New Usage Patterns for IBM Installation Manager on z/OS

June 20, 2022

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Introduction

With the introduction of the /global filesystem on z/OS, we are recommending several significant changes in how IBM Installation Manager is used in z/OS environments. These changes, which were incorporated into installation jobs and processes for WebSphere Application Server in 2020, provide improved usability, help you avoid errors, and add options to simplify product deployment across the enterprise.

What is changing, and why?

IBM Installation Manager is a tool for installing and maintaining computer software on a wide range of platforms. It provides both graphical and non-graphical interfaces, and has been in use on z/OS since it was first ported to that operating system in 2010.

Along with its advantages and multi-platform scope, Installation Manager has a few quirks which are particularly significant for z/OS:

1. Installation Manager *only* works with products installed into a directory-based file tree; it has no support for native MVS data sets.

2. Installed products are identified by their installation directory. Forgetting to mount a filesystem or mounting the wrong one before applying maintenance can easily cause irreparable damage, requiring a restore (assuming the problem is discovered quickly).

3. The directory paths saved by Installation Manager include the full expansion of variables and symbolic links. Since many z/OS filesystems (think /etc/ and /usr/lpp) have mountpoints with variables or symlinks in their mount paths, the act of upgrading to a newer level of z/OS can cause Installation Manager to lose track of installed products.

The new usage patterns proposed here have been tested within IBM, and shown to resolve or mitigate many of these concerns. They also allow for the creation of truly portable product stack installs with IBM Installation Manager, so that data centers can more easily propagate IM-installed products or sets of products across the enterprise. Read on to find out how this will work!

First recommendation: always use group mode

When an Installation Manager is "created" (that is, when the Installation Manager binaries are copied from the "install kit" and product installation metadata is initialized), the customer decides whether the resulting Installation Manager will be invoked by:

- Any superuser ("admin mode")

- A single user ("user mode")

- A group of users in the same group ("group mode")

Admin mode is convenient, but often runs afoul of local requirements that try to minimize the user of highly privileged IDs. Furthermore, it relies on the presencet of a special file in /etc/.ibm/registry hold essential information – and a z/OS upgrade can easily cause this file to be lost.

User mode is also convenient – but associating product installs with particular users can become a problem if those users leave or are reassigned. There is no way to move an Installation Manager from one user to another, since a file in $HOME/etc/.ibm/registry points to many essential Installation Manager components in the user's home directory.

While IBM will continue to support admin mode and user mode on z/OS, we recommend that all Installation Manager product installs on z/OS be done using group mode.

Setting up a central Installation Manager

The basics

In the past, IBM documentation and samples for IBM Installation Manager on z/OS have assumed that the Installation Manager "resides" in a filesystem mounted at

> /InstallationManager

Note only is this pathname a bit long, but using it requires that a directory be added in the root filesystem or sysplex root filesystem.

We will now recommend that all read/write Installation Manager files go into a filesystem mounted at

> /global/instgr

The /global directory is a recent addition to z/OS, and a read/write filesystem is normally mounted there. Customers should mount a filesystem for Installation Manager at this location, and use it to hold the following Installation Manager directories:

> /global/instmgr/appdata *data recording the status of installed products*
>
> /global/instmgr/bin *Installation Manager binaries, copied from the install kit*
>
> /global/linstmgr/shared *cached data used during product installation and maintenance*

Note that these directories contain pointers to one another, so they cannot be relocated, or shared among different Installation Managers, as data corruption will result and all products may need to be reinstalled.

The resulting Installation Manager can be accessed and used from anywhere in the sysplex. Customers who need more than one Installation Manager (for example, to accommodate two different teams installing very different sets of products, or customers in a data center whose installed products should be kept rigorously separate) can choose a different second level instead of "instmgr."

A local repository

Customers should create a filesystem to hold local product repostories, fix packs, and corrective services, and mount it at:

> /global/instmgr/repo

The space required for this filesystem will depend on the number and size of products beings installed, and whether product installation is normally done directly from ibm.com, or using downloaded product files.

We intend to provide scripts and tools to manage such a local repository on z/OS.   You can also use IBM Packaging Utility if desired.

A consistent location where products are installed and serviced

We recommend that each product or group or products be installed at

> /global/instmgr/products/<product and level>

and that the filesystem's data set name be clearly associated with the mountpoint directory used for service. This will help prevent mistakes when applying service. The filesystem can be remounted in read-only mode at a different path for actual use, or a copy can be made and is used in production.

