

# Using Installation Manager on z/OS

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**New in this edition (March 2018):**

- Added download information for Installation Manager sample jobs.
- Recommended placement of credentials files in the root of the Installation Manager directory.
- Added download information for WebSphere Application Server Version 8.5 sample jobs.
- Added information for WebSphere Application Server Version 9.0.

## Introduction

### *What is IBM Installation Manager?*

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.

IBM Installation Manager was ported to z/OS in 2010, and is currently at **Version 1.8.8**. Customers on older versions are strongly encouraged to upgrade to Version 1.8 .5 or above. (See Upgrading to a new level of IBM Installation Manager).

Complete documentation for IBM Installation Manager can be found in the IBM Knowledge Center:

[http://www-01.ibm.com/support/knowledgecenter/SSDV2W/im\\_family\\_welcome.html](http://www-01.ibm.com/support/knowledgecenter/SSDV2W/im_family_welcome.html)

The Knowledge Center documents the use of IBM Installation Manager on a variety of operating systems; this document will cover specific aspects of using IBM Installation Manager on z/OS.

### *Identifying a product and product level*

Software products managed with IBM Installation Manager are referred to as **offerings** or **packages**. Each such product is denoted by a **package name** such as

`com.ibm.websphere.zOS.v85`

An underscore and version/date/time may be added to identify a particular product level:

`com.ibm.websphere.zOS.v85_8.5.5005.20150220_0450`

Installation Manager uses a three part version.release.modlevel numbering scheme. Products such as IBM WebSphere Application Server that use a four-part number v.r.m.n are represented in IBM Installation Manager as v.r.(1000\*m+n). So the particular level of WebSphere Application Server corresponding to the package name above is Version 8.5.5.5.

### *Product repositories*

To perform software installations or upgrades, IBM Installation Manager makes use of **product repositories** which contain software parts together with metadata that describes how the parts are to be assembled. These repositories can reside on product media, on local file systems, or on a web server.

### *Installation directories*

A single Installation Manager can install and service multiple software products, and multiple copies of each product (for example, copies of a single product at different service levels). Installed products are identified by their **installation directories**.

- If multiple copies of a software product are installed, each copy must have its own installation directory.

- Separate products must have separate installation directories. **Exception:** some products are intended to be installed together; when this is the case, IBM Installation Manager validates the levels of the products installed into a single installation directory to ensure they are compatible.
- A particular installed product must always be serviced at its original installation location. (When not being serviced, the product can be mounted at another location if desired.)

IBM Installation Manager uses the term **package group** to refer to all the software installed in a particular installation directory – whether a single product, or several compatible products.

## Setting up an Installation Manager

When IBM Installation Manager is set up on a particular system, an **Installation Manager instance** (or simply, an **Installation Manager**) is created. As mentioned above, a single Installation Manager can maintain any desired collection of software for that system.

An Installation Manager consists of:

- A set of IBM Installation Manager binaries at a particular level;
- A set of run-time files (“appdata”) that describe all software that has been installed with the Installation Manager
- A set of shared resources and cached files

Each Installation Manager can only maintain its own software packages – that is, the software packages that were installed with that particular Installation Manager. Any user authorized to access a particular Installation Manager can update or modify any of the software packages known to that Installation Manager.

In general, you will only need one Installation Manager per system where software installs will take place. (At this time, we do not recommend sharing an Installation Manager across systems in a sysplex.)

### ***Some z/OS prerequisites***

IBM Installation Manager is supported at z/OS Version 1.13 and above.

On the z/OS operating system, IBM Installation Manager runs as a Unix System Services application. Before setting up an Installation Manager, check and make certain your Unix System Services settings in BPXPRMxx meet or exceed the following:

MAXASSIZE	805306368
MAXFILEPROC	10000 (64000 recommended)
MAXMMAPAREA	40960
SHRLIBRGNSIZE	67000000

Higher values may be needed for other products.

## The Installation Manager install kit

To create an Installation Manager on your system, you will need an **Installation Manager install kit**, which contains the Installation Manager binaries and setup scripts for a particular level of IBM Installation Manager. The install kit can also be used to upgrade older levels of Installation Manager.

IBM customers can obtain a copy of this install kit in SMP/E format by ordering the no-charge product

5655-IMZ      IBM Installation Manager for z/OS

This product contains a single FMID, HGIN140, which installs the IBM Installation Manager install kit into

/usr/lpp/InstallationManager/V1R4

Subsequent PTFs for FMID HGIN140 upgrade the install kit to newer levels; the current level as of this writing is Version 1.8.8 (PTF UI54368). Note that the version in the install kit path (V1R4) will not change even though the install kit is upgraded to later releases; do not try to change this path. For a list of Installation Manager PTFs, see

<http://www-01.ibm.com/support/docview.wss?rs=0&uid=swg27023075>

Some products, such as WebSphere Application Server for z/OS, automatically include a copy of FMID HGIN140 with their deliverables. In either case, the IBM Installation Manager install kit can be obtained preinstalled as part of a ServerPac.

You can also download an IBM Installation Manager install for z/OS from the IBM Fix Central web site. The install kit consists of single .zip file, which you must uncompress on your system. (See Appendix A for more information on working with .zip files under z/OS.) Go to the Installation Manager download page:

<http://www-01.ibm.com/support/docview.wss?rs=0&uid=swg27025142>

and click on the “Download document” link for the desired Installation Manager level, then select the download for z/OS. This will take you to a selection like the following:

---

<input type="checkbox"/> 1. <b>refresh pack:</b> <a href="#">1.8.2.0-IBMIM-ZOS-20150303_1526</a> → IBM Installation Manager Install Kit for all Z/OS versions supported by version 1.8.2	Mar 13, 2015
<input type="checkbox"/> 2. <b>refresh pack:</b> <a href="#">1.8.2.0-IBMIM-Multiplatform-Update-20150303_1526</a> → IBM Installation Manager 1.8.2 Fix Pack for multi-platform update	Mar 13, 2015

---

Choose the first (z/OS-specific) link, and log in with your IBM Software ID. The actual file you download to your workstation will have a file name like

agent.installer.zos.motif.s390\_1.8.2000.20150303\_1526.zip

This is the install kit; transfer it in binary to your z/OS system, and uncompress it (see Appendix A) into an empty directory. The unzipped install kit will require approximately 300 megabytes of disk space.

Whether you use SMP/E or download-and-uncompress, here is what an install kit looks like on z/OS:

```
# ls /usr/lpp/InstallationManager/V1R4
IBM                native
Offerings          plugins
configuration      readme.html
consoleinst.sh     repository.config
documentation       repository.xml
groupinstc         set-ext-attr.sh
groupinstc.ini     toolkit.unzip.sh
install.xml        toolkit.zip
installc           tools
installc.ini       userinstc
jre_7.0.8000.20141126_1221 userinstc.ini
license
#
```

## ***The Installation Manager sample jobs***

If you install the Installation Manager install kit with SMP/E, use the Installation Manager sample jobs in target data set SGINJCL..

Customers who download the Installation Manager install kit from Fix Central can access these sample jobs at

<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD106391>

This link provides an IEBUPDTE job which will place the sample jobs in a partitioned data set. These sample jobs have extensive comments to assist you in using IBM Installation Manager.

## ***Choosing an administration model***

IBM Installation Manager has three different administration models. The administration model determines who can invoke the Installation Manager.

	Who can access?	How many per system?	Setup command
Admin mode	Any superuser (uid 0)	One	install
User mode	The user who created it	One per user	userinstc
Group mode	Any user in the owning group	Any number	groupinstc

An **admin mode** Installation Manager can be invoked from a user ID with uid 0 (a “superuser”), and non-superusers cannot access it. A registry file is created in `/etc/.ibm/registry` pointing to the Installation Manager; since this file is unique, there can only be one admin-mode Installation Manager per system.

A **user mode** Installation Manager can only be invoked from a user ID that created it (either a superuser or non-superuser). By default, the Installation Manager’s files are stored in the user’s home directory. A registry file is created in `$HOME/etc/.ibm/registry` pointing to the Installation Manager; since this file is unique for each user, there can only be one user-mode Installation Manager per user ID.



A **group mode** Installation Manager is associated with a particular SAF group, and can only be invoked from user IDs that are connected to this group. The registry file for this Installation Manager is created in the Installation Manager's own file space, so there is no limit on the number of group-mode Installation Managers that can be created.

**Best practice:** on z/OS, we recommend the use of group-mode Installation Managers.

## ***Creating an Installation Manager user ID***

If you are creating an admin-mode or user-mode Installation Manager, you can use an existing z/OS user ID, as long as it is defined to Unix System Services and meets the other requirements in this section.

If you are creating a group-mode Installation Manager, we recommend that you create a special user ID and a special SAF group for the Installation Manager.

