next step*

Complete the fix installation. See [“Step 4: Completing fix installation” on page 37.](#)

### ***Distributing fixes to multiple systems with IBM Navigator for i***

After you have received your IBM i fixes, you can use IBM Navigator for i to distribute your fixes to other systems in your network.

To understand how a network is set up, see the following list for a description of the different roles. A single system can assume more than one role. For example, the same system can be the central system, the source system, and a model system.

### Central system

A central system directs and tracks activity in your environment. Normally it is the system that is running IBM Navigator for i.

### Endpoint systems

Endpoint systems are the systems that you are managing in your environment. The endpoint systems are controlled by the central system. The endpoint systems were created on your central system.

### Source system

This is the system from which items are sent when performing a task. The source system is the source of the item that is sent.

### Target system

This is the system to which items are sent when performing a task. The target system is the destination of the item that is sent.

### Model system

This is the system that is set up exactly the way you want it with regard to installed fixes. It has the fixes installed that you decided should be installed. You want the other systems that you are managing to have the same fixes installed as the model system. When you use the Compare and Update wizard, you make managing your fixes a lot easier.

#### *Sending and installing fixes*

Use IBM Navigator for i to send your IBM i fixes to remote systems and install them.

You can distribute some or all of the fixes that you receive to a remote system with IBM Navigator for i. However, you must have the save files to distribute the fixes. If you receive PTFs on media, you can use the Install PTFs function available from IBM Navigator for i to install the save files for the fixes onto your source system. If you already installed the PTFs from media and the Copy PTFs (CPYPTF) service attribute was set to \*YES, the save files have already been placed onto your system.

1. Expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.
2. Navigate through the PTF tree until you locate the option that contains the fixes you want to send and install.
3. Click on this option and select fixes you want to send and install in the work console place.
4. Select “**Send...**” or “**Send and Install...**” in Actions dropdown and follow the wizard’s instructions to send and install fixes.

#### *Your next step*

Complete the fix installation. See [“Step 4: Completing fix installation” on page 37](#) .

#### *Comparing and updating fixes*

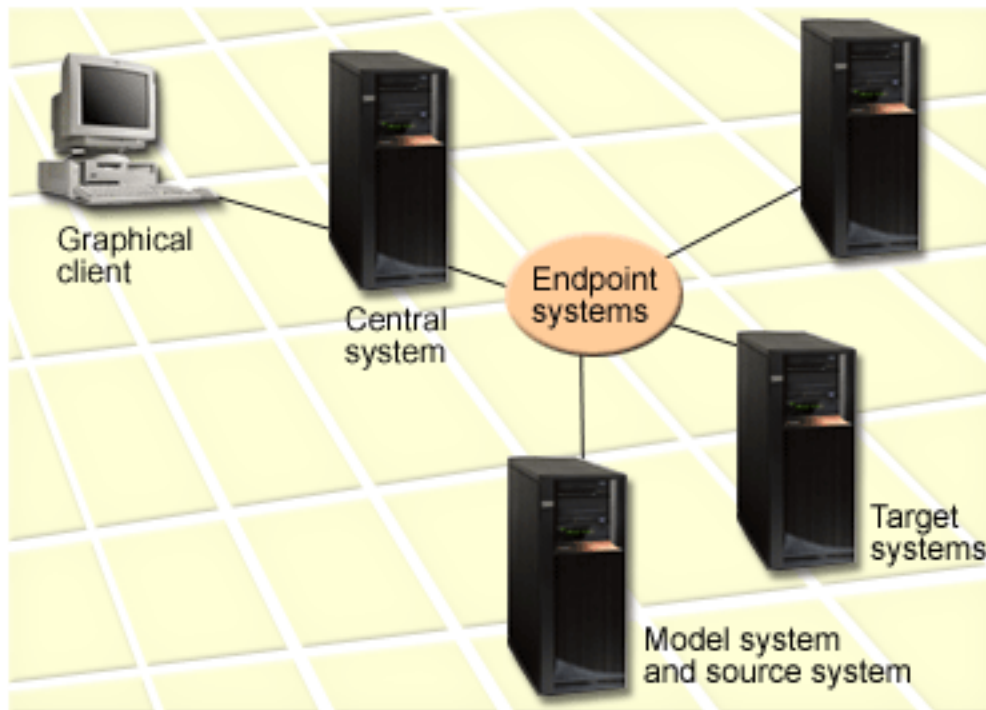
Use IBM Navigator for i (in particular, the Compare and Update wizard) to compare IBM i fixes across your systems or networks of systems. You then have the choice to update your systems with the missing fixes.

The Compare and Update wizard can be used to ensure that all systems in a network have the same level of fixes. The wizard compares the fix levels of a single system or multiple systems to a model system. You can send the save files of the missing fixes from a source system and then install the fixes to ensure the systems have the same level of fixes. You can also choose which missing fixes you want to send. You can launch the Compare and Update wizard from an endpoint system, a system group, or from a system in your list of connections.

**Note:** It is recommended that your systems be at the same cumulative level. Use the GO PTF menu to ensure that your systems are at the same level, and then use the Compare and Update wizard to work with a smaller number of differences. By following this recommendation, you ensure that the special instructions that accompany the cumulative PTF packages are followed.

To compare and update fixes, your model system must have the fix save files on it. You will use your model system to compare against other systems in your network to ensure that your other systems have the same level of fixes like the model system. The Compare and Update wizard finds missing fixes and extra fixes on the target systems.

Also, you can perform only a comparison of fixes with the Compare and Update wizard. You can choose to review your list of missing and extra fixes without requesting to perform an update for the missing fixes.



### 1. Set up your model system

Set up a model system that has the appropriate fixes installed for the particular products, all fixes for all products, or fixes for particular releases. In some instances, your model system might be your central system. You should define a model system that works best in your environment. To set up your model system, follow these steps:

- a) Determine which fixes you want installed on the model system.
- b) Install those fixes.

### 2. Set up your source system

Verify that the save files for the fixes exist on the source system for the fixes that are installed on the model system. In some instances, your source system might be your model system.

You can have the wizard perform a comparison, and optionally, send missing fixes, or send and install missing fixes after the compare has completed.

To **compare and update fixes on your target systems**, follow these steps:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and service > Program Temporary Fix**.
2. Click **Actions**, click **Compare and Update**.
3. Use the Compare and Update wizard to determine what fixes are missing from the target system when compared to your model system. When you have finished, IBM Navigator for i can send or send and install any missing fixes on the target system. When the missing fixes are installed, the target systems then have the same level of installed fixes as the model system.

#### *Compare and update considerations*

Scenarios can exist where a fix on the model system is listed as superseded on the target system. In this case, the compare and update function tells you that the fix is missing on the target system because the superseded fix is not installed or the superseding fix is not installed. The fix continues to show as missing until the superseding fix is installed. A fix with a *Superseded* status does not mean that the later fix was

installed. You can still load and apply the fix. A status of *Superseded* means that a later fix exists on the system. It is possible that the fix was not applied. The following scenarios illustrate this point.

#### Scenario 1

PTF A on the target system is not installed but shows a status of *Superseded*. PTF A shows as missing on the target system. The PTF is sent and installed and shows a status of *Temporarily applied* on the target system.

Model system	Target system
PTF A	PTF B exists on target system as a save file only. PTF B supersedes PTF A.

#### Scenario 2

PTF A on the target system is not installed but shows a status of *Superseded*. PTF A shows as missing on the target system and cannot be installed because PTF B was loaded. PTF B is installed on the target system. PTF A can be installed if it has a status of *Superseded* only if the superseding PTF, PTF B, was not loaded.

Model system	Target system
PTF A	PTF B was loaded on the target system. PTF B supersedes PTF A.

#### Notes:

1. Only those fixes that are identified as missing can be sent and installed. You cannot uninstall extra fixes. You can only display them.
2. The compare and update function works only with fixes that are installed in some form on the model system for the products that are installed on the model system.
3. Fix group levels are updated on the target system when you use the Compare and Update wizard.

### ***Installing fixes on systems with logical partitions***

Even though the basic steps of installing an IBM i fix on a system with logical partitions are the same as on a system without logical partitions, unique situations exist that you need to understand before you begin to install your fixes.

For systems where the IBM i is hosting logical partitions, the basic steps of installing a fix or PTF are the same.

However, you should take the following precautions:

- When you load fixes to a primary partition, power down all secondary partitions before you restart the primary partition.
- When you use the GO PTF command on the primary partition, change the automatic IPL parameter from the default (\*YES) to (\*NO). You do not have to do this if you first power down the secondary partitions.

For information about IBM POWER models, see [Customer service, support, and troubleshooting and “Installing server firmware fixes”](#) on page 35.

#### **Related concepts**

[Restarting a system with logical partitions](#)

#### **Related tasks**

[Powering down a system with logical partitions](#)

## Installing server firmware fixes

This topic describes how to install server firmware fixes when your system is managed by IBM i or the Hardware Management Console.

As the system administrator or system operator who manages the software level on your systems or partitions, you have two choices for performing this task for systems that are managed by the Hardware Management Console (HMC):

- You control the software level of the server firmware through the IBM i service partition. This method requires a server IPL for the updates to take effect. A server IPL requires you to power down all the partitions at the same time.

**Note:** Not all systems that are managed by an HMC allow the IBM i operating system to control the level of the server firmware.

- You allow the HMC to control the level of the server firmware. On systems that have an HMC attached, this is the default action. This method requires you to install fixes by using the HMC. With this method, the IBM i service partition is disabled from applying updates to the server firmware.

When server firmware fixes are applied or removed through the IBM i service partition, a message is sent that indicates if any of the PTFs require a server IPL. It is not sufficient to perform an IPL of only the service partition to activate the code. You must power down all partitions at the same time.

You can use the Display Firmware Status (DSPFMWSTS) command to determine if the server firmware is being managed by the operating system or by an HMC. When the system is being managed by the operating system, the fixes for the server firmware are delivered as MHnnnnn PTFs for an IBM i licensed program. The product identifier that is used depends on the system model that you are running. You can determine the product identifier that is used for the server firmware fixes by using the DSPFMWSTS command. You can also enter DSPPTF LICPGM(\*FMW) from the service partition to view the PTFs for the server firmware product.

## Installing IBM i fixes from an image catalog

To install PTFs that you receive on physical media, that you receive as images (using SNDPTFORD DLVRYFMT(\*IMAGE), or by downloading the images from Fix Central using either Download Director or FTP, follow these steps.

To install your fixes from an image catalog, do the following steps:

### 1. Create a virtual optical device

It is possible that you used an image catalog that is associated with a virtual optical device to perform a software upgrade. If you did, you do not need to perform this step. If you do not have a virtual optical device, you must create one.

- To create a device description, type the following on any command line:

```
CRTDEVOPT DEVD(OPTVRT01) RSRNAME(*VRT) ONLINE(*YES) TEXT(text-description)
```

- To determine whether a virtual optical device exists, type the following:

```
WRKDEVD DEVD(*OPT)
```

A virtual optical device is indicated by a device type of 632B.

To ensure that the device is active, press F14 (Work with configuration status). If the device is not active, type 1 to vary it on.

### 2. Create an image catalog

Create an image catalog for the set of PTFs that you want to install. The Create Image Catalog (CRTIMGCLG) command associates an image catalog with a target directory where the preloaded images are loaded.

```
CRTIMGCLG IMGCLG(ptfcatalog) DIR('/MYCATALOGDIRECTORY')  
CRTDIR(*YES) TEXT(text-description)
```



**Note:** A directory can be associated with only one image catalog.

As of IBM i 7.2, users can automatically add all images found in the image catalog directory as follows:

```
CRTIMGCLG IMGCLG(ptfcatalog) DIR('/MYCATALOGDIRECTORY')  
ADDVRTVOL(*DIR) TEXT(text-description)
```

If you use this method, skip to step 4.

### 3. Add an image catalog entry

You can add an image catalog entry for each physical media that you have. You can also add an image catalog entry for fixes that you received using FTP, for example, you downloaded fixes from Fix Central.