For example:

> /global/instmgr/products/WebSphere_8.5.5.18   ZOMVS.WAS85518.ZFS
>
> /global/instmgr/products/Liberty_20.0.0.4   ZOMVS.WLP20004.ZFS

A secure place for credentials

Finally, if credentials are necessary for accessing remote repositories, we recommend that the Installation Manager secure storage file and master password file should be kept in the home directory of each user ID that runs Installation Manager:

> $HOME/im.ssf   *secure storage file, containing the encrypted credentials*
>
> $HOME/im.mpw   *master password file containing an encryption key*

Both files should have permission bits of 700 (only owner can access). Storing these files in the user's home directory rather than in a shared directory allows better control over repository access credentials.

As an alternative, you can place the credentials files in the Installation Manager directory itself. For example:

> $HOME/im.ssf   *secure storage file, containing the encrypted credentials*
>
> $HOME/im.mpw   *master password file containing an encryption key*

This allows all users of the Installation Manager to share a set of credentials when accessing external repositories. Both files should have permission bits of 770 (anyone in the owning group can access). However, this also makes it more difficult to associate repository access with an individual.

Some examples

To see a list of all installed products, together with their installation directories:

```
cd /global/instmgr/bin/eclipse/tools

imcl listInstalledPackages
```

To install the latest level of WebSphere Application Server Version 8.5, with all recommended service, create and mount a new filesystem at /global/instmgr/products/WebSphere_855xx, and issue the commands:

```
cd /global/instmgr/bin/eclipse/tools

imcl install com.ibm.websphere.zOS.v85 -acceptLicense
  -installationDirectoryD  /global/instmgr/products/WebSphere_855xx
  -repositories http://www.ibm.com/software/repositorymanager/com.ibm.websphere.zOS.z85
  -installFixes recommended   -secureStorageFile ~/im.ssf   -masterPasswordFile  ~/im.mpf
```

The "installationDirectory", "installFixes", "secureStorageFile", and "masterPasswordFile" parameters can be abbreviated to -iD, -iF, -sSF, and -mPF respectively.

You may have noticed that the product level is part of the install path in the examples above. This is intentional. In general, it is quicker to install a new copy of a product at a desired level than it is to upgrade an existing copy. Furthermore, you may need to install corrective service on the old level before moving completely to the new level. Therefore, we recommend new installs for every major release or fix pack level; uninstall and delete the old levels once they re no longer needed.

Making products portable within the data center

There is one difficulty with the above scheme: if products are moved to a system outside the home sysplex, they can only be serviced if the entire Installation Manager filesystem (/global/instmgr), together with the product filesystem(s), are available on the new system. Similarly, any backup of Installation Manager products must consist of a copy of the entire Installation Manager filesystem together with all installed products. Any restore would have to be done on all installed products at once.

It is true that standardizing on /global/instmgr – a directory which should be available on any z/OS system – does help matters, but it still leaves most customers with a real problem when transporting products between systems: either move a vast amount of data, or give up on any servicing of products on the target systems and instead perform all maintenance, even urgent security fixes, on the sysplex used for the original install(s).

Therefore, we are recommending a second pattern for customers who value portability over central control. When a new product or group of related products are to be installed:

- Allocate a single filesystem to contain the product(s) and their Installation Manager metadata.

- Mount the filesystem at /global/instmgr/<product set name>

- Run the Installation Manager code directly from the Installation Manager install kit (/usr/lpp/InstallationManager or /usr/lpp/InstallationManager/V1R4). This will avoid having to keep a copy the Installation Manager binaries with each installed product.

- For each product to be installed, choose a directory *within* the product filesystem (for example, /global/instmgr/WAS_85518/AppServer) and issue an imcl command to install the product there. Add the parameters:

  ```
  -dataLocation               /global/instmgr/<product set name>/.im/data
  -sharedResourcesDirectory  /global/instmgr/<product set name>/.im/shared
  ```

- Unmount the filesystem.

You will now have a single filesystem containing one or more IM-installed products, at known levels, together with the Installation Manager metadata necessary to service the product(s) in a hidden subdirectory named ".im".   The filesystem can be moved and used anywhere in your enterprise, *and* can be serviced if necessary by mounting it at /global/instgr/<product set name>.