The Installation Manager user ID **must** have a **read-write HOME directory**. If the home directory is read-only, you will encounter a variety of obscure errors when running IBM Installation Manager. The user ID must also have the following permissions:

1. READ access to FACILITY profile BPX.FILEATTR.APF
2. READ access to FACILITY profile BPX.FILEATTR.PROGCTL
3. READ access to FACILITY profile BPX.FILEATTR.SHARELIB
4. READ access to UNIXPRIV profile SUPERUSER.FILESYS.CHOWN
5. READ access to UNIXPRIV profile SUPERUSER.FILESYS.CHANGEPERMS

Edit and run sample job GIN2ADMN to create an Installation Manager user ID and group, and assign the required permissions.

## ***Choosing directories for an Installation Manager***

An Installation Manager's files are stored in the following locations:

- **Binaries directory** – holds the Installation Manager product code, copied from the install kit.
- **Appdata directory** – holds the run-time data that records product installations
- **Shared resources directory** – a cache for holding program objects temporarily

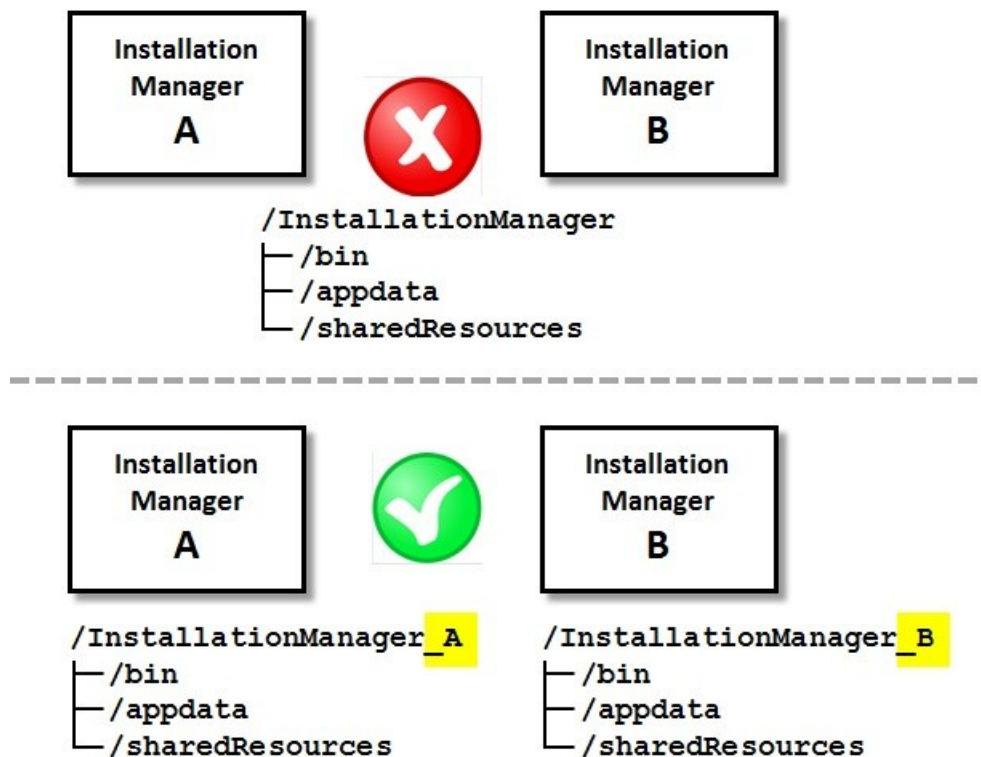
The binaries and appdata directories are set when the Installation Manager is created; the shared resources directory is set when the first product install is done. None of these can be easily changed once set.

	Default path*	Minimum space (3390 tracks)
Binaries	/InstallationManager/bin	10,000
Appdata	/InstallationManager/appdata	500
Shared Resources	/InstallationManager/sharedResources	Varies by product – 27,000 for

\* For a user-mode Installation Manager, these are created inside the user's home directory, \$HOME.

All three directories should be owned by the Installation Manager user ID (and in the case of a group-mode Installation Manager, by the Installation Manager group) and have permissions of 755 (or 775 for group mode).

If you have several Installation Managers, each requires its own binaries, appdata, shared resources, and product installation directories; they cannot be shared between Installation Managers:



You can put these three directories anywhere you like on your system, and set up separate file systems (HFS or zFS) for each. However, it is much simpler to create a single filesystem to contain the binaries, appdata, and shared resources.

For example, you could create a filesystem with 37,500 tracks (2500 cylinders of 3390 disk space) and mount it at /Installation, then allow IBM Installation Manager to create the required subdirectories:

```

/InstallationManager
  /bin
  /appdata
  /sharedResources

```

**WARNING** Choose directory names for the Installation Manager directories that do **not** contain symlinks, or only contain symlinks that are unlikely ever to change. Installation Manager stores the paths with all symlinks resolved. If the path contains symlinks with, say, the z/OS level, then the stored path may no longer match after a system upgrade, and the Installation Manager will be unusable.

Edit and run sample job GIN2CFS to create a filesystem that will hold the Installation Manager's binaries, appdata, and shared resources.

## ***Creating the Installation Manager***

You are now ready to create an Installation Manager by invoking the appropriate setup command (`installc`, `userinstc`, or `groupinstc`) from the Installation Manager install kit.

Edit and run sample job GIN2INST to create an Installation Manager.

You can also create an Installation Manager from the command line. Log in to the Unix System Services shell under the user ID that will own the Installation Manager.

1. Change directory to the IBM Installation Manager install kit:

```
cd /usr/lpp/InstallationManager/V1R4
```

2. Issue the appropriate setup command - `installc`, `userinstc`, or `groupinstc` - and specify the binaries and appdata directories to be used by the Installation Manager. The parameters are the same for all three commands. To create a group-mode Installation Manager:

```
./groupinstc -installationDirectory <Installation Manager binaries directory>
             -dataLocation <Installation Manager appdata directory>
             -acceptLicense
```

If you omit the `-installationDirectory` or `-dataLocation` parameters, then the default locations will be used.

If setup is successful, you will see output like the following:

```
Installed com.ibm.cic.agent_1.8.2000.20150303_1526 to the /InstallationManager/bin/eclipse directory.
```

If the setup is NOT successful, consult the Troubleshooting section of this document for assistance.

## ***Invoking the Installation Manager***

Once the Installation Manager has been created, you can issue the `imcl -version` command to verify that it has been correctly installed. The `imcl` command is in the **eclipse/tools** subdirectory of the Installation Manager binaries directory.

1. Log in to the Unix System Services shell under the Installation Manager user ID.
2. Change Installation Manager binaries directory (NOT the install kit!), down into **eclipse/tools**:

```
cd /InstallationManager/bin/eclipse/tools
```

3. Issue the `imcl` command:

```
./imcl -version
```

You can also use sample job GIN2CMD to issue Installation Manager commands with BPXBATCH.

## Invoking the Installation Manager in console mode

IBM Installation Manager also provides an interactive interface (running in the Unix System Services shell) called “console mode.” Using console mode, you can maintain a list of product repositories, install and uninstall products, and see what is already installed.

To start the Installation Manager in console mode:

1. Log in to the Unix System Services shell under the Installation Manager user ID.
2. Change Installation Manager binaries directory (NOT the install kit!), down into **eclipse/tools**:

```
cd /InstallationManager/bin/eclipse/tools
```

3. Issue the imcl command:

```
./imcl -c
```

## Product repositories

When IBM Installation Manager installs or upgrades a product, it retrieves parts and metadata from a **repository** for the product. These repositories are in a format specific to Installation Manager, and can reside on the Web, physical media (such as DVD), or on local disk space (in the Unix System Services file system).

There are two basic formats for Installation Manager repositories.

- A **network repository**
- An **electronic service delivery (ESD) repository**, a multidisk format used for products too large to fit in a network repository

The following table shows the top level layout of each type of repository. (Lines ending with slash (/) are directories containing additional files.)

Network repository:	ESD repository
repository.config repository.xml Offerings/ atoc/ native/ plugins/	disktag.inf ad/ md/ toc/

Either kind of repository can be accessed from local disk; a network repository can also be accessed through an FTP or HTTP/HTTPS server.

Repositories can contain an entire product, a particular fix pack for the product, or an individual fix. Use the `imcl listAvailablePackages` command to determine what is in a particular repository.

## **Repositories on media**

Some products, such as WebSphere Application Server for z/OS Version 8, provide product repositories for the base product level on physical media (CD or DVD), as zip files. These zip files can be transferred (in binary!) to a z/OS system and used to install the product. It is not necessary to uncompress (unzip) these product repositories; IBM Installation Manager can access the zip file directly.

We recommend that product repositories be stored in a subdirectory called `repo` in the directory that contains your Installation Manager binaries and `appdata` directories. For example:

```
/InstallationManager/repo/was.8550.zOS.zip
```

Since the product repositories can be large, you may want to create an appropriately sized filesystem for the repository files and mount it at `<Installation Manager>/repo`.

You can use sample job GIN3REPO to create and mount such a filesystem.