- Add an image catalog entry for each physical media that you have. You need to repeat this step for **each** volume of media. You should add the images in the same order as if you were going to install from them.

```
ADDIMGCLGE IMGCLG(ptfcatalog) FROMDEV(OPT01) TEXT(text-description)
```

- Add an image catalog entry for fixes that you downloaded from Fix Central into an IFS directory. You can add the directory into an image catalog in either of the following ways:
  - Into the same directory that is associated with the image catalog directory.

```
ADDIMGCLGE IMGCLG(PTFCATALOG) FROMFILE(iptfxxx_x.bin)  
TOFILE(iptfxxx_x.bin)
```

- Into a different directory.

```
ADDIMGCLGE IMGCLG(PTFCATALOG)  
FROMFILE('/differentdirectory/iptfxxxx_x.bin')  
TOFILE(iptfxxx_x.bin)
```

### 4. Load the image catalog

This step associates the virtual optical device to the image catalog. Only one image catalog can be associated with a specific virtual optical device. Type the following command to load the image catalog:

```
LODIMGCLG IMGCLG(ptfcatalog) DEV(OPTVRT01) OPTION(*LOAD)
```

### 5. Verify that the images are in the correct order

```
VFYIMGCLG IMGCLG(ptfcatalog) TYPE(*PTF) SORT(*YES)
```

The system puts the images in the correct order. By default, the volume with the lowest index is mounted; all the other volumes are loaded. Use the Work with Catalog Entries (WRKIMGCLGE) command to see the order of the images.

**Note:** If you are attempting to load individual PTFs with the Load PTF (LODPTF) command, only the PTFs on the volume set that is mounted can be loaded.

### 6. Install PTFs from virtual optical device

To install PTFs from an image catalog associated with a virtual optical device, see [“Installing fixes from media” on page 31](#) or [“Installing cumulative PTF packages” on page 28](#). For the device name, enter the name of the virtual optical device that is associated with your image catalog. All the PTFs from the images that are either mounted or loaded will be installed.

### 7. Delete images from image catalog

Once you have successfully installed the fixes, you should remove the images from the catalog with the Remove Image Catalog Entries (RMVIMGCLGE) command. If you continue to add new images to the same image catalog without removing the old images, PTF install processing will attempt to install the fixes from all of the loaded images in the catalog.



## Related concepts

[Qshell utility features](#)

## Related reference

[Create Directory \(CRTDIR\)](#)

### *Your next step*

Complete the fix installation. See [“Step 4: Completing fix installation” on page 37](#).

## Step 4: Completing fix installation

To complete your IBM i fix installation, follow these procedures.

An IPL of the system is required to complete the installation of PTFs.

If you are installing technology refresh PTFs at the same time that you are installing fixes with technology refresh requisite PTFs, you might be prompted to perform an additional normal IPL to permanently apply the technology refresh PTFs. The additional IPL might be required when installing a cumulative PTF package, a fix group (such as the HIPER group), or fixes that have been downloaded electronically. If an additional IPL is needed, and you are installing from a virtual optical device or save files (\*SERVICE), the second IPL is then performed automatically.

If an additional IPL is needed, and you are installing from a physical optical device or tape device, you must perform an IPL before completing the PTF installation process.

1. If the Confirm IPL to Complete PTF Install display is shown, do the following:
  - a) Press F10 to end all jobs on the system and IPL the system.
  - b) When the Sign On display is shown, continue with [“Step 5: Verifying fix installation” on page 37](#).
2. If the Confirm IPL for Technology Refresh PTFs display is shown, to complete the PTF installation process, do the following:
  - a) Press F10 to end all jobs on the system and IPL the system.
  - b) When the Sign On display is shown, enter **GO PTF** again with the same parameters.
  - c) Mount the first tape or optical volume in the PTF volume set.

If you entered a Y (Yes) for the Automatic IPL option, the system is IPLed automatically. After the IPL completes, the Sign On display is shown and the new PTFs are active. Otherwise, if you entered an N (No) for the Automatic IPL option, the display shows the licensed programs for which PTFs are being loaded and marked to be temporarily applied upon the next unattended IPL. When this procedure completes, the Program Temporary Fix display is shown.

3. If the Program Temporary Fix display is shown, end all jobs on the system and perform a normal mode IPL to the B IPL source.

After the IPL completes, the Sign On display is shown and the new PTFs are active.

## Related tasks

[Step 5: Verifying fix installation](#)

To verify that your IBM i fix installation is successful, follow these procedures.

### *Your next step*

Verify that the fixes are installed. See [“Step 5: Verifying fix installation” on page 37](#). If the cover letter includes any post-installation special instructions, follow those instructions at this time.

## Step 5: Verifying fix installation

To verify that your IBM i fix installation is successful, follow these procedures.

You should develop the habit of verifying whether you were successful in installing your fixes. In general, if your fixes did not install, you need to determine whether the failure occurred during the load or apply phase of the installation.

If the system did not IPL, then possibly the failure occurred during the load phase. Press Help on the failure message, and then press F10 (Display messages in the job log). Look for all escape messages that might identify what the problem is. You should fix these errors, and then try your request again.

If the system did IPL, but the PTFs did not apply, look at the history log.

1. Type **GO LICPGM** from any command line.
2. Type option 50 (Display log for messages).
3. Look for any messages that indicate any PTF activity during the previous IPL.

Normal PTF processing occurs only during an unattended IPL (initial program load) that immediately follows a normal system end.

If you did not specify Y for Perform Automatic IPL on the Install Options for PTFs display, verify that the Power Down System (PWRDWNSYS) command was run with RESTART(\*YES) and that the key lock position was at normal.

If an abnormal IPL occurs, some Licensed Internal Code fixes might be installed, but no other operating system or licensed program PTFs are applied. You can look at the previous end of system status system value (QABNORMSW) to view whether the previous end of system was normal or abnormal.

4. Look for any messages that indicate that there was a failure during the IPL or that indicate that a server IPL is required. If you find any failure messages, do the following:
  - a) Print the job log of the active start-control-program-function (SCPF) job using **DSPJOBLOG JOB(000000/QSYS/SCPF) OUTPUT(\*PRINT)**.
  - b) Find the error messages in the spooled file and determine what caused the error
  - c) Fix the errors and re-IPL the system to apply the rest of the PTFs.

Additionally, you can do the following to verify that your fixes have been installed correctly:

1. On any command line, type **GO LICPGM** and press Enter. The Work with Licensed Programs display appears.
2. Select Option 50 (Display log for messages). The Display Install History display appears.
3. Fill in the start date and start time on the Display Install History display and press Enter. The messages about fix installation are shown.
4. Optional: Verify that requisite PTFs for licensed programs are installed. For example, enter the following command:

```
CHKPRDOPT PRDID(*OPSYS) RLS(*OPSYS) OPTION(*BASE) CHKSIG(*NONE) DETAIL(*FULL)
```

**Note:** Checking several licensed programs or options might cause this command to run for several minutes.

**If the fixes were installed successfully**, you see messages like the following:

```
PTF installation process started.
Loading of PTFs completed successfully.
Marking of PTFs for delayed application started.
Marking of PTFs for delayed application completed successfully.
Apply PTF started.
Applying of PTFs for product 5770xxx completed successfully.
Applying of PTFs for product 5770xxx completed successfully.
Applying of PTFs for product 5770xx completed successfully.
.
.
.
Applying of PTFs completed.
```

**If the PTFs were installed successfully but require a server IPL to activate the changes,** you see messages like the following:

```
PTF installation process started.  
PTFs installed successfully, but actions pending.  
Server IPL required.
```

You must perform a server IPL to the temporary IPL source (T-side) to activate the changes to the server firmware. Use the Display Firmware Status (DSPFMWSTS) command to determine the PTF that requires a server IPL. See [“Installing server firmware fixes”](#) on page 35 for information on performing a server IPL.

**If the cumulative PTF package was not installed successfully,** you see error messages like the following:

```
PTF installation process started.  
Loading of PTFs failed.  
Marking of PTFs for delayed application started.  
Marking of PTFs for delayed application failed.  
Apply PTF started.  
. .  
Applying of PTFs failed for product 5770xxx.  
. .  
Applying PTFs failed.
```

## Related concepts

### [Single fixes](#)

Single PTFs (fixes) are applied to correct specific reported problems.

### [Causes of abnormal IPLs](#)

## Advanced procedures for fix installation

This topic introduces the advanced topics of loading and applying IBM i PTFs. You will also learn how to create your own fix package from optical media and how to create a fix package to a virtual image.

In general, use option 8 from the Go PTF menu to install your fixes. Option 8 loads and applies fixes in one step. However, you can encounter some situations where you need to perform the separate steps of loading and then applying fixes. In addition to these two topics, you will learn how to customize a PTF package from optical media and how to customize a PTF package to a virtual image.

### ***Advanced fix installation: Building a custom fix package***

You can encounter situations where you, as a service provider, do not want to distribute the same IBM i fixes to your service requesters. In those situations, you will want to build your own fix package from DVD-ROM that can be used the same way as a fix package supplied by IBM service support.

This example combines a fix package with individual fixes into a custom fix package for distribution to other systems in your network.

**Note:** If you build a custom fix package and save it to virtual optical media, you cannot span virtual volumes. Your custom fix package must fit on one volume.

The order of a cumulative PTF package is:

- High-impact pervasive (HIPER) Licensed Internal Code fixes
- HIPER IBM i fixes
- HIPER licensed program fixes
- A delimiter that divides the HIPER fixes from the non-HIPER fixes
- Non-HIPER Licensed Internal Code fixes
- Non-HIPER IBM i fixes
- IBM i Online information fixes, if any

- Non-HIPER licensed program fixes

### Customizing a PTF package from DVD-ROM

For the following example, assume that you want a tape that contains all but one (SF00600) of the PTFs from the most recent PTF package received from IBM service support, including the HIPER PTFs. In addition, you want to include four individual PTFs received electronically from service support. These PTFs are MF00050, SF00480, SF00500, and SF00800.

Because the four individual PTFs were received from IBM service support, they already exist in save files in library QGPL. They exist in the library as object type \*file, as shown below:

- QMF00050: \*FILE
- QSF00480: \*FILE
- QSF00500: \*FILE
- QSF00800: \*FILE

1. Find out the path identifier for the fix file you want to copy from the cumulative PTF package:

**Note:** A path identifier is a 1 to 6-digit number that identifies each fix file on the DVD-ROM. Each release of a licensed product on the DVD-ROM has its own unique set of identifiers. Each set of path identifiers for the product begins with the number 1 indicating the first fix file for the product and release. This first fix file may or may not contain HIPER fixes for the product.

To get the path identifier for each fix file you want to copy from the cumulative PTF package for your product, use the Copy Program Temporary Fix (CPYPTF) command, and specify PATHID(\*SELECT). The Select PTF File display is shown.

#### Select PTF File display

```

                                Select PTF File
                                System:  SYSNAMXX

Product . . . . . : 5770SS1
Type option, press Enter.
1=Select

  Opt   Release   Feature   National   Path   Hiper
       V7R2M0    Type     Language  Identifier Hiper
                               Version
       V7R2M0    *CODE
       V7R2M0    *CODE
       V7R2M0    *LNG     2924      2        No

```

2. Use the CPYPTF command to bring the HIPER fixes from the cumulative PTF package into library QGPL. Two licensed programs are being used in this example (MF and SF PTFs). You can identify the HIPER fix files on the Select PTF File display by a Yes in the Hiper PTFs column.

```

CPYPTF LICPGM(5770999)
FROMDEV(OPT01)
TODEV(*SAVF)
FROMPATHID(1)
TOSAVF(QGPL/PCUMH999)

CPYPTF LICPGM(5770SS1)
FROMDEV(OPT01)
TODEV(*SAVF)
FROMPATHID(1)
TOSAVF(QGPL/PCUMHSS1)

```

3. Copy the product delimiter into a save file.

```

CPYPTF LICPGM(5770111)
FROMDEV(OPT01)
TODEV(*SAVF)

```

```
SELECT(*ALL)
FROMPATHID(1)
TOSAVF(QGPL/PCUMH111)
```

4. Copy the non-HIPER fixes from the cumulative package into a save file omitting the unwanted fixes.

```
CPYPTF LICPGM(5770999)
FROMDEV(OPT01)
TODEV(*SAVF)
FROMPATHID(2)
TOSAVF(QGPL/PCUMP999)

CPYPTF LICPGM(5770SS1)
FROMDEV(OPT01)
TODEV(*SAVF)
OMIT(SF00600)
FROMPATHID(2)
TOSAVF(QGPL/PCUMPSS1)
```

### Creating the custom package

Repeat the command for each licensed program with non-HIPER fixes. The OMIT parameter was used to identify the fix not included in the tailored package. The TOSAVF name must be 8 characters in length and must start with the letter P. You can choose the remaining seven characters. The library on the TOSAVF parameter must be QGPL.