(This will also require a copy of the Installation Manager install kit, at the same level used to install the product(s) originall, or some later level. But you will only need one such copy of the install kit for any number of installed products.)

Such a "portable" install will typically require 20-40% more disk space than the installed products alone, in order to leave room for object caching during product installation and service. But you can use the `zfsadm shrink` command to compress the filesystem when it is not being serviced.

Advantages and disadvantages of a portable install

By using portable installs, you can manage entire sets of related products together, apply service to all of them at once if desired, and back them up together while maintaining serviceability.

You can also use z/OSMF Software Management to deploy the portable installs across your data center.

What you lose, of course, is the ability to list all your Installation Manager-installed products with a single command. Some customers may wish to set up a central Installation Manager for certain products, and use portable installs for others. The recommended directory structure in /global/instmgr is designed to accommodate such an option.

One other feature which is not (presently) allowed with portable installs is the semi-conversational "console mode" of Installation Manager (imcl -c), since this mode is not available when the Installation Manager code is run directly from the install kit.

Sample jobs for portable installs

The 2020 updates to the WebSphere Application Server for z/OS sample install and maintenance jobs included a complete set of jobs for creating and working with portable installs. In general, the member names for these jobs add a P or a Q to distinguish them from the jobs for the normal or "standard" layout.

The sample jobs are update periodically, and can be found in the SBBOJCL data set for your WebSphere Applicatiom Server for z/OS product. They can also be downloaded from ibm.com. (Liberty jobs are provided with both WebSphere Application Server versions, and do not have a separate download.)

https://www.ibm.com/support/pages/websphere-application-server-v855-sample-installation-jobs-zos

https://www.ibm.com/support/pages/websphere-application-server-v90-sample-installation-jobs-zos

Each set of sample jobs has a BBO$INDX member which lists the available sample jobs.

There are also general sample jobs for IBM Installation Manager for z/OS, which are updated periodically and can be found in the SGINJCL data set for IBM Installation Manager (FMID HGIN14), or downloaded from ibm.com.

https://www.ibm.com/support/pages/installation-manager-185-sample-jobs

See member GIN$INDX for a list of the Installation Manager sample jobs.

Portable installs now available directly from IBM Fix Central

Beginning with WebSphere Application Server Fix Packs 8.5.5.21 and 9.0.5.11, and WebSphere Liberty Fix Pack 22.0.0.2, portable installs are now available on IBM Fix Central for each WebSphere Applicatiom Server for z/OS and WebSphere Liberty fix pack.

Follow your usual procedures to find the particular fix pack you are interested in, then look for an entry like one of the following:

Version 8.5:

Portable Installation Manager installs for z/OS *Instructions*		
Download Description	**Platform**	**Download Links (Fix Central)**
Application Server (includes IBM HTTP Server and Web Server plugins)	z/OS	was-zos-8.5.5.21.pax.Z

Version 9.0:

Portable Installation Manager installs for z/OS *Instructions*		
Download Description	**Platform**	**Download Links (Fix Central)**
Application Server (includes IBM HTTP Server and Web Server plugins)	z/OS	was-zos-9.0.5.11.pax.Z

Liberty:

Portable Installation Manager installs for z/OS *Instructions*		
Download Description	**Platform**	**Download Links (Fix Central)**
Liberty (portable install)	z/OS	wlp-zos-22.0.0.1.pax.Z
Liberty with IBM Java SDK 8 (portable install)	z/OS	wlp-zos-java8-22.0.0.1.pax.Z

A few notes:

- Version 8.5 portable installs include WebSphere Application Server, IBM HTTP Server, and the Web Server Plugins. The Fix Pack 8.5.5.21 portable install also includes IBM Java 7.0 and IBM Java 7.0, which reach end of service in July 2022.

- Version 9.0 portable includes include WebSphere Application Server, IBM SDK for Java Version 9, IBM HTTP Server, and the Web Server Plugins.

- Liberty portable installs come in two formats: one with just the Liberty runtime, and one with both the Liberty runtime and IBM SDK for Java Version 8.

The blue **Instructions** link on each Fix Central portable install takes you to an overview document explaining how to download, uncompress, and use the portable installs. Each portable install includes a README file (on Fix Central, and in the root of the portable install itself) which lists the contents of the portable install, space requirements, and the service mountpoint to be used for the portable install.

End of Document