## **Repositories downloaded from Fix Central**

The primary drawback to repositories on physical media is that they will contain nothing more recent than the original base product level. To obtain more recent product levels or individual fixes, you can download preventive or corrective service from the IBM Fix Central website as zip files. IBM Installation Manager can combine the contents of several repositories in a single install or upgrade.

Like base product repositories, these can be placed in the `repo` directory for your Installation Manager:

```
/InstallationManager/repo/8.5.5-WS-WAS-OS390-FP0000008.zip
```

You can store corrective service (interim fixes) in the `repo` directory, or in their own `ifixes` directory, to make them easier to manage:

```
/InstallationManager/ifixes/8.5.0.0-WS-WAS-MultiOS-TF67584.zip
```

## **Repositories in SMP/E format**

For z/OS customers with no direct access to the internet, some IBM products provide product repositories in SMP/E format. In most cases, the base product repository and a single fix pack level of the product are installed at:

```
/usr/lpp/InstallationManagerRepository/<fmid>
```

Such a repository can be used to install the product at either the base level or the level of the included fix pack, or upgrade an existing install of the product to the included fix pack level.

Why only one fix pack level? Because if the SMP/E-managed repository contained all fix pack levels, its disk "footprint" would grow without bounds. Customers who wish to keep multiple fix pack levels of an SMP/E-managed repository "on site" should consider using the IBM Packaging Utility (described below) to maintain a local enterprise repository with the desired product levels.

Interim fixes are not available in SMP/E format.

## **Web-based repositories**

If your z/OS system has access to the internet (perhaps through a proxy server), then the easiest way to install products is from the IBM web-based repository at:

`http://www.ibm.com/software/repositorymanager/offeringID`

This repository provides preventive and corrective service for a wide range of IBM products. In some cases, it also provides base software product code, allowing you to do entire product installs directly from `ibm.com`, across an encrypted connection.

Installation Manager must be at a minimum level of 1.8.5 to access the IBM web-based repository.

By using this repository, you ensure that you are getting the latest available product code and service, and minimize the “footprint” required on your local system for repository storage.

**Note:** the Web-based repository is meant to be accessed directly by Installation Manager, rather than by a web browser. However, you can check your access to a particular product’s repository by adding “/repository.config” to the end of the URL, and pointing a browser to it. For example:

`http://www.ibm.com/software/repositorymanager/com.ibm.websphere.zOS.v85/repository.config`

To access the web-based repository, you will need an IBM user ID and password; you can obtain one from

<http://www.ibm.com/account/profile>

This ID will give you access to all “generally available” service, *but not to the base products themselves*<sup>1</sup>. For these, you need to associate your IBM user ID with a customer number that is entitled for the product(s) you wish to install:

1. Go to [www.ibm.com](http://www.ibm.com)
2. Select "Support & downloads".
3. Select "Support registrations". You will be asked to log in with your IBM user ID and password if you have not done so already.
4. Enter your IBM customer ID and a justification for access (such as "Allow product installs with IBM Installation Manager") and click "Request additional access."
5. After your request is approved by the administrator for the customer ID, you will be able to access the base repositories for entitled products.

---

<sup>1</sup> With a few exceptions. For example, the IBM Java SDK for WebSphere Application Server can be installed from Fix Central onto an existing copy of WebSphere Application Server without proving entitlement; the fact that you already have an installed copy of WebSphere Application Server is considered proof of entitlement. Also, WebSphere Application Server Version 9.0 allows for a 90-day trial install, so the product can be installed from the web-based repository by any user.

## Creating a credentials file

IBM Installation Manager can prompt you for your IBM user ID and password when it accesses the IBM web-based repository, but it is usually more secure (and convenient) to create an encrypted credentials file to contain the user ID and password. (Credentials files also make it possible to use Installation Manager in a batch job and still access secured repositories.)

We recommend that these credentials be kept in the same filesystem that contains your Installation Manager.

First, create a master password file that will be used to encrypt your credentials file. This file must reside in the Unix System Services file system, and should only be accessible to the Installation Manager user ID or group. Add whatever text you like to the file; the text will be used as an encryption/decryption key.

```
oedit /InstallationManager/master.password
(add text and save)
chmod 700 /InstallationManager/master.password (admin / user mode IM)
chmod 770 /InstallationManager/master.password (group mode IM)
```

Next, create a secure storage file with the `imutilsc` command, which resides in the same directory as the `imcl` command:

```
cd /InstallationManager/bin/eclipse/tools
./imutilsc saveCredential
    -username           <IBM user ID>
    -userPassword       <password for the IBM user ID>
    -secureStorageFile  /InstallationManager/im.ssf
    -masterPasswordFile /InstallationManager/master.password
    -url http://www.ibm.com/software/repositorymanager/entitled
```

Note: you will need to have access to the internet to use this command! (If your internet access is through a firewall, see the next section of this document, "Using a Proxy Server.")

This command will access the repository at the indicated URL, verify that the credentials work, and save them, encrypted, in the secure storage file. You can now specify the combination of the secure storage file and the master password file to IBM Installation Manager whenever you access the web-based service repository.

(By the way: the particular repository URL shown here is a "magic" one that provides access to all IBM products that your IBM user ID is entitled to install or service. However, it is a very slow interface for ordinary use; when actually performing product installs, you are better off using the repository URL with the offering ID of the product you are installing.)

A single secure storage file can contain multiple sets of credentials for accessing different repositories (for example, local repositories set up within your own data center). To add new credentials to the secure storage file or update existing credentials, rerun the `imutilsc saveCredential` command with the appropriate user ID, password, and repository URL.

**Note:** specifying your own master password provides additional security, but is not absolutely necessary; if none is specified, then the `imutilsc` command uses a built-in encryption key to create the secure

storage file. In this case, you must *not* specify a master password file along with any secure storage file that was created without one.

You can use sample job GIN3CRED to create a credentials files.

## Using a proxy server

Customers whose z/OS systems are behind a firewall may not be able to access the web-based service repository directly. But if a proxy server is available, then IBM Installation Manager can use the proxy server to connect to the web-based service repository.

You can include your proxy server's credentials in your secure storage file by adding the following additional parameters to the `imutilsc saveCredential` command:

```
-proxyHost      <proxy server host name>
-proxyPort     <proxy server port>
-proxyUsername <proxy server user name>
-proxyPassword <proxy server password>
-useSocks
```

The “-useSocks” parameter is only required if this is a SOCKS proxy connection.

Then add the following `-preferences` values to the `imcl` command to access the proxy server:

```
-preferences
  com.ibm.cic.common.core.preferences.http.proxyEnabled=True,
  com.ibm.cic.common.core.preferences.http.proxyHost=proxy.hostname,
  com.ibm.cic.common.core.preferences.http.proxyPort=proxy_port,
  [com.ibm.cic.common.core.preferences.http.proxyUseSocks=True]
```

To test a repository connection, you can use the `imcl listAvailablePackages` command (described next).

## Finding out what is in a repository

No matter what kind of repository you have, you can determine its contents with the `imcl listAvailablePackages` command:

```
imcl listAvailablePackages -repositories <repository list>
```

where `<repository list>` can contain any of the following, separated by commas:

- The path and filename of a zipped repository
- The path of an (uncompressed) repository on disk
- The URL of a web-based (HTTP or FTP) repository

If you are accessing a web-based repository, be sure to include your credentials in the form of a secure storage file (and master password file, if one was used).

Here are some examples:

Repository transferred from product media:



```
imcl listAvailablePackages
  -repositories /InstallationManager/repo/was.repo.8550.zOS.zip
```

Fix pack downloaded from Fix Central:

```
imcl listAvailablePackages
  -repositories
    /InstallationManager/repo/8.5.5-WS-WAS-OS390-FP0000008.zip
```

SMP/E-managed repository:

```
imcl listAvailablePackages
  -repositories /usr/lpp/InstallationManagerRepository/HBB0850
```

Web-based repository:

```
imcl listAvailablePackages
  -repositories http://www.ibm.com/software/repositorymanager/
    com.ibm.websphere.zOS.v85
  -secureStorageFile /u/sys27/IM.software.ssf
  -masterPasswordField /u/sys27/master.password
```

Web-based repository through a proxy server:

```
imcl listAvailablePackages
  -repositories http://www.ibm.com/software/repositorymanager/
    com.ibm.websphere.zOS.v85
  -preferences
    com.ibm.cic.common.core.preferences.http.proxyEnabled=True,
    com.ibm.cic.common.core.preferences.http.proxyHost=
      prox1.inhouse.acme.com,
    com.ibm.cic.common.core.preferences.http.proxyPort=2231
  -secureStorageFile /u/sys27/IM.software.ssf
  -masterPasswordField /u/sys27/master.password
```

(Proxy credentials will be retrieved from the secure storage file.)