Library QGPL now contains:

File Name	Object Type
QMF00050	*FILE
QSF00480	*FILE
QSF00500	*FILE
QSF00800	*FILE
PCUMH999	*FILE
PCUMHSS1	*FILE (plus more for HIPERs of licensed programs)
PCUMH111	*FILE
PCUMH999	*FILE
PCUMPSS1	*FILE (plus more for non-HIPERs of licensed programs)

1. Initialize the tape for the tailored cumulative package.

```
INZTAP DEV(TAP01)
NEWVOL(CUMPKG)
```

2. Copy the Licensed Internal Code HIPER fixes into one file and place it first on the tape.

```
CPYPTF LICPGM(5770999)
FROMDEV(*SERVICE)
TODEV(TAP01)
SELECT(CUMH999)
TOENDOPT(*LEAVE)
```

The TOENDOPT(\*LEAVE) parameter is used to maintain the tape position.

3. Copy the IBM i HIPER fixes onto the tape.

```
CPYPTF LICPGM(5770SS1)
FROMDEV(*SERVICE)
TODEV(TAP01)
SELECT(CUMHSS1)
TOENDOPT(*LEAVE)
```

Repeat for each licensed program with HIPER fixes.

4. Copy the delimiter to the tape.

```
CPYPTF LICPGM(5770111)
FROMDEV(*SERVICE)
TODEV(TAP01)
SELECT(CUMH111)
TOENDOPT(*LEAVE)
```

5. Copy the non-HIPER Licensed Internal Code fixes into one file and place on the tape.

```
CPYPTF LICPGM(5770999)
FROMDEV(*SERVICE)
TODEV(TAP01)
SELECT(CUMP999 MF00050)
TOENDOPT(*LEAVE)
```

6. Copy the non-HIPER IBM i fixes into one file and place on the tape.

```
CPYPTF LICPGM(5770SS1)
FROMDEV(*SERVICE)
TODEV(TAP01)
SELECT(CUMPSS1 SF00480 SF00500 SF00800)
TOENDOPT(*LEAVE)
```

Repeat for each licensed program with non-HIPER fixes.

The tape now contains the tailored fix package. It can be used in the same way that your service support fix packages are used.

Fixes can now be loaded on, applied to, or removed from a system.

### **Advanced fix installation: Building virtual image fix packages**

To create your own virtual image for fix packages that you want to install at a later time, follow these procedures.

#### **Notes:**

1. Your user profile must have \*ALLOBJ and \*SECADM authority to use the image catalog commands.
2. If you do not have a virtual optical device, you must create one. To create one, see [“Installing IBM i fixes from an image catalog”](#) on page 35.
3. If you build a custom fix package and save it to virtual optical media, you cannot span virtual volumes. Your custom fix package must fit on one volume.

To create your own virtual image in an image catalog, do the following steps:

#### **1. Create an image catalog**

Create an image catalog for the set of PTFs that you want to install. The Create Image Catalog (CRTIMGCLG) command associates an image catalog with a target directory where the pre-loaded images are loaded.

```
CRTIMGCLG IMGCLG(ptfcatalog) DIR('/MYCATALOGDIRECTORY')
CRTDIR(*YES) TEXT(text-description)
```

**Note:** A directory can be associated with only one image catalog.

#### **2. Add an image catalog entry**

Add an image catalog entry to create a new image file in the image catalog.

```
ADDIMGCLGE IMGCLG(ptfcatalog) FROMFILE(*NEW) TOFILE(NEWIMAGEFILE)
IMGSIZ(xxxxx) TEXT(text-description)
```

The size of the image needs be large enough to contain the size of the fixes that you want to distribute.

#### **3. Load the image catalog**

This step associates the virtual optical device to the image catalog. Only one image catalog can be associated with a specific virtual optical device. Type the following command to load the image catalog:

```
LODIMGCLG IMGCLG(ptfcatalog) DEV(OPTVRT01) OPTION(*LOAD)
```

#### **4. Initialize the virtual image**

```
INZOPT NEWVOL(MYVOLUMEID) DEV(OPTVRT01) CHECK(*NO)
TEXT(MYTEXTDESCRIPTION)
```

The system initializes the virtual image.

## 5. Copy PTFs to virtual media

Copy any PTFs and PTF groups to virtual optical device. You cannot span virtual optical volumes; all PTFs and PTF groups must fit on a single volume. If you exceed the capacity of the volume, either create a new volume or initialize the volume to a larger size.

Use the Copy PTF Groups (CPYPTFGRP) command to copy the PTF groups to the media. You can optionally specify CPYPTF(\*YES) on the command to copy the PTFs in the group.

```
CPYPTFGRP PTFGRP(xxxxxxxx) FROMDEV(*SERVICE)
TODEV(OPTVRT01) CPYPTF(*YES)
```

Use the Copy PTF (CPYPTF) command to copy PTFs to the media. Repeat the command for each product that you have.

```
CPYPTF LICPGM(xxxxxxxx) FROMDEV(*SERVICE)
TODEV(OPTVRT01) SELECT(xxxxxxxx)
```

### Related tasks

[Create actual media from a virtual image](#)

[Transport virtual images](#)

### **Advanced fix installation: Loading fixes**

To load one, some, or all of your IBM i fixes, use the Load Program Temporary Fix (LODPTF) command.

Typically, you should use option 8 from the GO PTF menu to install your fixes. However, you can encounter some situations where you need to perform the separate steps of loading and then applying the fixes. If a PTF has been permanently removed or damaged, LODPTF must be used to reload the PTF.

The fix packages on optical media or in a save file can contain many fixes. You can load one, some, or all of them using the Load Program Temporary Fix (LODPTF) command. As fixes are loaded, the system verifies that the release of the product is correct. Fix status is "Not applied" after the fix has been loaded on the system. Use the Apply Program Temporary Fix (APYPTF) command to apply the fix. For some of the applied fixes, the status is Temporarily applied - ACN. There are also some temporarily applied fixes that show a status of Temporarily applied - PND. For these fixes, you need additional actions to make them active.

#### *Loading individual fixes from a cumulative PTF package*

To load one fix from a cumulative package, do the following steps:

1. Type LODPTF and press F4 (Prompt).
2. Specify the parameter values according to the fix you are loading.
3. Specify the fix identifier you want to load in the fix numbers to select (SELECT) parameter and press Enter.
4. Repeat LODPTF command for each fix you want loaded from the cumulative package.

For fixes on optical media, the system will automatically find the fix file in the cumulative package that contains the selected individual fixes when you specify PATHID(\*FIRST). All fixes to be loaded must exist in the same path identifier. Otherwise, you need to load the fixes separately.

For fixes on an image catalog, only the images that are part of the volume set for the image that is mounted are searched.

#### *Loading fixes that supersede other fixes*

If the fix being loaded replaces (supersedes) existing fixes (identified in the fix cover letter) the following considerations apply:

- If the fix to be replaced is not applied to the system, the new fix can be loaded successfully. A record is kept indicating that the replaced fix has been superseded.

- If the fix to be replaced is permanently applied, it is considered to be a part of the operating system or licensed program to which it was applied. The new fix can be loaded successfully.
- If the fix to be replaced is temporarily applied, the load operation will automatically permanently apply any replaced (superseded) fixes. If you do not want the fix function to permanently apply any replaced (superseded) temporarily applied fixes automatically, specify \*NOAPY for the Superseded PTFs (SPRPTF) parameter on the LODPTF command. The fixes to be replaced must either be permanently applied or permanently removed before fixes that are replacing them can be loaded.

**Note:** When you order a fix, IBM Service Center does not search through the fixes to determine which one is the latest level. For example, if you order a fix that is superseded by another fix, IBM Service Center will send you only the fix that you ordered instead of the superseding fix. You need to use the summary list to identify the fix you need to order. Scan the summary list for fixes that replace the fix in question and then order the fix.

#### *Loading fixes that have technology refresh requisites (\*TRREQ)*

If the fix being loaded has a technology refresh requisite (identified in the fix cover letter), the following considerations apply:

- If the technology refresh requisite fix is not applied to the system, the new fix cannot be loaded until the technology refresh requisite fix is permanently applied.
- If the technology refresh requisite fix is permanently applied, it is considered to be a part of the operating system. The new fix can be loaded successfully.
- If the technology refresh requisite fix is temporarily applied, the load operation automatically permanently applies the technology refresh requisite fix. If you do not want the fix function to permanently apply any temporarily applied technology refresh requisite fixes, specify \*NOAPY for the Superseded PTFs (SPRPTF) parameter on the LODPTF command. A technology refresh requisite fix must be permanently applied before the new fix can be loaded.

### **Advanced fix installation: Applying fixes**

Find out how to apply one, some, or all of your IBM i fixes with the Apply Program Temporary Fix (APYPTF) command.

Typically, use option 8 from the GO PTF menu to install your fixes. However, you can encounter some situations where you need to perform the separate steps of loading the fixes and then applying the fixes.

Some fixes cannot be applied immediately because the operating system or licensed programs they affect are active. These fixes are called delayed fixes and can be applied only at the next system initial program load (IPL). Immediate fixes can be applied without doing an IPL if the objects that they affect are not in use and if all requisite fixes can be applied immediately. Immediate fixes can also be applied when you do the next IPL. Use the Display PTF Apply Information (DSPPTFAPYI) command to determine whether the selected PTF can be applied immediately based on the state of all requisite PTFs.

Fixes generally should be installed when received. Installing fixes allows you to test them in your operational environment. You should ensure that the new fixes operate properly on your system before permanently installing them. As long as the fixes are installed temporarily, they can be removed. Once they have been installed permanently, they cannot be removed.

When you are sure that the Licensed Internal Code fixes work properly, it is recommended that you install them permanently to reduce the time required to install the next cumulative PTF package, and to make available the storage for future fixes. If this storage is not made available, you will need to permanently install some of your Licensed Internal Code fixes before you can temporarily install any additional fixes. Temporarily installed Licensed Internal Code fixes are only in effect when you use the B storage area to perform an IPL.

#### **Notes:**

1. You cannot apply or remove fixes with mandatory special instructions when \*ALL is specified on the PTF numbers to select (SELECT) parameter of Apply Program Temporary Fix (APYPTF) or Remove Program Temporary Fix (RMVPTF) commands. These PTFs are only applied or removed when they



are specified by a number on the SELECT parameter. This protects against applying or removing fixes without reading the mandatory special instructions.

2. The term fix, in this context, refers to Licensed Internal Code fixes and licensed program fixes, including IBM i program fixes.
3. When installing fixes, other fixes can be specified as requisites for the fix. These different types include *prerequisite fixes*, *corequisite fixes*, and *technology refresh requisite fixes*. Each type has a different relationship with the fix that you are trying to apply.

Fixes can be applied (made active) on either a temporary or permanent basis. If the fix is applied temporarily (also known as temporarily installed), a copy of the object being changed is saved. If the fix is applied permanently (also known as permanently installed), the old object is removed. Permanently applied fixes cannot be removed. You can also apply fixes during an attended IPL or during an unattended IPL. The following tasks provide you with instructions on how you can apply fixes:

#### *Advanced fix installation: Canceling the application of fixes*

To prevent an IBM i fix that was selected to be installed at the next IPL from being installed, follow these directions.

To prevent a fix that is selected to be installed after you have already selected option 8 (Install program temporary fix package) on the GO PTF menu, but before the IPL has been done, enter the following command:

```
APYPTF LICPGM(XXXXXXX) SELECT(YYYYYYY) DELAYED(*YES)
APY(*TEMP) IPLAPY(*NO)
```

where XXXXXXXX is the licensed program and YYYYYYYY is the number of the fix you want to omit.

This action resets the IPL apply indicator to IPL Action NONE.

#### *Advanced fix installation: Applying fixes during an unattended IPL*

To temporarily or permanently install both delayed and immediate IBM i fixes during an unattended IPL, follow these procedures.

You can temporarily or permanently install both delayed and immediate fixes. To install delayed fixes temporarily, follow these steps:

1. On any command line, type:

```
APYPTF LICPGM(*ALL) SELECT(*ALL) APY(*TEMP)
DELAYED(*YES) IPLAPY(*YES)
```

2. Press Enter.

To permanently install all fixes that are temporarily installed (status of *Temporarily applied*) during the next unattended IPL, or to permanently install all immediate fixes that have a status of *Not applied* during the next IPL, follow these steps:

1. On any command line, type:

```
APYPTF LICPGM(*ALL) SELECT(*ALL) APY(*PERM)
DELAYED(*YES) IPLAPY(*YES)
```

2. Press Enter.

To perform an IPL on the system, follow these steps:

1. On any command line, type:

```
PWRDWNSYS *IMMED RESTART(*YES) IPLSRC(B)
```

2. Press Enter.

**Note:** If your system has logical partitioning, the Power pushbutton, DST option 7, or the Power Down System (PWRDWNSYS) command can affect multiple partitions.

## Related concepts

### Managing logical partitions

#### *Advanced fix installation: Applying fixes during attended IPL*

To temporarily or permanently install both delayed and immediate IBM i fixes during an attended IPL, follow these procedures.

You can temporarily or permanently install both delayed and immediate fixes that have a status of *Not applied* during an attended IPL.

To temporarily install a delayed fix, you only need to do one IPL. To permanently install a delayed fix after it has been applied temporarily and tested, you need to do another IPL.

**Before you start:** Send a message to users notifying them to sign off the system.

To temporarily or permanently install a fix during an attended IPL:

1. Switch the system unit to the Manual mode. If you are temporarily installing delayed Licensed Internal Code fixes, select storage area **A**. Immediate Licensed Internal Code fixes can be installed when you do an IPL to storage area B. If you are permanently installing Licensed Internal Code fixes, select storage area **B**.
2. Type:

```
PWRDWN SYS *IMMED RESTART(*YES) IPLSRC(x)
```

where x is your storage area, on any command line and press Enter.

3. Select option 1 (Perform an IPL) on the IPL or Install the System display.
4. Type your user ID and password on the Sign On display.
5. On the Select Products to Work with PTFs display, select the licensed program for which you want to install the fix.
  - If fixes are not applied or are temporarily applied, the Work with PTFs display is shown. This display is used to install and remove fixes and shows the current status of each fix that you can work with.
  - If you want to keep the same status for any of the fixes displayed, leave the Opt column empty.
  - Fixes that are not installed can be either temporarily installed using option 1 or permanently removed using option 4.
  - Fixes that are temporarily installed can be either permanently installed using option 2 or temporarily removed using option 3.

**Note:** For an explanation of *permanently removed* and *temporarily removed* PTFs, see [“Removing software fixes”](#) on page 55.

6. After typing the option number you want for each of the fixes displayed, press Enter.
7. Repeat step [“5” on page 46](#) and step [“6” on page 46](#) for each licensed program for which you want to apply fixes.
8. Press F3 (Exit) to continue with system operations.

#### *Advanced fix installation: Applying fixes without an IPL*

To temporarily or permanently install immediate IBM i fixes without doing an IPL, follow these steps.

1. Make sure the licensed programs to which the fixes are being applied are not in use.

**Note:** Be sure to follow any special instructions, including activation instructions, in the cover letter to ensure that the system is in the correct state.

2. Enter the Apply Program Temporary Fix (APYPTF) command and press F4 (Prompt). Press F9 (All parameters) to display all of the fields on the Apply Program Temporary Fix (APYPTF) display.
3. Specify the number that corresponds to the licensed program you are applying fixes for the Product (LICPGM) parameter.
4. Specify the release level for the Release (RLS) parameter.

**Note:** The release parameter is only required if more than one release of the product is installed.

5. Select the fixes you want applied by doing one of the following:
  - Specify the identifiers of the fix you want to apply in the PTF numbers to select (SELECT) parameter. To apply all fixes, specify \*ALL in the PTF numbers to select (SELECT) parameter.
  - Specify \*ALL for the fix numbers to select (SELECT) parameter, and the numbers of specific fixes you do not want to apply for the fix numbers to omit (OMIT) parameter.

**Note:** Specify APYREQ(\*YES) to ensure all requisites within the same product are also applied if individual fix identifiers are specified in the SELECT parameter.
6. To temporarily install the fixes, specify \*TEMP for the Extent of change (APY) parameter. To permanently install the fixes, specify \*PERM.
 

**Note:** Fixes that are temporarily installed can be removed; fixes that are permanently installed cannot be removed (see Removing fixes).
7. Specify \*NO for the Delayed PTFs (DELAYED) parameter.
 

**Note:** To apply all immediate fixes right now and all delayed fixes on the next IPL, specify \*ALL for the Product (LICPGM) parameter, \*ALL for the Select (SELECT) parameter, and \*IMMDLY for the Delayed PTFs (DELAYED) parameter.
8. Press Enter. The system applies the fixes to the specific licensed program.
9. Repeat steps “2” on page 46 through “8” on page 47 until the fixes are applied for all the selected licensed programs.

*Advanced fix installation: Applying fixes at the next unattended IPL*

To apply Licensed Internal Code fixes at the next unattended IPL, follow these procedures.

To apply Licensed Internal Code that is currently operating on the A storage area, the Licensed Internal Code fixes can be applied immediately.

1. Make sure the system is in the Normal mode.
2. If you are not running on the correct storage area, type the following on any command line and press Enter:

```
PWRDWSYS *IMMED RESTART(*YES)
IPLSRC(B)
```

3. Type the following commands on any command line and press Enter after each one:

```
APYPTF LICPGM(5770999) APY(*TEMP) DELAYED(*YES)
```

```
PWRDWSYS *IMMED RESTART(*YES) IPLSRC(B)
```

**Note:** While applying Licensed Internal Code fixes, it may be necessary for the system to reorganize a portion of the Licensed Internal Code storage. This reorganization can take up to 1 hour. While this reorganization is taking place, reference codes C600 434B and C600 435B are displayed.

*Advanced fix installation: Applying Licensed Internal Code fixes without an IPL*

To determine how to apply Licensed Internal Code fixes without an IPL, follow these procedures.

You may be operating from either storage area to temporarily install an immediate Licensed Internal Code fix without doing an IPL. You must be operating from the B storage area to permanently install a temporarily installed Licensed Internal Code fix without doing an IPL.

To immediately apply a delayed Licensed Internal Code fix without doing an IPL, you must be operating from the A storage area. If you are on the B storage area, see “[Advanced fix installation: Applying fixes at the next unattended IPL](#)” on page 47.

To determine the storage area you are currently operating from:

1. On any command line, type:

```
DSPPTF 5770999
```

2. Press Enter.

On the Display PTF Status display, the storage area is identified in the IPL source field. ##MACH#A is the A storage area and ##MACH#B is the B storage area.

If you are not running on the correct storage area, do the following steps:

1. On any command line, type:

```
PWRDWN SYS *IMMED RESTART(*YES) IPLSRC(X)
```

where IPLSRC(X) is A if you want to apply them temporarily or B if you want to apply them permanently.

2. Press Enter.

To apply Licensed Internal Code fixes immediately, do the following steps:

1. On any command line, type:

```
APYPTF 5770999 APY(XXXXX) DELAY(*NO)
```

where where XXXXX is \*TEMP or \*PERM.

2. Press Enter.

## Displaying fixes information on your system

This topic describes what each fix status means in your IBM i environment.

You can find information about the purpose and contents of fixes, general information about fixes, and details about the status of fixes on your system. For further information, see [“Where to find information about fixes” on page 16](#).

### Displaying fix status with IBM Navigator for i

To use IBM Navigator for i to view the status descriptions for your IBM i fixes, follow these procedures.

The fix management function available through IBM Navigator for i allows you to manage your fixes with a web user interface. To view the status of the fixes for products that are installed and supported on your system, do the following:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.
2. Navigate through the PTF tree until you locate the option that contains the fix you want to display status for.
3. Click on this option to display its contents in the console work space.
4. Right-click the fix and select **Properties** to see detailed information.

### Displaying PTF information with the character-based interface

To use the character-based interface to view the status descriptions for your IBM i fixes, follow these procedures.

You can manage your PTFs with the options available from the GO PTF menu. Option 5 (Display Program Temporary Fix) shows you the status of your PTFs. In addition to the status of a PTF, you can also find out general information about a PTF.

### Displaying PTF status information

To determine the status of the PTFs for products that are installed and supported on your system, do the following:

1. Type DSPPTF and press F4 (Prompt).

- Specify the licensed program number and fix identifier for the product (LICPGM) parameter and for the fix numbers to select (SELECT) parameter. If you want to see the status for all the products on the system, specify \*ALL for both parameters and press Enter until all the licensed programs are displayed.
- The Display Program Temporary Fix display shows the action that will be taken for a fix at the next unattended IPL (initial program load).

### **Displaying PTF details**

In addition to the status of a PTF, you can find out general information about a fix by doing the following:

- On any command line, type DSPPTF. The display PTF Status display appears.
- Select the specific fix that you want to display and then select Option 5 (Display PTF details). The Display PTF menu appears.
- Select Option 1 (General information). The General information display appears.

The following table describes each field on the General information display:

<b>Field</b>	<b>Description</b>
On order	Specifies whether the fix is on order. Yes indicates that the fix is on order, but may or may not be on the system. No indicates that the fix is not ordered.
PTF save file	Specifies whether a save file exists for the fix.
PTF status	Specifies the current status of the fix. The fix status field on the Display information display may differ from the Status field on the Display PTF status display for several reasons: <ul style="list-style-type: none"> <li>If there has been a change in status since the Display PTF Status display is shown, the General information display shows the updated status.</li> <li>The Status field on the Display PTF Status display is a combination of the fix status field, and the Action pending and Action required fields on the General information display.</li> <li>If the system encountered an error while building the fix information file, the fix status is updated when the General information display is shown.</li> </ul>
Latest superseding PTF	Specifies the most recent superseding PTF to the PTF currently shown.
Superseded by	Specifies the PTF that replaced all objects of the PTF currently shown.
Status date/time	Specifies the date and time that the PTF status was last changed. The PTF obtained the current status at the date and time listed.
Type	Specifies whether the fix is immediate or delayed
Unattended IPL action	Specifies the action that will occur on the next unattended IPL (initial program load).
Optional part	Specifies the option that this fix is for.
PTF library	Specifies the library this fix is installed into.
Cover letter	Specifies whether there is a cover letter for this fix.

Field	Description
Mandatory instructions	Specifies whether there are instructions that need to be performed before this fix is applied.
Test Fix	Specifies that you cannot permanently apply a test fix on the system.
Action pending	Specifies whether there is an action that needs to be performed. If YES is specified for this field, an action needs to be taken to make the fix active or inactive. If NO is specified, it means the fix is active.
Action required	Specifies whether an action is required to make this fix active after it has been applied.
Target release	Specifies the release of the operating system this fix can be copied to or loaded on.
Minimum-maximum level	Specifies the lowest and highest level of the product that this fix can be installed on. Some fixes are able to span multiple levels of a product.
PTF creation date/time	Specifies the date and time that the PTF was created.
Temporarily applied date/time	Specifies the date and time that the PTF was temporarily applied.
Technology refresh PTF	Specifies whether or not the PTF is a technology refresh PTF. A technology refresh PTF is used to deliver a significant amount of new function between major releases.

## Displaying properties of a fix

To display the information about your IBM i fixes and fix groups, follow these procedures using IBM Navigator for i.

Information similar to what you see when you use the command interface is shown in IBM Navigator for i. For example, several properties pages exist to provide you with information about fixes similar to what is shown when you use the Display PTF (DSPPTF) command. You can view the fix ID, the associated product and release, the status, and whether or not a cover letter or save file exists on the system. In addition, you are shown any requisite fixes or dependent fixes. Finally, you can see the objects that are contained in the fix and the name of the library in which the objects reside after you install the fix.

### *Displaying properties of a fix*

To display the properties of a fix, follow these steps:

**Note:** If you use the character-based interface, use the Display Program Temporary Fix (DSPPTF) command.

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.
2. Navigate through the PTF tree until you locate the option that contains the fix you want to display properties for.
3. Click on this option to display its contents in the console work space.
4. Right-click the fix for which you want to view the properties and select **Properties**.

## Displaying level of fixes

To find out the latest level of the IBM i cumulative PTF package, of the Licensed Internal Code fixes, or of the server firmware level, follow these procedures.

You might have a need to know what the latest levels are of cumulative PTF packages, Licensed Internal Code PTFs, HIPER PTFs, or the server firmware level. The cumulative PTF package level of your system refers to the latest cumulative PTF package installed on your systems.