Here is a sample output from the `imcl listAvailablePackages` command:

```
com.ibm.websphere.IHS.zOS.v85_8.5.5007.20150709_1930
com.ibm.websphere.NDDMZ.zOS.v85_8.5.5007.20150709_1925
com.ibm.websphere.PLG.zOS.v85_8.5.5007.20150709_1934
com.ibm.websphere.liberty.zOS.v85_8.5.5006.20150630_1414
com.ibm.websphere.zOS.v85_8.5.5007.20150709_1925
```

Each line represents a product/service level combination – an offering ID following by a version/time/date stamp. Later, we will see how these values are used when performing product installs.

**Hint:** if you are using a local repository or have already installed a product, you can add

```
-useServiceRepository
```

to your `imcl install` command and the service repository for the product will automatically be appended to your repository list.

Edit and run sample job GIN3LSTA to list all available packages in a web-based product and service repository.

## Installation directories

All software managed by IBM Installation Manager resides in the Unix System Services file structure on z/OS. Each installed product (or group of products in a package group) are associated with a particular installation directory. The installation directory is your Installation Manager's "key" to finding the installed product.

**Whenever IBM Installation Manager is used to update an installed product, the product must be mounted at the same installation directory at which it was initially installed.**

### *Choosing installation directories*

When you install a new software product, it is easy enough to choose a very straightforward name for the Installation directory, such as

```
/usr/lpp/zWebSphere/V8R5
```

or

```
/opt/IBM/ManagementConsole
```

But once the product is in use, it may be necessary to stop all servers or applications that are using the product in order to apply service. So in general, the installation directory should NOT be the same as the location at which the software will be mounted for use.

We recommend that you select installation directories in the products subdirectory of your Installation Manager, and create subdirector(ies) identifying the product and product level:

```
mkdir /InstallationManager/product
mkdir /InstallationManager/product/WebSphere
mkdir /InstallationManager/product/WebSphere/8.5.5.0
chown -R IMADMIN:IMGROUP /InstallationManager/products
```

Since IBM Installation Manager, unlike SMP/E, can easily install an entire new copy of a product at any particular service level (at least one that is in the available repositories), you have two choices:

1. Install a single copy of a product, and upgrade it with IBM Installation Manager as needed. If you make copies of the older levels, they will not be serviceable.
2. Perform a new install of the product at each desired service level, and swap the levels into production as needed. Each level of the product can be independently maintained (via corrective service, for example) and uninstalled when no longer needed.

**Best practice:** in general, we recommend this second approach. Create a new filesystem for each product level and assign it an installation directory that indicates the product level. Keep product directory mountpoints in the Installation Manager filesystem so it is clear which products are associated with each Installation Manager (if you have more than one). This also avoids problems with symbolic links.

```
/InstallationManager/products/WebSphere/8.5.5.4
```

/InstallationManager/products/ManagementConsole/1.2.1

**Best practice:** once you are done installing or updating a product with IBM Installation Manager, unmount it and remount it (read-only) at the location where you will use it. In a production environment, we recommend that you make a copy of the filesystem for production use, so that you can apply service to the original copy without disturbing your production environment.

Creating new product installs as needed is often faster than performing product upgrades in place, and leaves the old level available and serviceable. The only potential drawback is that IBM Installation Manager will not be able to automatically determine if all corrective service applied to the old level is contained in the new, separate install. We will address this issue later on.

## Creating product filesystems

Each product's documentation should tell you how much space is required for its product filesystem(s); some products will also provide a sample job to allocate product filesystem(s).

If not, you can edit and run sample job GIN3CFS, or invoke the `zCreateFileSystem.sh` script yourself:

```
/usr/lpp/InstallationManager/zCreateFileSystem.sh
  -name WAS.V8554.PRODUCT.HFS
  -type HFS -storclass OMVS -mgmtclas NOMIG
  -cylinders 2500
  -mountpoint /InstallationManager/products/WebSphere/8.5.5.4
  -owner IMADMIN -group IMGROUP
```

Product filesystems should always be owned by the owning user ID and group of the Installation Manager that will be used to install and maintain them.

## Space management for installation directories

You can use the Unix System Services `df -pK` command to show the total space and used space (in kilobytes) of the filesystem mounted at a particular location:

```
# df -Pk /InstallationManager/products/WebSphere/V8R0
Filesystem      1024-blocks      Used Available Capacity Mounted on
WAS.V80.SBBOHFS 2903040         2736076   164748    95% /InstallationManager/products/Web
#
```

This filesystem contains 2,903,040 one-kilobyte blocks (about 2.8 gigabytes), with 164,748 block (about 160 megabytes) of free space.

When IBM Installation Manager performs a product install or upgrade, it will estimate the amount of free space that must be present in the product's filesystem for the operation to succeed. Since Installation Manager does not take secondary extents into account – and even if it did, there is no way to be sure that the required additional space will be available on the disk pack when it is needed – Installation Manager will not continue the operation if the space is not available.

Instead, a message will be issued telling you how much free space is needed, and how much is available:

```
CRIMA1179E ERROR: Available disk space at /opt/SBBOHFS is insufficient.
Total required space is 2.68 GB. Total available space is 2.31 GB.
```

To extend an HFS filesystem, use the `conffhfs` command to add a specific amount of space:

```
/usr/sbin/confighfs -x 400M /opt/SBB0HFS
```

To extend a zFS filesystem, use the `zfsadm` command to enlarge the filesystem to a specific total size:

```
zfsadm grow WAS.V85.SBB0ZFS 1228800
```

The new total size is specified in one-kilobyte blocks, so this command enlarges the zFS file system to a total size of 1200 megabytes.

You may also need to add space if you install new products into a product group – for example, when adding a new level of the Java SDK to a WebSphere Application Server for z/OS install. Consult the product documentation for the required free space values, or attempt the install and let Installation Manager calculate it for you.

## Installing products with IBM Installation Manager

Once your Installation Manager has been created, you have access to product repositories, and you have determined where your products will go, you are ready to do product installs.

### *Installing a new product*

To install a product from the command line, use the `imcl install` command:

```
imcl install <offering>
      -installationDirectory <installation directory>
      -repositories          <repository list>
      -acceptLicense
```

These are the essentials of the `imcl install` command, but we will take a look at them in a particular order before showing you some additional parameters you will probably want to use.

Most products will provide a sample install job; the same job can be used to upgrade a product to a new level by pointing to more recent product and service repositories.

### The repository list

Repositories can reside on local file systems, or on FTP or HTTP servers, and are specified by URL:

```
file:/usr/lpp/InstallationManagerRepository/HBB0850
file:/InstallationManager/repo/was8554.fixpack.zip
http://www.ibm.com/software/repositorymanager/com.ibm.cic.packagingUtility
ftp://acme.com:2323/local/repository
```

(The `file:` prefix can be omitted for repositories on local file systems.)

You have several repository options that vary with the product.

#### Repository uploaded from media:

Here is how to specify a local file or directory used as a repository (omitting the `file:` prefix):

```
-repositories /InstallationManager/repo/was.repo.8550.zOS.zip
```

Repositories on media will usually contain only the base level of the product. You can download a fix pack repository from Fix Central and add it to the repository list:

```
-repositories /InstallationManager/repo/was.repo.8550.zOS.zip,
              /InstallationManager/repo/8.5.5-WS-WAS-OS390-FP000005.zip
```

(Note the comma that separates the two repositories in the `-repositories` list.)

### **SMP/E-managed repository:**

Here is how to specify a repository that has been installed with SMP/E as FMID HBBO850:

```
-repositories /usr/lpp/InstallationManagerRepository/HBB0850
```

This will contain the base level of the product, and if PTFs have been applied, the single fix pack level associated with the PTF(s).

### **Web-based repository:**

Here is how to specify a web-based repository:

```
-repositories
http://www.ibm.com/software/repositorymanager/com.ibm.websphere.zOS.v85
```

To use this repository for a product install, your IBM user ID must be associated with customer number that is entitled for the product. This repository also provides access to all available fix packs and published corrective service. Remember to specify your repository credentials:

```
-secureStorageFile <secure storage file path and filename>
-masterPasswordFile <master password file path and filename>
```

If you access the web through a proxy server, add the following `-preferences` values:

```
-preferences
com.ibm.cic.common.core.preferences.http.proxyEnabled=True,
com.ibm.cic.common.core.preferences.http.proxyHost=proxy_hostname,
com.ibm.cic.common.core.preferences.http.proxyPort=proxy_port,
[com.ibm.cic.common.core.preferences.http.proxyUseSocks=True]
```

## **The product offering ID**

This is the string that names the particular product you are installing to IBM Installation Manager, and can be found in the product documentation. For example, the offering ID for the WebSphere Application Server for z/OS Liberty profile is:

```
com.ibm.websphere.liberty.zOS.85
```

So an install command for the Liberty profile would begin:

```
imcl install com.ibm.websphere.liberty.zOS.v85
```

Since there is no version/date/time stamp after the offering ID, IBM Installation Manager will install the highest level of the product that is available in the repository list. If you want to install a particular level, add the version/time/date stamp to the offering ID:

```
imcl install com.ibm.websphere.liberty.zOS.v85_8.5.5002.20140408_2239
```

You can use the `imcl listAvailablePackages` command to find the version strings for available levels of the products in the repository list:

```
imcl listAvailablePackages -repositories <repository list>
```

Be sure to add the repository credentials for a web-based repository. See sample job GIN3LSTA.

### Optional features

Some products have selectable features, either required or optional. See the product documentation for a list of available features. Features to be installed are specified, separated by commas, after the offering ID:

```
imcl install com.ibm.websphere.adapters.v75,SAP,Siebel
```

When specifying a feature list, you should know that any list of features that is specified completely replaces the default feature list. For example, WebSphere Application Server for z/OS Version 8 has optional features **ejbdeploy**, **thinclient**, and **samples**. By default, **ejbdeploy** and **thinclient** are installed and **samples** is not. But if you specify just **samples**:

```
Imcl install com.ibm.websphere.zOS.v80,samples
```

Then *only* the **samples** feature will be installed, and **ejbdeploy** and **thinclient** will be omitted. To install the product with all three features, you must specify all three explicitly:

```
Imcl install com.ibm.websphere.zOS.v80,ejbdeploy,thinclient,samples
```

In such cases, it may be easier to install the product with the default features, and modify the product (as described below) to add additional needed features or delete undesired ones.

## Installation directory

When you specify the installation directory:

```
-installationDirectory <installation directory>
```

It must be writeable by the Installation Manager user ID, and be in a filesystem with sufficient free space to do the product install. IBM Installation Manager will create the directory if it does not already exist.

For a new product install, the installation directory should be empty – *unless* you are installing an additional product into a package group which already contains installed products which are to be augmented by the new one.

**Reminder:** do not use an installation directory whose path contains symlinks unless you are sure that those symlinks will not change their value. For example, a path containing a system variable for the z/OS level should **not** be used for an Installation Manager-installed product.

**Best practice:** Install each product into an empty filesystem mounted at:

```
<InstallationManager>/products/<product>/<level>
```

For example:

```
/InstallationManager/products/ManagementConsoles/1.5.3
```

## Automatically installing corrective service

By default, if you do not specify a version/date/time string on an `imcl install` command, Installation Manager will also attempt to install all available corrective service (iFixes - like ++APARs) from the repository list.

On the other hand, if a version/date/time string is specified, corrective service is NOT installed.

You can control this behavior by adding the `-installFixes` option to the `imcl install` command:

<code>-installFixes=all</code>	install all available corrective service
<code>-installFixes=recommended</code>	install all IBM-recommended corrective service
<code>-installFixes=none</code>	do not install corrective service

**Best practice:** use `-installFixes=recommended` where possible.

## Shared resources directory

The shared resources directory is used to temporarily store downloaded or interim objects during Installation Manager processing. This directory is not set until the first product install is done with a particular Installation Manager:

```
-sharedResourcesDirectory <shared resources directory>
```

After the first product install, the `-sharedResourcesDirectory` location does not have to be specified, because the location cannot be changed unless all products are first uninstalled.

**Best practice:** we recommend that customers use a shared resources directory of

```
<Installation Manager>/sharedResources
```

For example:

```
/InstallationManager/sharedResources
```

**Best practice:** we recommend that z/OS customers add the following statement to each `imcl install` command:

```
-preferences com.ibm.cic.common.core.preferences.preserveDownloadedArtifacts=false
```

This tells Installation Manager to discard cached objects from the shared resources directory after the install is complete, to prevent this directory from filling up with unneeded files.

If you accidentally omit this option, you can use Installation Manager console mode (described later) to safely delete unneeded files in the shared resources directory.

## Summary

Putting these all together, we have the following format for the `imcl install` command to install a new product:

```
imcl install <offering>[optional version/date/time][,optional feature list]
  -installationDirectory <installation directory>
```

```

-repositories          <repository list>
-secureStoreFile      <secure storage file>
-masterPasswordFile   <master password file>
-sharedResourcesDirectory <shared resources directory>
-preferences com.ibm.cic.common.core.preferences.preserveDownloadedArtifacts=false
-installFixes recommended
-acceptLicense

```

*additional -preference values if a proxy server is used:*

```

-preferences
  com.ibm.cic.common.core.preferences.http.proxyEnabled=True,
  com.ibm.cic.common.core.preferences.http.proxyHost=proxy.hostname,
  com.ibm.cic.common.core.preferences.http.proxyPort=proxy_port,
  [com.ibm.cic.common.core.preferences.http.proxyUseSocks=True]

```

## ***Installing a product in console mode***

In addition to the command line interface, IBM Installation Manager provides a prompted “console mode” interface, which you can invoke under the Installation Manager ID with the command:

```
imcl -c
```

(You can optionally add `-secureStorageFile` and `-masterPasswordFile` to point to repository credentials.)

The main panel of the console mode interface looks like this:

```

# imcl -c
=====> IBM Installation Manager
Select:
  1. Install - Install software packages
  2. Update - Find and install updates and fixes to installed software packages
  3. Modify - Change installed software packages
  4. Roll Back - Revert to an earlier version of installed software packages
  5. Uninstall - Remove installed software packages

Other Options:
  L. View Logs
  S. View Installation History
  V. View Installed Packages
  -----
  P. Preferences
  -----
  A. About IBM Installation Manager
  -----
  X. Exit Installation Manager
----->

```

Start by entering P (Preferences), then 1 (Repositories), then D (Add repository), and type in the first repository you wish to use. You can add as many repositories as you like to the list.

Then enter A (Apply) to return to the Preferences table, and select 3 (Files for rollback), then choose 1 (Save files for rollback) to turn caching in the shared resources directory OFF. This panel will also show you the total size of cached files if any, and allow you to select D (Delete saved files) to clear them from the saved resources directory.



Finally, select A (Apply) then R (Return to main menu).

Now if you select 1 (Install software packages), IBM Installation Manager will walk you through the install process, allowing you to choose the package(s) to be installed, the corresponding product level(s), any optional features or languages, corrective service, and installation locations. When all selections have been made, enter I (Install) to perform the install.

Console mode cannot be used in a batch job, but does provide a very simple interface to your Installation Manager, and also allows you to view installed product information and Installation Manager logs.

## ***Uninstalling a product***

To uninstall a software product, enter the `imcl uninstall` command and specify the package name to be uninstalled (no need to provide the version/date/time stamp) and the installation directory:

```
Imcl uninstall com.ibm.websphere.zOS.v85
      -installationDirectory /InstallationManager/products/WebSphere/8.5.5.4
```

The installation directory can be omitted if there is only one installed copy of the package.

In some cases, files such as properties or logs may be left behind after the uninstall, and you may need to delete these files before the installation directory can be re-used for a new product install.

You can also uninstall products with option 5 (Uninstall) in Installation Manager console mode.

If several products are installed into a package group, you must uninstall any dependent products before uninstalling their prerequisites. (If you forget, Installation Manager will list the dependent products and tell you to uninstall them first.)

## **Updating and modifying products with IBM Installation Manager**

The `imcl install` command is used for both new product installs and product updates:

- If Installation Manager already “knows” that the same product is installed in a particular location, then any `imcl install` command pointing to that location is assumed to be a product upgrade rather than a new install.
- If Installation Manager has no products installed in a particular installation directory, then any install to that directory is assumed to be a new product install (and the directory must be empty).
- If you attempt to install a product to an installation directory that is in use, and the new product is not compatible with the existing products at that location, the install will be refused.

You can use the following command to see all installation directories that are known to a particular Installation Manager:

```
Imcl listInstallationDirectories
```

To see what products are installed at a particular installation directory:

```
Imcl listInstalledPackages -installationDirectory <installation directory>
```

To see a list of all installed products:

```
Imcl listInstalledPackages
```

Add the `-long` option to include the installation directory and product level on each line.

Add the `-verbose` option for extensive information about all installed products, or the product(s) in the specified installation directory.

You can also edit and run sample job GIN3LSTI to list all installed packages.

## ***Applying a new product level***

Eventually, you will want to upgrade products to more recent levels. There are three different ways to search for product service:

1. Point a web browser to IBM Fix Central (<http://www.ibm.com/support/fixcentral>) and use the pulldown lists to select the Product Group, Product, Installed Version (your current version, the one you want to upgrade), and the Platform (z/OS). This will display a list of service that can be downloaded and installed: whether fix packs (product levels) or iFixes (corrective service).
2. Issue the `imcl listAvailablePackages` command to the web-based service repository to see what fix packs and iFixes are available; use IBM Fix Central to research them further.
3. Start Installation Manager in console mode and select 2 (Update). This will walk you through the available service in your repository list. In the Preferences under Repositories (1), you can also tell Installation Manager to check the web-based service repository automatically.

Once you find the product level (fix pack) that you want, you can:

- Download the fix pack repository from Fix Central and use it to upgrade an existing product install by issuing the `imcl install` command, pointing to the same installation directory, and including the fix pack repository in your repositories list.
- Apply the appropriate fix pack PTFs to an SMP/E-managed product repository and use the updated repository to upgrade your existing product by issuing the `imcl install` command, pointing to the same installation directory, and including the (updated) SMP/E-managed repository in your repositories list.
- Use option 2 (Update) in Installation Manager console mode to apply product updates.