### ***Determining your current cumulative PTF package level***

To determine your current cumulative PTF package level, do one of the following:

#### **Display a cumulative PTF (fix) group**

Use the Work with PTF Groups (WRKPTFGRP) command or view the fix groups with IBM Navigator for i. Find the PTF group named SF99740 and display the latest level of the fix group that you have installed. The status of the fix group indicates if all the PTFs in the cumulative PTF package are installed on your system. The level of the fix group identifies the level of the cumulative PTF package. For example, if the level is 6178, your cumulative PTF package ID is C6178740 (740 is added to the end of the package ID to indicate version 7 release 4 modification level 0). The level of the cumulative package ID indicates the release date of the package using the Julian calendar. Specify WRKPTFGRP SF99740 and type option 8 (Display special handling PTFs). The date shown may be later than the release date of the package in the Level field if the special handling PTF section has changed. This date may be referred to from the PSP information when installing your cumulative PTF package.

#### **Display cumulative marker PTFs**

To display cumulative marker PTFs, do one of the following:

- For the cumulative PTF package level, type the following from the character-based interface:

```
DSPPTF LICPGM(5770SS1)
```

- For the Licensed Internal Code PTFs level, type the following:

```
DSPPTF LICPGM(5770999)
```

The PTF ID column on the Display PTF Status display lists the identifiers for all of the cumulative PTF packages installed on your system. Cumulative PTF package identifiers start with the letter T.

If you are using version 7 release 4 modification 0 and you have PTF TC06178 installed on your system, your cumulative fix package level is C6178740 (740 is added to the end of the package ID to indicate version 7 release 4 modification level 0). The last four digits of the cumulative package ID indicate the release date of the package, using the Julian calendar. The latest level of the cumulative PTF package is the one where the last four digits are the highest.

**Note:** Fix IDs that start with the letters TC indicate that the entire cumulative PTF package has been loaded or applied. Fix IDs that start with the letters TA indicate that the HIPER fixes and HIPER Licensed Internal Code fixes have been loaded or applied. Fix IDs that start with the letters TL indicate that the HIPER Licensed Internal Code fixes have been loaded or applied. A status of *Temporarily Applied* or *Permanently Applied* for these marker PTFs indicates the corresponding PTFs they represent have also been applied. Never order, load, or apply these marker PTFs individually; this would result in an inaccurate status.

### ***Printing or displaying the summary of fixes in a cumulative PTF package on optical media***

To print or display the summary of fixes contained in a cumulative PTF package on optical media, do the following:

1. Load the cumulative PTF package optical media in the optical media drive.
2. On any command line, type this command:

```
LODPTF LICPGM(5770SS1) DEV(OPTYY) SELECT(*ALL)
PATHID(*FIRST) COVER(*ONLY)
```

(OPTYY is the name of the optical device in which you loaded the PTF optical media.) For information about printing the cumulative fix package summary, see [“Displaying and printing fix cover letters”](#) on page 54. A copy of the PTF summary is put into file QAPZCOVER in Library QGPL.

## Displaying server firmware information

POWER models come preinstalled with server firmware. Server firmware is the licensed machine code that resides in system flash memory, and includes a number of subcomponents, including POWER Hypervisor power control, service processor, and logical partition firmware that is loaded into either AIX® or Linux® logical partitions. Managing the level of the server firmware is a critical component to properly maintaining your system. On some models, you can only change the level of server firmware by using the Hardware Management Console (HMC). However, some systems allow you to change the level of the server firmware by installing IBM i PTFs on the service partition. For more information about managing the level of the server firmware, see the topics [Customer service, support, and troubleshooting](#) and [“Installing server firmware fixes”](#) on page 35.

Use the Display Firmware Status (DSPFMWSTS) command to show information about the level of the server firmware that is running on your system. The command can be run from any IBM i logical partition. Different types of information are displayed, however, depending on if the command is run from the service partition or another partition or if server firmware updates are managed by an HMC. The DSPFMWSTS command shows this information.

- The **Service partition** field indicates whether the logical partition is operating as the service partition.
- The **Firmware update policy** field indicates if the server firmware is currently being managed by the operating system or an HMC.
- The **Server firmware product ID/release** field indicates what IBM i product matches the level of the server firmware on your system. Managing the server firmware level is performed by applying or removing PTFs for this product.
- When PTFs are applied for the server firmware product but are not active, the **Server IPL required** field shows a value of Yes.
- The **Server IPL source** field shows the side (Temporary or Permanent) on which the last server IPL was performed for the server firmware code.
- The **Server firmware fix pack** and **PTF ID** fields show the level of server firmware on your system.
- The **Update access key expiration date** field shows the expiration date of the Update access key. Server firmware fix packs with a later date are not activated until a valid Update access key expiration date is detected. This field is only displayed on POWER8® and higher POWER models.
- There are three copies of the server firmware: The active copy is the level of server firmware that is currently running. The temporary copy is the installed level of server firmware. The permanent copy is the backup level of server firmware. When running the DSPFMWSTS command on the service partition, the **Operating system** fields show the level of server firmware on the temporary and permanent copies of the operating system. A value of \*NONE indicates no server firmware PTFs have been applied.

## Displaying PTF apply information

This topic describes how to obtain potential PTF apply information.

The Display PTF Apply Information (DSPPTFAPYI) command can be used to predict if the selected PTFs or PTF group can be applied immediately from \*SERVICE. All selected PTFs and their requisite PTFs that are not currently applied are displayed. The "Apply immediate" field will be returned with one of the following values:

- \*YES - The selected PTFs can be installed immediately.
- \*NO - An IPL is required to install the selected PTFs.
- \*PRECND - The selected PTFs can be installed immediately if all of the preconditions are met.



The selected PTFs and requisite PTFs to be installed must exist in \*SERVICE. Save files must exist for the selected PTFs not loaded. The specified PTF group must exist on the system along with its PTFs and requisite PTFs that are not yet installed. If the PTFs and PTF groups are on physical media or in an image catalog, use one of the following methods to copy the PTF save files and PTF groups into \*SERVICE before you run the DSPPTFAPYI command:

- Use the QPZCPYSV API to copy the PTF save files and PTF groups into \*SERVICE.
- Use the Copy PTF (CPYPTF) command to copy the PTF save files from media into \*SERVICE. Use the Copy PTF Group (CPYPTFGRP) from media into \*SERVICE to copy the PTF groups into \*SERVICE.

## Working with fix cover letters

Fix cover letters provide information about the IBM i fixes that they accompany.

The primary function of a cover letter is to convey any special instructions that can exist when you install your fixes. Therefore, it is important that you review the cover letters prior to installing your fixes. For an example of a cover letter, see [“Sample fix cover letter and description of fields” on page 9](#). You can delete old cover letters to save space on your system as part of the cleanup fixes task. For more information, refer to [“Cleaning up fixes” on page 54](#).

## Ordering fix cover letters

To order IBM i fix cover letters, use the Send PTF Order (SNDPTFORD) command.

You can use the SNDPTFORD command to prepare an order for the following types of fix information:

- Individual fixes
- Cumulative PTF packages
- Group fix
- Summary information for available fixes
- Preventive Service Planning (PSP) information

Additionally, the SNDPTFORD command allows you to specify whether you want to order complete fixes or cover letters only (\*CVRLTR) for fix parts. Use the cover letters only option by specifying PTFPART(\*CVRLTR) to preview new fixes and to determine whether or not you want to order that fix. To order a fix cover letter without ordering the fix, complete these steps from any command line:

1. Type: SNDPTFORD nnnnnnn PTFPART(\*CVRLTR)
2. Press Enter.
3. Verify contact information. This information is used by your service representative to contact you or send you service information. You can specify the language in which you want to receive your cover letter. If the language that you specify is not available, the cover letter is sent in English.

## Copying fix cover letters from media

To copy IBM i fix cover letters from media, follow these procedures.

Fixes that are packaged on optical media are sent by mail. A shipping information letter is included, and each fix on the media may also have a cover letter. To view the cover letters, you must use the Copy Program Temporary Fix Cover Letter (CPYPTFCVR) command to copy the cover letters from optical media into file QAPZCOVER in library QGPL. Each cover letter contains information such as problem description, correction, and special instructions. This action allows you to display and print the cover letters.

## Copying all cover letters

To copy all cover letters from media onto the system for fixes that are not already applied to your system, enter the following command:

```
CPYPTFCVR DEV(YYYYY) LICPGM(*ALL) SELECT(*NOTAPY)
```

YYYYYY is the media device name (typically named OPT01 for optical devices).

## Copying a cover letter for a specific fix

To copy a cover letter for a specific fix from media onto the system, enter the following command:

```
CPYPTFCVR DEV(YYYYYY) LICPGM(XXXXXXX) SELECT(ZZZZZZZ)
```

XXXXXXX is the licensed program number, YYYYYY is the device name (typically named OPT01 for optical devices), and ZZZZZZZ is the fix ID for the cover letter you want to copy.

## Displaying and printing fix cover letters

Cover letters provide information about the IBM i fixes that they accompany. You can display them with IBM Navigator for i or display and print them through the Display PTF Cover Letter (DSPPTFCVR) command.

If you receive your fixes on media, you must copy the fix cover letters from media before you can display the cover letters. For instructions, see [“Copying fix cover letters from media”](#) on page 53.

### Related reference

[Display PTF Cover Letter \(DSPPTFCVR\) command](#)

## Displaying cover letters from IBM Navigator for i

To display a cover letter from IBM Navigator for i, follow these steps:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.
2. Navigate through the PTF tree until you locate the option that contains the fix you want to display cover letter for.
3. Click on this option and select the fix you want to display cover letter for in the work console place.
4. Right-click the fix, select **Properties** and click Cover Letter page.

## Displaying and printing cover letters from the character-based interface

To display or print cover letters for all fixes that are currently not applied on your system, enter **one** of the following commands:

- **DSPPTFCVR LICPGM(\*ALL) SELECT(\*NOTAPY)**
- **DSPPTFCVR LICPGM(\*ALL) SELECT(\*NOTAPY) OUTPUT(\*PRINT)**

**Note:** You can also choose to view only cover letters that have certain attributes such as specifying CVRATR(\*SPCINST) to view all cover letters that have special instructions.

To display or print a cover letter for a specific fix, enter **one** of the following commands:

- **DSPPTFCVR LICPGM(XXXXXXX) SELECT(ZZZZZZZ)**
- **DSPPTFCVR LICPGM(XXXXXXX) SELECT(ZZZZZZZ) OUTPUT(\*PRINT)**

XXXXXXX is the licensed program number and ZZZZZZZ is the fix ID for the cover letter you want.

## Cleaning up fixes

If you are running out of storage space on your system, it might be time to delete your save files and cover letters for IBM i fixes.

Over time, save files and cover letters for fixes tend to accumulate. After you have permanently installed a fix and performed a SAVSYS operation, you might want to delete the fix save file and cover letter if you do not need to distribute it to another system and if you are satisfied that the fix is not defective. Once a fix has been permanently installed and the save file is deleted, all information about the fix except the status

information is also deleted. By deleting the save file, you can make more room on your system for other files.

## Deleting save files with IBM Navigator for i

IBM Navigator for i provides you with a way to delete save files and cover letters for fixes that are no longer needed. To clean up your save files and cover letters, follow these steps:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.
2. Do one of following to clean up save files and cover letters:
  - a) Click **PTFs** to show a list of products on the system. Right-click a product and select Clean Up PTFs to clean up save files and cover letters for all fixes of this product.
  - b) Navigate through the PTF tree until you locate the option that contains the fixes you want to clean up save files and cover letters for. Select the fixes and select Clean Up in the Actions dropdown.

## Deleting save files with the DLTPTF command

From the character-based interface, use the Delete Program Temporary Fix (DLTPTF) command to delete PTF save files and cover letters. Specify \*PRMAPY on the PTF parameter to delete PTFs that are permanently applied. Do not use the Delete File (DLTF) command to delete PTF save files. If you use the DLTF command, the PTF function will not detect that you deleted the save file.

**Note:** Fix save files and cover letters for a previous release are removed during automatic cleanup if system logs are specified.

## Cleaning up PTF groups

If you follow a PTF (fix) maintenance strategy, you normally might have several PTF groups stored on your system. A PTF group is automatically deleted if the PTF group does not contain a target release or if the target release is less than the current release and the PTF group does not contain PTFs for any installed or supported licensed programs. PTF groups are automatically deleted when you upgrade to a new release of IBM i and during Operational Assist (OA) cleanup.

If you want to manually delete a PTF group, follow these steps:

1. Use the Work with PTF Groups (WRKPTFGRP) command.
2. Select option 4 next to each PTF group that you want to delete.

**Note:** Deleting a PTF group deletes only the PTF group information from the system. It does not delete or remove any PTFs from the system or any related PTF groups that are defined in the PTF group.

## Removing software fixes

This topic summarizes when IBM i, Licensed Internal Code, or licensed program fixes can be removed from your system.

You can remove fixes that you installed temporarily. Delayed fixes that you installed temporarily can be removed temporarily when you do a restart or IPL (initial program load) and then removed permanently without doing an IPL. Immediate fixes that you installed temporarily can be removed either temporarily or permanently without doing an IPL. You can also remove immediate fixes that have been loaded but not applied. Fixes permanently installed cannot be removed.

When fixes are removed temporarily, the original objects that were replaced by the fix are restored to the program library. The system again verifies that the fix being removed is not required for any other currently applied fix. If the fix being removed is found to be required, the other fix (that it is required for) must be removed first or at the same time.

**Note:** Licensed Internal Code fixes can only be removed permanently.

## Removing licensed program fixes

To remove one or more licensed program fixes, follow these steps.

1. Enter the Remove Program Temporary Fix (RMVPTF) command and press F4 (Prompt).
2. On the Remove Program Temporary Fix (RMVPTF) display, specify the licensed program for the Product (LICPGM) parameter.
3. Select the fixes you want removed by doing one of the following:
  - Specify the numbers of the fixes you want to remove for the PTF numbers to select (SELECT) parameter or \*ALL to remove all of them.

**Note:** Specify RMVDEP(\*YES) when specific fix numbers are entered on the SELECT parameter to ensure that dependents in the same product are also removed.

  - Specify \*ALL for the PTF numbers to select (SELECT) field and the numbers of specific fixes you do not want to remove for the PTF numbers to omit (OMIT) parameter.
4. Specify \*TEMP for the Extent of change (APY) parameter to remove the fixes temporarily or \*PERM to remove the fixes permanently.
5. If you are removing immediate fixes, specify \*NO for the Delayed PTFs (DELAYED) parameter.
6. If you are identifying delayed or immediate fixes that are to be automatically removed during the next unattended IPL, specify \*YES for the Delayed PTFs (DELAYED) parameter and \*YES for the Remove on unattended IPL (IPLRMV) parameter.
7. Press Enter.

## Removing IBM i fixes

To remove one or more IBM i fixes, follow these steps.

For the two types of fixes that exist (immediate or delayed), you can choose to remove them temporarily or permanently. The following table provides instructions for removing the two types either temporarily or permanently.

Immediate		Delayed	
Temporarily	Permanently	Temporarily	Permanently
<p>Type:</p> <pre>RMVPTF LICPGM(5770SS1) SELECT(SIxxxxx) RMV(*TEMP) RMVDEP(*YES)</pre> <p>where xxxxx is the fix identifier. If the fix is only temporarily removed, it will be applied again with the next cumulative PTF package.</p>	<p>Type:</p> <pre>RMVPTF LICPGM(5770SS1) SELECT(SIxxxxx) RMV(*PERM) RMVDEP(*YES)</pre>	<p>1. Type:</p> <pre>RMVPTF LICPGM(5770SS1) SELECT(SIxxxxx) RMV(*TEMP) DELAYED(*YES) RMVDEP(*YES)</pre> <p>where xxxxx is the fix identifier.</p> <p>2. Type the following command and press Enter to do an IPL to the B side:</p> <pre>PWRDWSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(B)</pre>	<p>1. Temporarily remove the delayed fix first.</p> <p>2. Type:</p> <pre>RMVPTF LICPGM(5770SS1) SELECT(SIxxxxx) RMV(*PERM) DELAYED(*YES) RMVDEP(*YES)</pre> <p>where xxxxx is the fix identifier.</p>

To remove a fix with IBM Navigator for i, follow these steps:

1. In IBM Navigator for i, expand **IBM i Management > Configuration and Service > Program Temporary Fixes > PTFs**.

2. Navigate through the PTF tree until you locate the option that contains the fix you want to remove.
3. Click on this option to display its contents in the console work space.
4. Right-click the fix for which you want to remove and select Remove.
5. Check the box if you want to remove dependent PTFs and click OK.

## Removing Licensed Internal Code fixes

To remove Licensed Internal Code fixes, follow these steps.

For the two types of fixes that exist, immediate or delayed, you can remove them permanently. The following table shows you the two types of fixes with details for removing them.

Immediate	Delayed
<p>To remove an immediate fix, type:</p> <pre> RMVPTF LICPGM(5770999) SELECT(MFxxxxx) RMV(*PERM) RMVDEP(*YES) </pre> <p>where xxxxx is the fix identifier</p>	<p>To permanently remove a delayed Licensed Internal Code fix that is running on the B side, do the following:</p> <ol style="list-style-type: none"> <li>1. Type: <pre> RMVPTF LICPGM(5770999) SELECT(MFxxxxx) RMV(*PERM) DELAYED(*YES) RMVDEP(*YES) </pre> <p>where xxxxx is the Licensed Internal Code identifier.</p> </li> <li>2. Type the following command and press <b>Enter</b> to do an IPL to the B side: <pre> PWRDWSYS OPTION(*IMMED) RESTART(*YES) IPLSRC(B) </pre> </li> </ol>

**Note:** To remove a Licensed Internal Code fix that is running on the A side, follow the instruction for removing an immediate fix.

To find out what other types of fixes you can remove, go to Remove software fixes.

## Auditing fixes

This topic summarizes steps for auditing fixes.

PTF operations and PTF object changes can be audited by using the security auditing support that is described in the System i Security Reference manual. The security auditing support and security audit journal (QSYS/QAUDJRN) is used to track PTF changes made to installed licensed programs. The QAUDCTL (Auditing Control) system value indicates whether auditing is performed. When QAUDCTL is set to \*AUDLVL, auditing is performed for any functions that are selected on the QAUDLVL and QAUDLVL2 system values. The Auditing Level (QAUDLVL) system value along with the QAUDLVL2 system value determines which security-related events are logged to the security audit journal (QAUDJRN) for all system users. The following new values are allowed for Auditing Level:

- \*PTFOPR - Program Temporary Fix (PTF) operations are audited. The following are some examples:
  - Load, apply, or remove a PTF.
  - Log or delete a PTF save file.
  - Install PTFs by using GO PTF or INSPTF command
- \*PTFOBJ - Changes to Program Temporary Fix (PTF) objects are audited. The following are some examples:

- Library objects such as \*PGM and \*SRVPGM objects.
- Replaceable Unit (RU) objects for Licensed Internal Code (LIC) PTFs.
- Integrated File System (IFS) objects.

Appendix F of the System i Security Reference manual includes the layout of audit journal entries and describes the entry specific data for PF (\*PTFOPR) and PU (\*PTFOBJ) auditing types.


## Working with software agreements and licenses

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This information describes how you and IBM can manage the usage, documentation, and the maintenance of software license information for certain IBM i licenses and packaged products.

All models have IBM i processor entitlements. On certain medium and large Power Systems models, logical partitions can have IBM i and additional processor activations. For these logical partitions, you can use a processor entitlement option that allows minimal use of Db2® for i.

On certain models, IBM i licensing includes both processor entitlements and user entitlements.

For the most current updates concerning licensing on IBM i, see the "Licensing" topic on the [IBM i and Related Software](#)  wiki in developerWorks. This requires a developerWorks user account.

A *packaged product* is a program on your system that was installed by using either the Restore License Program (RSTLICPGM) command or the GO LICPGM menus. A *licensed-enabled* packaged product uses IBM i software license management functions.

### Notes:

- You have the option to display or print software agreements.
- You can display and change software license information required by IBM usage-based products through the Work with License Information (WRKLICINF) command.

## IBM i Application Server licensing

On an assigned logical partition on certain medium and large Power Systems models that have the IBM i operating system, you can use an IBM i Application Server processor entitlement that allows minimal use of DB2® for IBM i.

On such a partition, you can run products such as WebSphere® Application Server, for example, that do not require DB2 for IBM i to run. The logical partitions with this option can also host applications that access DB2 data located in other systems or logical partitions.

The terms and conditions for an IBM i Application Server order are included in the License Information Document for IBM i. Ensure that you understand the terms and conditions for IBM i Application Server and keep this document in a secure location.

### Processor entitlement keys on systems with IBM i Application Server

On systems that offer IBM i Application Server processor entitlements, the following types of processor entitlements are managed by one software license key (feature 5051).

#### 5770-SS1 feature 5051

This processor entitlement key indicates the total number of IBM i processors across a system. You enter this 5051 processor entitlement key in each partition on the system. The value that you enter is compared to the 5051 key quantity to determine license compliance. The 5051 key quantity is the total quantity of IBM i processor entitlements plus IBM i Application Server processor entitlements.

#### 5770-SS1 feature 5053

IBM i Application Server processor entitlement.

Consider these examples of how the processor entitlements are counted across the entire system.

- If a system has two logical partitions with one 5051 processor in each logical partition, the system has a total of two 5051 processor entitlements.

- If one of those logical partitions is assigned an entitlement for an IBM i Application Server processor, the system has two 5051 processor entitlements and one 5053 IBM i Application Server processor entitlement.
- If one of the logical partitions has one processor and the other logical partition has two processors and a 5053 IBM i Application Server processor, the system requires three 5051 processor entitlements and two 5053 processor entitlements.
- If one of the logical partitions has one processor with a 5053 IBM i Application Server processor enabled and the other logical partition has two processors and two 5053 IBM i Application Server processors enabled, the system requires three 5051 processor entitlements and three 5053 processor entitlements regardless of the version and release of the operating system.

## Adding a 5053 software license key

If you used electronic software delivery to download feature 5053 online, the software license key for this entitlement is automatically added to your partition.

If you received a printed copy of your software license key for feature 5053, the steps for adding these keys are the same as for other software license keys. You can add the key to individual logical partitions or to all the partitions.

## Adding support for IBM i Application Server

After you add a software license key for feature 5053 and you have an adequate number of activated processors, you can change the processor entitlements for a logical partition between one that has complete IBM i support and one that has IBM i Application Server support. To do this, you use the Set Application Server Support (QLZASPAS) API.

To add support for the IBM i Application Server, enter the following text on the command line:

```
CALL QSYS/QLZASPAS PARM('*ADD5053 ')
```

## Removing support for IBM i Application Server

You also have the option to change a logical partition from being a IBM i Application Server partition to being a partition that has complete IBM i support.

To remove support for IBM i Application Server, enter the following text on the command line:

```
CALL QSYS/QLZASPAS PARM('*RMV5053 ')
```

### Related reference

[Set Application Server Support \(QLZASPAS\) API](#)

## IBM i licensing on IBM system models that offer user entitlements


On certain system models, IBM i licensing consists of two types of entitlements: user entitlements and processor entitlements. Review this information to understand concepts, requirements, and procedures that are associated with user entitlements and processor entitlements.

On all system models, an entitlement is required for each processor that runs the IBM i operating system. System models that offer user entitlements require that you have both IBM i user entitlements and IBM i processor entitlements.

### IBM i user entitlements

An *IBM i user* is a person who accesses the IBM i operating system through one or more connections. The user exchanges credentials (user identifications) either directly with the operating system, or indirectly through application or middleware software that is supported by the operating system. On system models

that offer user entitlements, you must acquire entitlements for the maximum number of IBM i users who are authenticated on the system at the same time (*concurrent IBM i users*).

For more information about IBM i user entitlements, go to the [Offering Information](#)  Web site, create a quick search profile, and use the advanced search function to search for the Announcement letter for IBM i licensing by user. In the **Title** field, specify `licensing by user`.

## IBM i processor entitlements

In addition to licensing by the number of IBM i users, the operating system is also licensed by processor. Each IBM i model that offers user entitlements includes at least one IBM i processor entitlement. You might need to purchase additional processor entitlements to configure or run the operating system on additional processors.

## IBM i software license keys for system models that offer user entitlements

On systems that offer IBM i user entitlements, you receive three software license keys.

### 5770-SS1 feature 5050

The software license key of a 70-day trial period for the operating system

### 5770-SS1 feature 5051

The processor entitlement key that indicates the number of processors used by the operating system

### 5770-SS1 feature 5052

The user entitlement key that indicates the number of users who are authorized to use the operating system

If you have preinstalled the IBM i operating system, the software license keys for feature 5050, feature 5052, and a single processor entitlement for feature 5051 are already included on the system. If you have ordered more than one processor, see the Customer Notice included with your order for how to access additional software license keys.