IBM Installation Manager will examine all currently applied service to the product; uninstall any corrective service; apply the new service level, and reinstall corrective service if necessary. It will also inform you if any problems fixed in the previous level are NOT marked as resolved in the new level as well.

As an alternative to upgrading an existing product install, you can also choose to perform a new product install at the new fix pack level by including the fix pack repository for the desired level in your repositories list.

**NOTE:** IBM Installation Manager does *not* verify the contents of an installation directory when performing a product upgrade. This means that if you forget to mount the product file system at the proper installation directory, or mount the wrong filesystem, the Installation Manager will attempt the upgrade and (generally) fail, leaving the installation directory empty.

If this happens, the Installation Manager's record of the installed product will generally be corrupted, and you will need to uninstall the product at that location then perform a new install. Moral: always double-check that a product is properly mounted before performing a product upgrade.

## ***Applying corrective service***

With IBM Installation Manager, corrective service generally comes in the form of interim fixes, or "iFixes." These are comparable to ++APARs, but are installed with Installation Manager instead of SMP/E.

Each iFix has its own package name, which is generally NOT the same as the package name of the product it updates. (This distinguishes iFixes from fix packs, whose package name is simply a newer level of the base product's name.) Here are some sample iFix names:

```
8.0.0.1-WS-WAS-OS390-IFPM46785.zip
```

```
8.5.5.5-WS-WLP-IFPI39793.zip
```

These fixes can be installed from the web-based service repository, downloaded from Fix Central as zip files, or obtained from IBM Support.

To install a specific iFix from the web-based service repository:

```
imcl install <ifix name>
    -installationDirectory <installation directory>
    -useServiceRepository
    (proxy server options if required)
    -secureStorageFile <secure storage file>
    -masterPasswordFile <master password file> (if needed)
    -acceptLicense
```

**Note:** the `-useServiceRepository` option is a shorthand for specifying the exact URL of a product's service repository in the repositories list. It can be used as long as Installation Manager can clearly determine the product that is being updated, and has access to the internet.

To install a downloaded iFix, place the iFix zip file in a Unix File System directory, and make sure the file can be read by the Installation Manager user ID. Then issue the `imcl` command:

```
imcl install <ifix name>
    -installationDirectory <installation directory>
    -repositories <path and filename of .zip file>
    -acceptLicense
```

It is usually helpful to store the iFix .zip file on your system with a filename that exactly matches the iFix name, plus the .zip suffix:

```
imcl install 8.5.5.5-WAS-WAS-IFPI39793
  -installationDirectory /opt/WebSphere/8.5.5.5
  -repositories
    /InstallationManager/repo/8.5.5.5-WAS-WAS-IFPI39793.zip
  -acceptLicense
```

You can also install iFixes (either all iFixes or all recommended iFixes) during a product install or upgrade by specifying `-installFixes all` or `-installFixes recommended`, and including the web-based service repository for your product in the repositories list.

## ***Modifying product features***

You can use the features option of the `imcl listAvailablePackages` command to see the features list for a particular product:

```
imcl listAvailablePackages -features
  -repositories <repository list>
```

The `imcl listInstalledPackages -verbose` command displays which features are currently installed:

```
imcl listInstalledPackages -verbose
  -installationDirectory <installation directory>
```

To add an optional feature to a product:

```
imcl modify <offering>
  -installationDirectory <installation directory>
  -addFeature <list of feature to be added, separated by commas>
  -repositories <repository list>
```

To remove an optional feature from a product:

```
imcl modify <offering>
  -installationDirectory <installation directory>
  -removeFeature < list of features to be removed, separated by commas>
```

## ***Modifying product languages***

Some products support multiple languages as “language packs.” Refer to the product documentation for a list of supported languages and their Installation Manager keywords.

The `imcl listInstalledPackages -verbose` command displays which languages are currently installed:

```
imcl listInstalledPackages -verbose
  -installationDirectory <installation directory>
```

Look for the word “Translations:”; if language packs are installed, these will be listed.

To add a language pack during product install or upgrade, specify the `cic.selector.nl` property on the `imcl install` command and list the desired pack codes, separated by double commas:

```
-properties cic.selector.nl=de,,zh
```

If you have several properties to include, separate the properties by single commas:

```
-preferences cic.selector.nl=de,,zh,
  com.ibm.cic.common.core.preferences.preserveDownloadedArtifacts=false
```

You can also specify the `cic.selector.nl` property on the `imcl modify` command. Note, however, that the language list applies to all products installed in the same directory; therefore, if you add additional languages, you should include in the repository list the product repositor(ies) for all products in the package group.

**Hint:** Installation Manager console mode provides language choices in the Install, Update, and Modify menus; this generally the easiest way to make language pack choices in an installed product.

## Adding Installation Manager user IDs

If you created an admin-mode Installation Manager, any superuser ID (that is, an ID with `uid=0`) can invoke the Installation Manager. You may need to add the various SAF profile privileges for Unix System Services authorizations described above, and contained in the GIN2ADMN job.

If you created a group-mode Installation Manager ID, you can authorize additional user IDs for the Installation Manager as follows:

- Associate the new user ID with the Installation Manager group. For RACF, this can be done with the TSO CONNECT command:

```
CONNECT userid GROUP(im_group)
```

- Authorize the user ID to the various SAF Unix System Services privileges listed in the **Creating an Installation Manager user ID** topic earlier in this document.
- Make sure the user ID has a read/write HOME directory.

When you invoke a group mode Installation Manager, the *effective* (i.e. current) group of the invoking user ID must match the group that owns the Installation Manager binaries directory. If the Installation Manager group is not the default group for the user ID, you make that group your effective group by:

- Issuing the following Unix System services command before invoking `imcl`:  
`newgrp im_group`
- Adding `GROUP=im_group` to the JOB statement of a batch job that invokes `imcl`.

## Managing local repositories

A local repository is an IBM Installation Manager product repository that you create and manage within your own data center. You can create a local multi-product or multi-level repository with the IBM Packaging Utility, or by building one or more composite repositories.

### ***Why create a local repository?***

If your system does not have direct access to the internet, creating a local repository with all your products and service levels can be easier than managing many downloaded zip files containing individual product, fix pack, and iFix repositories.

A local repository can give you more control over your collection of available products, and may provide performance improvements as well. A local repository can be housed on any computer system, and made available to Installation Managers within your organization via local disk, shared disk, or an FTP or HTTP server.

### ***Installing IBM Packaging Utility***

The IBM Packaging Utility is a supported, no-charge product from IBM that accompanies IBM Installation Manager.

To install IBM Packaging Utility from IBM's web-based repository:

```
imcl install com.ibm.cic.packagingUtility
  -installationDirectory <installation directory>
  -repositories
  http://www.ibm.com/software/repository/com.ibm.cic.packagingUtility
  -secureStoreFile <secure storage file>          (if necessary)
  -masterPasswordField <master password file> (if used to encrypt the secure storage file)
  -sharedResourcesDirectory <shared resources directory>
  -preferences
  com.ibm.cic.common.core.preferences.preserveDownloadedArtifacts=false
  -acceptLicense
```

*additional -preference values if a proxy server is used:*

```
-preferences
  com.ibm.cic.common.core.preferences.http.proxyEnabled=True,
  com.ibm.cic.common.core.preferences.http.proxyHost=proxy.hostname,
  com.ibm.cic.common.core.preferences.http.proxyPort=proxy_port,
  [com.ibm.cic.common.core.preferences.http.proxyUseSocks=True]
```

If you do have direct access to the internet, you can download a repository for IBM Packaging Utility from the Installation Manager downloads page:

<http://www-01.ibm.com/support/docview.wss?rs=0&uid=swg27025142>

You can also install IBM Packaging Utility from IBM Installation Manager in console mode.

The default installation directory for IBM Packaging Utility is:

<Installation Manager binaries directory>/IBM/PackagingUtility

and the Packaging Utility line mode command (PUCL - note that this is all uppercase) can be found in:

<Packaging Utility installation directory>/bin

## ***Creating a local repository***

To create a local repository, simply copy a product from another repository to an empty directory on your system:

```
<Packaging Utility installation directory>/bin/PUCL
  copy <offering>
      -repositories <repository list>
      -target <local repository directory>
      -acceptLicense
```

If you do not specify a version/date/time on the offering, the latest level will be copied. If parts from several repositories are needed, these will be merged into the new repository, and unneeded parts will be dropped. You can copy any combination of products, product levels, and iFixes into a local repository.

You can only copy entire products with IBM Packaging Utility. In other words, if you point PUCL at a repository containing only a product fix pack, then all the other parts needed for the product must already exist in the local repository.

IBM Packaging Utility does provide a good way to extract and keep a range of product levels from an SMP/E-managed repository like the one for WebSphere Application Server for z/OS. The SMP/E-managed repository can only contain the base product plus one fix pack level; use IBM Packaging Utility to copy the current fix pack level into a local repository before applying PTFs for the new fix pack level. (You can use the PUCL delete command, described below, to remove fix pack levels from the local repository once they are no longer needed.)

## ***Working with a local repository***

To view all product levels in your local repository:

```
<Packaging Utility installation directory>/bin/PUCL
  listAvailablePackages -repositories <local repository directory>
```

This command is functionally equivalent to `imcl listAvailablePackages`, and supports the `-long` and `-features` options.

To delete a product level from your local repository:

```
<Packaging Utility installation directory>/bin/PUCL
  delete <offering, with version/date/time stamp>
      -target <local repository directory>
```

Any parts specific to the product level will be removed from the repository. If other versions of the product are in the local repository, any common files are retained.

## **Composite repositories**

You can also logically “combine” several repositories, without merging them, into a **composite repository**. Choose a directory to represent your “combined” repository, and create a file in this directory called `repository.config`:

```
LayoutPolicy=Composite
LayoutPolicyVersion=0.0.0.1
repository.url.1=<url of first repository>
repository.url.2=<url of second repository>
etc.
```

This file must be stored in ASCII (see Appendix B) and accessible to the Installation Manager ID(s) that will use the composite repository.

Include one line in `repository.config` for each repository you want to include in the composite. These can be relative file paths, absolute file paths, or FTP or HTTP URL's. For example:

```
LayoutPolicy=Composite
LayoutPolicyVersion=0.0.0.1
repository.url.1=/downloads/WAS/was.repo.8550.zip
repository.url.2=/downloads/WAS/8.5.5-WS-WAS-OS390-FP000005.zip
repository.url.3=/downloads/WAS/8.5.5.0-WS-WAS-IFPM89423.zip
```

If you put the `repository.config` file in the same directory as a group of download repositories or repository zips, you can use relative URL's. You can also mix types of repositories together.

```
LayoutPolicy=Composite
LayoutPolicyVersion=0.0.0.1
repository.url.1=./was.repo.8550.zip
repository.url.2=./8.5.5-WS-WAS-OS390-FP000005.zip
repository.url.3=./8.5.5.0-WS-WAS-IFPM89423.zip
repository.url.4=http://www.ibm.com/software/repositorymanager/
com.ibm.cic.packagingUtility
```

Once you have created the composite, you can access it from Installation Manager:

```
imcl listAvailablePackages -repositories /path/to/composite/repository
```

Using a composite repository can make it easier to keep your own collection of preventive and corrective service.

## **Maintaining your Installation Manager**

IBM Installation Manager does not require a lot of “care and feeding” once set up properly; here are some general guidelines.



## ***Checking the Installation Manager level***

Issue the following command to display the current level of your Installation Manager:

```
<Installation Manager binaries>/eclipse/tools/imcl -version
```

Issue the following command to display the level of an Installation Manager install kit:

```
<Installation Manager install kit>/tools/imcl -version
```

An install kit can be used to upgrade any Installation Manager that is currently at a lower level.

## ***Backing up your Installation Manager and installed products***

The Installation Manager binaries, appdata, and shared resources are interrelated, and should be backed up together, along with the Installation Manager's installed products.

An admin-mode Installation Manager depends on the presence and contents of a registry file named

```
/etc/.ibm/registry/InstallationManager.dat
```

Be sure to back up this file and copy it to the new /etc directory whenever you upgrade z/OS.

For a user-mode Installation Manager, the registry file is named

```
$USERHOME/etc/.ibm/registry/InstallationManager.dat
```

For both admin-mode and user-mode Installation Managers, remember to include the registry file in your Installation Manager backups. If this file is missing or corrupted, the Installation Manager will not start.

(The corresponding registry file for a group mode Installation Manager is stored inside the Installation Manager's appdata directory,

## ***Upgrading to a new level of IBM Installation Manager***

To upgrade an Installation Manager to a new level:

- Update your install kit to the desired level, by installing a newer Installation Manager PTF to FMID HGIN140, or downloading a new install kit from [ibm.com](http://ibm.com) and unzipping it into an empty directory.
- Mount the updated install kit read/only.
- Reissue the original setup command (`installc`, `userinstc`, or `groupinstc`), with its parameters (`-installationDirectory` and `-dataLocation`) from the new install kit. If you used the GIN2INST job, rerun the same job, making sure that the setup command is invoked from the new install kit.

Reissuing the setup command will copy the new level of Installation Manager binaries from the install kit into the Installation Manager binaries directory, and update the Installation Manager appdata directory

to indicate the new level of Installation Manager. Always run the setup command under the user ID (and group, if group mode) that own the Installation Manager.

## ***Moving an Installation Manager***

It is possible to move or clone an Installation Manager, but the same directories (binaries, appdata, shared resources, and installation directories) must be used on the old and new systems.

When moving or cloning an admin-mode Installation Manager, you must also move or copy the file

```
/etc/.ibm/registry/InstallationManager.dat
```

When moving or cloning a user-mode Installation Manager, you must also move or copy the file

```
$HOME/etc/.ibm/registry/InstallationManager.dat
```

and the user ID must have the same home directory path on the old and new systems.

## **Troubleshooting**

Installation Manager setup fails	<ol style="list-style-type: none"> <li>1. Make sure the user ID running the Installation Manager setup is defined to Unix System Services and has a read/write home directory.</li> <li>2. Make sure the downloaded install kit zip file or PTF was not truncated during download.</li> <li>3. Make sure all required resources in BPXPRMxx are at or above their minimum values.</li> </ol>
Installation Manager won't start	<ol style="list-style-type: none"> <li>1. Make sure you are running under the Installation Manager user ID. For a group-mode Installation Manager, you must be under the proper group.</li> <li>2. Make sure all required resources in BPXPRMxx are at or above their minimum values.</li> <li>3. If logged on to TSO, make sure your login region (SIZE on the TSO login panel) is at least 2096127.</li> <li>4. Make sure both the Installation Manager binaries and appdata are mounted at the proper locations, and accessible to the Installation Manager user ID.</li> <li>5. Make sure the registry file is correct (see below).</li> </ol>
Product installation fails	<ol style="list-style-type: none"> <li>1. Make sure all required repositories are mounted or accessible.</li> <li>2. Use the listAvailablePackages command to make sure that all product parts are present.</li> </ol>

	<ol style="list-style-type: none"> <li>3. Make sure that the installation directory contains sufficient space and can be written to by the Installation Manager user ID.</li> </ol>
Product upgrade fails	<ol style="list-style-type: none"> <li>1. Make sure the proper filesystem for the product being upgraded is mounted at the right location, read/write.</li> <li>2. Make sure all required repositories are mounted or accessible.</li> <li>3. Use the listAvailablePackages command to make sure that all product parts are present.</li> </ol>
Can't connect to a product repository	<ol style="list-style-type: none"> <li>1. For a local repository, make sure the repository filesystem or zip file is mounted and can be read by the Installation Manager user ID.</li> <li>2. For a web-based repository: <ol style="list-style-type: none"> <li>a. Make sure you are at Installation Manager 1.8 or above.</li> <li>b. Check the repository URL for correctness.</li> <li>c. Check your credentials by pointing a web browser to &lt;repository URL/repository.config and entering your credentials manually</li> <li>d. If you are behind a firewall, check that the required proxy is in place, and that your proxy credentials are correct.</li> <li>e. Use the listAvailablePackages command to determine what products, if any, are available from the web-based repository.</li> <li>f. If you have problems connecting to the IBM web-based repository, you can check the repository status here:   <a href="https://rad.ratl.swg.usma.ibm.com/capilano/g10/85515-ibm.html">https://rad.ratl.swg.usma.ibm.com/capilano/g10/85515-ibm.html</a> </li> </ol> </li> </ol>

## Checking the registry file

IBM Installation Manager uses a registry file to connect the Installation Manager binaries, appdata, shared resources, and product directories together.

- a. Go to <Installation Manager binaries>/eclipse/configuration.
- b. Examine the file config.ini, which is in ASCII (see Appendix B). This file should contain the line

```
cic.appdataLocation=<Installation Manager appdata path>
```

Check this path for correctness.

- c. Find the registry file:

```
Admin mode: /etc/.ibm/registry/InstallationManager.dat
User mode:  $HOME/etc/.ibm/registry/InstallationManager.dat
Group mode: <IM appdata>/etc/.ibm/registry/InstallationManager.dat
```

The file is in ASCII (see Appendix B) and should look like the following:

```
location=<Installation Manager binaries>
version=<Installation Manager version>
internalVersion=<Installation Manager version string>
launcher=<Installation Manager binaries>/eclipse/IBMIM
appDataLocation=<Installation Manager appdata>
```

For example:

```
location=/InstallationManager/bin
version=1.7.4.1
internalVersion=1.7.4001.20150326_1351
launcher=/InstallationManager/bin/eclipse/IBMIM
appDataLocation=/InstallationManager/appdata
```

Make sure the file contains the expected values.