## Licensing documents and warranties for systems with IBM i user entitlements

With any IBM i order, you receive several software licensing documents that are either online or printable. These documents contain important information concerning the use, management, and transfer of licensed programs.

- Before you use the licensed programs, ensure that you read and understand all software license documents.
- Keep the printed documents in a secure location.
- When you transfer a program, pass both the online and the printable documents to the new owner.

## Logical partitions and IBM i user entitlements

On a system that is configured with multiple logical partitions, you can install different versions of the IBM i operating system on individual partitions. On such a system, the cross partition usage count for the IBM i user entitlement, 5770-SS1 feature 5052, includes the combined usage count of all versions of the IBM i operating system across all the logical partitions.

For example, the following three logical partitions are configured on the same physical system.

Logical partitions	Versions of IBM i installed
Logical partition A	Version 7 Release 2
Logical partition B	Version 7 Release 3
Logical partition C	Version 7 Release 4



On this system, the cross partition usage count for IBM i user entitlement, 5770-SS1 feature 5052, includes the total usage count on logical partitions A, B, and C. The cross partition usage count is the same number on all three logical partitions, but the local usage count for individual logical partitions might be different because it reflects only the usage on each respective partition.

For further information about IBM i licensing and logical partitions, search for [Software licensing for IBM licensed programs on logical partitions](#) in the IBM Systems Hardware Information Center.

## User profiles and IBM i user entitlements

A *user profile* is an object on an IBM i partition with a unique name that contains the user password, the list of special authorities assigned to a user, and the objects the user owns. You can use the Work with License Information (WRKLICINF) command to track the number of enabled user profiles on your IBM i partition, and to help maintain compliance with the IBM i licensing on system models that offer user entitlements. Select Option 8 (Work with license users) to display the user profiles accounted for in the Logical partition portion in the Usage Count Information field. To help meet license compliance, check this usage count against the number of user entitlements that are available on the system.

It might be valid for the number of enabled profiles to be greater than the number of user entitlements. For example, you might have many users who are not authenticated to the IBM i partition concurrently. To provide a more accurate usage count, IBM-supplied system profiles are excluded from the usage count.

Three common IBM i user profile commands are the Create User Profile (CRTUSRPRF) command, Change User Profile (CHGUSRPRF) command, and Restore User Profile (RSTUSRPRF) command. The status parameter on these commands can be either enabled (\*ENABLED) or disabled (\*DISABLED).

Status	Command parameter	Description
enabled	*ENABLED	A user profile with enabled status is included in the usage count as a tool to help manage the number of required IBM i user entitlements.
disabled	*DISABLED	A disabled status indicates that the user does not have access to the operating system, and the user profile is not included in the usage count.

### Notes:

- For more information about control language (CL) commands that work with common IBM i user profiles, use the [CL command finder](#).
- To create new user profiles on the IBM i partition, you need to have security officer (QSECOFR) authority. For more information about user profiles, see [User profiles](#).

Various situations based on the number of user entitlements on the system can affect the status of a user profile. For example, if a user attempts to sign on and the maximum number of attempts is exceeded, the user profile status is changed to disabled and the usage count is reduced.

You can exclude user profiles from the IBM i user entitlement requirements by using the Change User Entitlement Attribute (QLZACUEA) API. This API also provides an interface to change the status of a profile to be disabled, which might result in a change to the usage count for IBM i user entitlement feature 5052.

For example, to exclude the enabled user profile EXAMPLE from holding a user entitlement, specify the following command:

```
QSYS/CALL PGM(QSYS/QLZACUEA)
  PARM('EXAMPLE 0*SAME ' X'00000015' 'CEAI0100' X'00000000')
```


For more details about the QLZACUEA API, see [Change User Entitlement Attribute \(QLZACUEA\) API](#).

## Hardware upgrades on systems with IBM i user entitlements

If you are upgrading from a system with processor-based licensing to system model that supports IBM i user entitlements, the usage limit that you purchased for IBM i user entitlement should match the number of enabled user profiles. Before you upgrade your hardware to the target system, add the new license key that contains the license entitlements to the source system. At the first initial program load (IPL) of the target system or logical partition, user profiles are scanned and licenses are checked for the user profiles that have a status of enabled.

For further information about hardware upgrades, see [Capacity Upgrade on Demand](#) in the IBM Systems Hardware Information Center.

## Related information

- [Offering Information](#) 

(<http://www.ibm.com/common/ssi/index.wss>)

Go to this Web site and use the search function to search for the Announcement letter for IBM i licensing by user. In the **Title** field, specify `licensing by user`.

- [IBM Knowledge Center](#)

Use the **Search for** function with **licensing and logical partitions** to see information about IBM i licensing and logical partitions.

Use the **Search for** function with **PowerVM® Editions** to see information about installing, configuring, managing, and using the PowerVM Editions technologies.

## Software agreements and licensing concepts

Software license agreements and software license keys are foundations for the use and management of licensed programs.

Any licensed program may be subject to the terms in a software agreement. The IBM i licensed programs that you use are available through the media distribution set, which includes the standard set, the keyed set, and single sets of products. The keyed set contains products and program options that require software license keys to regulate their use.

### Software agreements

Software agreements contain important information concerning the use and management of licensed programs. These could include both printed software agreements and online software agreements.

IBM licenses software to you, either as an individual or an entity, through legal agreements (software agreements). Before you install or use Machine Code (which includes the Licensed Internal Code) and the IBM i operating system, you must accept the online software agreements for them. Other IBM licensed programs may have software agreements that need to be accepted before the licensed programs can be installed.

If you have non-IBM licensed programs to install on your system, you could be required to accept the terms of an online software agreement for them as well.

Software agreements for IBM or non-IBM products can be displayed or printed through the Work with Software Agreements (WRKSWAGR) command.

If you are a software provider who wants to present license terms prior to the installation of your software product, you may do so by generating a software agreement and then associating it with your product

by using software product APIs. For instructions, see [“Generating software agreements for your own products”](#) on page 69.

### **Related tasks**

Required: [Accepting software agreements](#)

## **Software license keys**

When you install, upgrade, or move certain licensed programs in the keyed set of IBM i products, you must install software license keys.

Software license keys are designed to regulate the use of priced licensed programs. You must install these keys when you install, upgrade, or move certain keyed, licensed-enabled packaged products. You might be required to install these keys when you change software machine groups, add additional licenses, or purchase new software that requires a license key.

IBM provides a 70-day trial period for certain keyed IBM products during which you can try a product without a key. However, after the 70-day trial period, you must load a license key to continue to use the licensed program. The 70-day period starts from the day of the first use of the IBM licensed program.

If you have lost your license key or need an emergency license key, you can order these through the software key center for your country or region. For these special situations, IBM can ship the license key through electronic mail (e-mail), telephone, fax, or Internet delivery.

With each keyed product that you order, you will receive a software license key sheet.

Each keyed product or feature has its own key. You can add license key information by using the Work with License Information (WRKLICINF) command. For instructions, see [“Adding license key information”](#) on page 68.

### **Related information**

[Entitled software support Web site](#)

## **Planning for software licensing**

You can track trends in the usage of licensed-enabled packaged products that are currently installed on your system.

You can then use this information to determine what you need to purchase for the next software upgrade.

### **Determining the usage limit for products not in the keyed set**

To determine the number of licenses you need to purchase for the next release of an IBM i product that is not in the keyed set, use the Work with License Information (WRKLICINF) command.

The usage limit of a licensed-enabled packaged product must be set greater than or equal to the peak number of licensed users for the product.

You can track license information over a period of time to determine if the peak occurs at certain times or under certain conditions. It might be possible to reduce the peak usage by changing product usage during these peak times. The WRKLICINF command displays the current usage count and the peak usage for each product. To track peak usage, reset the peak usage on a regular basis by using option 10 (Reset peak usage) on the WRKLICINF command display.

For more detailed information on usage, you can turn logging on for a particular licensed-enabled packaged product. To turn logging on, specify LOG(\*YES) on the Change License Information (CHGLICINF) command. Whenever the usage limit is exceeded, this usage information is logged to journal QLZALOG. The log information contains the usage limit, current usage, and the list of license users at the time the usage limit is exceeded. To view the log, use the Display Journal (DSPJRN) command. Specify L for the journal code and LU for the entry type. Model output files for this journal entry type are QALZALU and QALZALU4 in library QSYS.

## Determining the usage limit for products priced by processor

For Power Systems that meet certain requirements, the operating system automatically adjusts the number of available processors to match the installed usage limit for IBM i feature 5051.

### Processing capacity adjustment

The number of active processors that you configure for your system can exceed the number of IBM i processor entitlements that you have purchased. The operating system automatically adjusts the number of available processors to reflect the installed processor entitlement for IBM i feature 5051. Processing capacity adjustment is only applicable if your system meets the following requirements:

- The system is a POWER6® or higher system.
- The system is configured with a single partition.
- The partition uses dedicated processors.
- The system is not attached to a hardware management console (HMC).

### Default usage limit

The default usage limit for IBM i processor entitlement feature 5051 is one processor. The default usage limit might be in effect if you have never entered a valid license key, or if you have a temporary license key that has expired.

If your partition is running under the default usage limit, the processing capacity adjustment is not performed. When you are using a temporary license key, your partition's user count is adjusted to match the usage limit of the temporary license key. When a temporary key expires, the usage limit reverts to the default usage limit. If the configured IBM i processing capacity exceeds the default usage limit, a compliance message is sent to the QSYSOPR message queue every hour.

### Related concepts

[Displaying and changing software license information](#)

To add license key information and set the usage limit for your licensed-enabled packaged products, follow these procedures.

### Setting a usage limit with workload groups

Workload groups allow you to set a usage limit for a licensed program by restricting the number of processor cores that are available to be used by the licensed program with a given logical partition.

Without workload groups, a licensed program's usage count for a given partition is calculated by using the full configured processing capacity of the logical partition. With workload groups, a licensed program and all of its workloads are associated with a workload group. This allows the licensed program's usage count for a given partition to be based on the maximum capacity of the workload group.

Limiting the usage count of a licensed program to a value less than the full configured processing capacity of a partition can affect the licensing of a product. A licensed program owner can choose to recognize the workload group maximum processor core limit as an acceptable usage count for the product. If the licensed program owner accepts the workload group maximum processor core limit, they can then choose to provide a reduced cost license key reflecting the reduced core capacity of the workload group.

#### Notes:

- Only those licensed programs that use the \*PROCESSOR usage type can be licensed using a workload group.
- IBM i is not eligible for licensing using a workload group.
- Any given licensed program can be associated with only one workload group.
- The processor core limit for a workload group represents the local usage count for any licensed programs associated with the workload group. The global usage count is a sum of the usage of the licensed product across all the IBM i partitions in a system. The global usage count may exceed the core limit of the workload group.

## **Scenario: Software licensing with workload groups**

In this scenario, a customer uses workload groups to reduce the cost of licensing a licensed program.

### **Situation**

A customer installs a \*PROCESSOR usage type licensed program on a partition configured with four processor cores.

### **Objectives**

The customer wants to reduce the cost of licensing the licensed program by limiting the processor cores available to the licensed program.

### **Details**

- The customer creates a workload group with a maximum processor core limit that is less than the four processor cores configured for the partition.
- The customer then adds the licensed program to the newly created workload group.
- The customer identifies the workloads associated with the licensed program and associates the workloads with the newly created workload group. The workloads can be identified by the licensed program owner.
- The licensed program owner can then choose to accept the reduced processor core capacity and can issue a new license key with a reduced capacity.

**Note:** This capability requires the workload groups PTF. If you need assistance in acquiring, loading, or applying this group PTF, contact your IBM i software service provider.

### **Setting up software licensing with workload groups**

Use this procedure to set up workload groups for software licensing on your system.

A workload group defines the number of processor cores that can be used concurrently by jobs and threads that are associated with the group. The workload group contains entries that define the license terms and features of the licensed programs in the group.

The following steps are the basic steps for setting up software licensing with workload groups. For the complete procedures for adding workloads to a workload group, see [Setting up workload groups](#).

To set up software licensing with workload groups, use the character-based interface.

1. Create a workload group using the [Add Workload Group \(ADDWLCGRP\)](#) command.

The workload group can be created with any name you choose. The processor core limit defines the number of cores that jobs and threads associated with this workload group are allowed to run on concurrently.

For example:

```
ADDWLCGRP WLCGRP(MYGROUP) PRCLMT(2)
```

2. Add product information to the group using the [Add WLC Product Entry \(ADDWLCPRDE\)](#) command.

Product entries define the license term and feature of the licensed program to be limited by the number of processor cores defined for the workload group.

For example:

```
ADDWLCPRDE WLCGRP(MYGROUP) PRDID(5770xxx) LICTRM(*ALLINS) FEATURE(*ALLINS)
```

3. Identify all the workloads that are associated with the product. These workloads must be associated with the newly created workload group. The workloads can be identified by the licensed program owner. For instructions on how to associate the workloads with a workload group, see [Setting up workload groups](#).

## Related tasks

[Setting up workload groups](#)

## Related reference

[Add Workload Group \(ADDWLCGRP\) command](#)

[Add WLC Product Entry \(ADDWLCPRDE\) command](#)

## Retrieving workload groups licensed program information

Use this procedure to retrieve information about the licensed programs that are associated with workload groups on your system.

The list of licensed programs associated with any given workload group for the current partition can be displayed by using the [Display Workload Group \(DSPWLCGRP\) command](#). For example:

```
DSPWLCGRP WLCGRP(*ALL) OUTPUT(*)
```

The current workload groups and any product entries associated with the groups are displayed. The output can also be sent to the job's spooled output by specifying OUTPUT(\*PRINT).

## Related reference

[Add Workload Group \(ADDWLCGRP\) command](#)

## Auditing workload groups licensed program information

Use this procedure to review the workload groups and related licensed program information that is set up for your system.

The following workload groups operations are audited by the system and stored as journal entries:

- Adding, updating, and removing workload groups
- Adding and removing licensed products associated with workload groups

These workload groups operations result in a ZC (object change) journal entry being written to the QAUDJRN journal. The specific workload groups operation performed is stored in the **Entry specific data** field of the QAUDJRN journal.

For example, if you created workload group WLCFIVE with a maximum processor limit of 5, the associated journal entry would have the following entry-specific data:

```
Entry specific data
*...+...1...+...2...+...3...+...4...+...5
'CQLZAWLCSPAQUSRSYS *MSCSP  "*CRT WLCFIVE 000'
'5
```

In another example, if you added licensed program 5770ABC with license term V7R1M0 and feature code 5050 to workload group WLCFIVE. the associated journal entry would have the following entry-specific data:

```
Entry specific data
*...+...1...+...2...+...3...+...4...+...5
'CQLZAWLCSPAQUSRSYS *MSCSP  "*ADDPWLCFIVE 000'
'05770ABCV7R1M05050
```

To view the journal entries related to workload groups:

1. Display the QAUDJRN journal to an output file (\*OUTFILE).
2. Run a query against the output file.

This example uses interactive SQL, which requires the IBM Db2 Query Manager and SQL Development Kit for i licensed program, 5770-ST1:

```
STRSQL
SELECT * FROM OUTFILELIB/OUTFILENAME
WHERE JOESD LIKE 'CQLZAWLCSPA%'
```

A different example uses the [Run Query \(RUNQRY\) command](#) and requires the IBM Query for i licensed program, 5770-QU1.

```
RUNQRY QRYFILE((OUTFILELIB/OUTFILENAME *FIRST)) RCDSLT(*YES)
```

Specify the following values on the record selection display:

Field: JOESD

Test: LIKE

Value: 'CQLZAWLCSPA%'

### **Related reference**

[Run Query \(RUNQRY\) command](#)

## **Managing software agreements and license keys**

Before you can install or use Licensed Internal Code and the IBM i operating system, you are required to accept the online software agreements for these licensed programs.

Software agreements for other IBM licensed programs also need to be accepted before the licensed programs can be installed.

### **Accepting software agreements**

To install certain licensed programs, you must accept software agreements for them.

Before you can install Licensed Internal Code and the IBM i operating system, you are required to accept the online software agreements for them. Other licensed programs that have online software agreements also need to have their agreements accepted before the installation.

If you have the i 7.3 release on your system and you want to install other licensed programs, follow the instructions in the topic, [Installing additional licensed programs](#). These instructions include accepting the online software agreements for the licensed programs that require them.

If you are a software provider who wants to present terms before the installation of your packaged software product, you may do so by generating a software agreement and then associating it with your product by using software product APIs. For instructions, see [“Generating software agreements for your own products”](#) on page 69.

### **Related tasks**

[Required: Accepting software agreements](#)

[Installing additional licensed programs](#)

## **Displaying or printing your software agreements**

Use the Work with Software Agreements (WRKSFWAGR) command to display or print your software agreements.

The Work with Software Agreements display allows you to work with a list of installed licensed programs that have software agreements. These agreements can be printed or displayed in different languages provided by the software provider.

## **Preparing software agreements for transfer of ownership**

If you are transferring a system or logical partition to a new owner, use the Work with Licensed Programs menu to transfer ownership of the i 7.3 software agreements.

This task is performed by IBM Business Partners or anyone who intends to transfer ownership of an entire system or logical partition with i 7.3 installed to a new owner. This is the final task before the system or logical partition is powered down.

1. On the command line, type GO LICPGM and press Enter. The Work with Licensed Programs display appears.



2. From the Work with Licensed Programs (LICPGM) menu, select option 31 (Prepare software agreements for transfer of ownership) and press Enter. A confirmation display appears. Continuing with the task will power down the system or logical partition.

The new owner accepts the software agreements during the initial program load (IPL) to enable the system or logical partition to be used.

## Displaying and changing software license information

To add license key information and set the usage limit for your licensed-enabled packaged products, follow these procedures.

After you install your licensed-enabled packaged products, use the following functions from the Work with License Information (WRKLICINF) command to continue to manage software license information on your system.

### Related concepts

[Determining the usage limit for products priced by processor](#)

For Power Systems that meet certain requirements, the operating system automatically adjusts the number of available processors to match the installed usage limit for IBM i feature 5051.

### Adding license key information

To use a keyed, licensed-enabled packaged product beyond the trial period, load the license key and other required information.

You can use the Work with License Information (WRKLICINF) command to add your license key information for your licensed-enabled packaged products. The WRKLICINF command allows you to load the license key and other required information to use a product beyond its trial period.

To add your license key information, do the following:

1. Type WRKLICINF and press Enter.
2. On the Work with License Information display, type a 1 in the option column next to the product identification number to add license key information for a program. Press Enter.
3. On the Add License Key Information (ADDLICENSE) display, type the required information and add the license key information. Some fields may already contain the required information, such as the product identifier, license term, and system serial number. The 18-character license key is typed into three fields:
  - In the first field, type in characters one through six.
  - In the second field, type in characters seven through twelve.
  - In the last field, type in characters 13 through 18.

In the usage limit field, type in the number of authorized users or the value \*NOMAX.

**Note:** You will need \*ALLOBJ authority in your user profile to supply the license key information. If you experience a problem with the key provided, contact your software provider.

### *License key repository*

The license key repository stores product license key information for each unique licensed-enabled packaged product, license term, feature, and system. The repository can contain license keys for any system, and the product need not be installed.

If the product is installed on the system when you add license key information to the repository and the license is for this system, the ADDLICENSE command also installs the license key. When you install the license key, the product's current usage limit is changed to the usage limit that is specified by the license key. The expiration date is also set.

If the license key information already exists in the license key repository for a product that is being installed, the license key information is installed as part of the product installation process.



## Setting the usage limit

After you complete the IBM i installation process and before you make the system available to all users, you must set the usage limit for the license-managed products that are not in the keyed set.

For IBM, these products are listed on the Proof of Entitlement (POE), invoice, or other document that you have received with your software order. You can set the usage limit for license-managed products that are not in the keyed set by using the Work with License Information (WRKLICINF) command.

To set your usage limit, do the following:

1. Type WRKLICINF and press Enter.
2. On the Work with License Information display, press F11 (Display Usage Information). The usage limit number on each product that is listed on the POE, invoice, or other documents must match the usage limit number on the Work with License Information display for the associated product.
3. Move the cursor to the line that contains the product name whose usage limit is to be updated.
4. Type 2 (Change), and press Enter.
5. When the Change License Information display is shown, update the usage limit prompt with the usage limit shown on the POE. In addition, update the threshold prompt with either \*CALC or \*USGLMT. Do not leave the threshold set to zero.

**Note:** If the following message is sent, respond by typing **G**. CPA9E1B: Usage limit increase must be authorized. Press help before replying (C G).

6. If the POE lists more products than the Work with License Information display, set the usage limits after you install those products.

## Distributing software license keys

You can distribute software license keys from one central site system to another system.

You do this by creating a file to automatically load the software license information to the other system during an IBM i software upgrade. The topics [Preparing software license information for central site distribution](#) or [Distributing software license information using System i® Navigator](#) describe how to create a license information file.

## Generating software agreements for your own products

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To present license terms before you install a non-IBM software product, you generate a software agreement and then associate it with your packaged product. To do this, you use IBM i software product APIs. Users then accept the software agreement to continue with the installation of the software product.

Independent software providers can create online software license agreements. A user is then required to accept the software agreement to complete the installation.

To create a software agreement, you begin by creating the directory for your documents in the /QIBM/UserData/LicenseDoc directory. Choose a name that is unique from any other agreement from any other vendor. Consider using your product identifier, version, release, modification, and option as part of the name. For example, you could use the Work with Object Links (WRKLNK) command and create the MyProdIDVRMOptDoc1 directory.

You then create one or more language versions of the software agreement in this directory. A document's name begins with the directory name and has a language suffix appended. For example, MyProdIDVRMOptDoc1\_en for an English version of the agreement, and MyProdIDVRMOptDoc1\_ja for a Japanese version.

The software agreement documents need to be created in UCS-2 Unicode, specifically UTF-16. The Unicode coded character set identifier (CCSID) is 13488. To create the documents, you can use the edit function under the WRKLNK command, as well as variety of PC tools. If you use a tool that generates UTF-16, it needs to be BigEndian.

To use the WRKLNK command to create a software agreement document in the MyProdIDVRMOptDoc1 directory, do the following:

1. Select Option 2 (Edit) against your MyProdIDVRMOptDoc1 directory.
2. Under the new file prompt, type MyProdIDVRMOptDoc1\_en for the file name and press Enter to edit.
3. Before entering text, select F15 (Services).
4. Select option 3 and change the CCSID to 13488. Press Enter.
5. Select option 5 and change the stream file EOL option to \*CRLF.
6. Press F3 to edit your agreement. Make sure that no characters go past column 76 (either single wide or double wide).
7. Press F2 to save and then press PF3 to exit.

Details on how to format the agreement, the naming requirements, and languages supported are described in the [Create Product Load \(QSZCRTPL\) API](#).

#### **Related reference**

[Software product APIs](#)

## Generating license keys for your own products

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Use this information to find out how to generate software license keys to allow access to your own products.

If any of your own products require keyed compliance, you need to create software license keys for them. A valid license key for each of these products must be loaded on the system so that users can access the product or an option of a product.

To create a license key, use the [Generate License Key \(QLZAGENK\) API](#).

#### **Related information**

[System Manager Use](#)


## Related information for Maintaining and managing IBM i and related software

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Product manuals, Web sites, and other information center topic collections contain information that relates to the Maintaining and managing IBM i and related software topic collection. You can view or print any of the PDF files.

#### **Web sites**

There are a variety of Web sites you can use to find more information about managing and maintaining software and licensed programs. These include:

- [Support for IBM i](#) 

The IBM Support for IBM i Web site takes you to information such as ordering and downloading fixes.

- For the most current updates concerning Fix delivery on IBM i, see the "Fixes" topic on the [IBM i and Related Software](#) 

#### **Other information**

- The **Backup and recovery** category contains information about how to plan a backup and recovery strategy, how to set up disk protection for your data, how to back up your system, and how to control your system shutdown in the event of a failure.
- The **Distributing software** topic collection describes how you can distribute some or all of the programs on a system, including the operating system, to another system.
- The **Installing, upgrading, or deleting IBM i and related software** topic collection describes how you can install the IBM i release, part of the release, or licensed programs related to IBM i. This information

also describes how to change a primary language, install a secondary language, or delete software that is related to the IBM i operating system.

**Related reference**

[PDF file for Maintaining and managing IBM i and related software](#)

You can view and print a PDF file of this information.



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