## Working with Installation Manager logs

IBM Installation Manager creates a log for each invocation of the imcl command; the logs are in ASCII and stored as files named

```
<Installation Manager appdata>/logs/<date_time_stamp>.xml
```

You can download these files in binary to a workstation, along with the file log.xsl in the same directory, then point a browser to the .xml log file. The browser will use the log.xsl file to format the Installation Manager log and display it.

## Gathering problem determination data

If you contact IBM for assistance with IBM Installation Manager, you should direct your problem to the team supporting the product you are installing or upgrading.

You can be asked to collect problem determination information from your Installation Manager with the `imutilsc exportInstallData` command. See the following document for instructions:

<http://www-01.ibm.com/support/docview.wss?uid=swg21497417>

## Case study 1: WebSphere Application Server Version 8.0 for z/OS

WebSphere Application Server for z/OS Version 8.0 was the first IBM product to be installable on z/OS using IBM Installation Manager.

It consists of the following FMIDs:

HGIN140	IBM Installation Manager install kit
HBBO800	Installation Manager repository for WebSphere Application Server for z/OS V8.0

Each FMID has its own Program Directory. The program directory for HGIN140 shows how to install the Installation Manager install kit into

```
/usr/lpp/InstallationManager/V1R4
```

and create an Installation Manager.

The program directory for HBBO800 shows how to install the WebSphere Application Server for z/OS product repository into

```
/usr/lpp/InstallationManagerRepository/HBB0800
```

and install the various WebSphere Application Server components: the Application Server itself, the NDDMZ Secure Proxy Server, the IBM HTTP Server, and the web server plugins for WebSphere Application Server. Product data set SBBOJCL contains sample jobs to install each component with IBM Installation Manager.

The product repository provided by HBBO800 is actually a composite repository with subdirectories:

```
/usr/lpp/InstallationManagerRepository/HBB0800
  /WAS          - contains Application Server and NDDMZ Secure Proxy service base
                 repository
  /IHS          - contains IBM HTTP Server base repository
  /PLG          - contains web server plugins base repository
```

Applying fix pack PTFs to this repository adds *one* current fix pack level of each component, deleting any previous fix pack levels.

Because this is a composite repository, IBM Installation Manager can be pointed to

```
-repositories /usr/lpp/InstallationManagerRepository/HBB0800
```

to install all components.

Customers can also use the following web-based service repositories to apply preventive service (fix packs) and corrective service (fix packs):

```
http://www.ibm.com/software/repositorymanager/com.ibm.websphere.zOS.v80
http://www.ibm.com/software/repositorymanager/com.ibm.websphere.NDDMZ.zOS.v80
```

<http://www.ibm.com/software/repositorymanager/com.ibm.websphere.IHS.v80>

<http://www.ibm.com/software/repositorymanager/com.ibm.websphere.PLG.zOS.v80>

SMP/E *must* be used to install the base product repository. The web-based repository contains service only.

The WebSphere Application Server component (com.ibm.websphere.zOS.v80) contains three optional features:

Installed by default:           ejbcontainer, thinclient

Not installed by default:       samples

## Case study 2: WebSphere Application Server Version 8.5.5 for z/OS

WebSphere Application Server for z/OS Version 8.5 contained a number of install improvements compare to Version 8.0.

It consists of the following FMIDs:

HGIN140	IBM Installation Manager install kit (PTF for Installation Manager 1.5.2 required)
HBBO850	Installation Manager repository for WebSphere Application Server for z/OS V8.5
HBJA700	Installation Manager repository for IBM Java 7.0 for WebSphere Application Server

As with WebSphere Application Server Version 8.0, separate Program Directories describe the creation of the install kit and two SMP/E-managed product repositories:

```
/usr/lpp/InstallationManager/V1R4  
/usr/lpp/InstallationManagerRepository/HBB0850  
/usr/lpp/InstallationManagerRepository/HBJA700
```

The install kit is used to set up the Installation Manager. The WebSphere Application Server product repository is used to install:

- the Application Server
- the NDDMZ Secure Proxy Server
- IBM HTTP Server
- Web server plugins for WebSphere Application Server
- WebSphere Application Server Liberty Profile (new)

The Java 7 repository is used to install Java 7.0 on top of an existing copy of the Application Server, NDDMZ Secure Proxy Server, or Liberty profile. See the previous case study for the layout of the SMP/E-managed composite repositories.

But SMP/E is not the only way to obtain these repositories:

- Customers can order physical media (DVD's) or electronic DVD images (.iso files) containing zipped repositories for the WebSphere Application Server components as well as Java 7.
- Customers with an entitled customer number can install all WebSphere Application Server Version 8.0 components and Java 7 directly from the web-based server repository.

For information about repositories on physical media, see Appendix A in the WebSphere Application Server Version 8.5.5 Program Directory.

For information about installing the entire product from the web-based repository, see the following technote:

<http://www.ibm.com/support/docview.wss?uid=swg21659636>

A complete set of sample jobs for installation from media or the web-based repository can be downloaded here:

<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD106417>

**With fix pack 8.5.5.2**, a new Java level, Java 7.1, became available. Because of footprint concerns, this Java for WebSphere Application Server is only available as a download from Fix Central, or from the web-based repository.

com.ibm.websphere.IBMJAVA.v71  
com.ibm.websphere.liberty.IBMJAVA.v71

**With fix pack 8.5.5.4**, another new Java level, Java 8.0, became available, but for Liberty only. As with Java 7.1, this Java product is available as a download from Fix Central, or from the web-based repository.

com.ibm.websphere.liberty.IBMJAVA.v80

Also in Fix Pack 8.5.5.4, support was added to IBM Installation Manager to install Liberty profile features. See the WebSphere Application Server for z/OS V8.5 documentation for more details.



## Case study 3: WebSphere Application Server Version 9.0 for z/OS

WebSphere Application Server for z/OS Version 9.0 marked a major change in the way Installation Manager-based products are shipped by IBM. No repository is provided in SMP/E format, to reduce product footprint (which had grown to more than 350,000 tracks in Version 8.5). Instead, a single FMID

HBBO900 Installation Manager sample jobs for WebSphere Application Server for z/OS V9.0 provides a complete set of sample install jobs in target data set SBBOJCL. These sample jobs can also be downloaded here:

<http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD106392>

Both sets of sample jobs have complete instructions for installing the product from the web-based service repository, or from a combination of base product repositories (uploaded from product media) and service repositories (downloaded from Fix Central).

Sample jobs are also provided to apply corrective service (interim fixes, or iFixes) from either the web-based service repository, or downloaded fix files.

For complete installation instructions, see the WebSphere Application Server Knowledge Center:

[https://www.ibm.com/support/knowledgecenter/SS7K4U\\_9.0.0/](https://www.ibm.com/support/knowledgecenter/SS7K4U_9.0.0/)

## Appendix A: Working with zip files on z/OS

The “zip” file compression format is widely use across a range of computer systems. The z/OS operating system, however, does not currently have a native zip/unzip command (though several are available commercially).

Most Installation Manager operations can use repositories in .zip format. However, certain procedures may require you to have access to an unzip capability. Here are some options.

### ***Install an unzip command from the IBM Unix System Services Ported Tools page***

The IBM Unix System Services ported tools page at

<http://www-03.ibm.com/systems/z/os/zos/features/unix/bpxa1ty1.html>

has zip and unzip command that you can download and run on z/OS. Select **unzip** to retrieve a file named `unzip-5.2.2.tar.Z`; transfer this file in binary to your z/OS system and issue the commands:

```
pax -zrvf unzip-5.2.2.tar.Z
```

This will extract the unzip binary. Use the `chmod` command if necessary to make the unzip command world-readable:

```
chmod 755 unzip
```

To unzip a particular file, change to the directory you want to unzip into, and issue the unzip command:

```
cd /directory/to/unzip/into
/path/to/unzip/command/unzip zip_file_name
```

and the contents of the zip file will be uncompressed into the current directory.

### ***Use the jar command to uncompress .zip files***

Java .jar files use the same basic file compression format as .zip files. So if you have a Java SDK available on z/OS. You can use the jar command to extract the contents of a .zip file into the current directory:

```
/usr/lpp/java/J1.7/jar -xvf zip_file_name
```

**Note:** the jar command does not preserve file permissions or extended attributes, and it does not support symbolic links. If you use the jar command to unzip files, you may need to manually set file permissions or extended attributes on the extracted files.

## Appendix B: Working with ASCII files on z/OS

Under z/OS, IBM Installation Manager requires certain files to be in the ASCII character set rather than the EBCDIC character set commonly used on z/OS.

If you have created a Unix System Services file and wish to create a new file with the same contents in ASCII, you can issue the following shell command:

```
iconv -f IBM-1047 -t ISO8859-1 input_file > output_file
```

To create an EBCDIC copy of an ASCII file:

```
iconv -f ISO8859-1 -t IBM-1047 input_file > output_file
```

If a file is already in ASCII, you can tag it to indicate the character set with the following command:

```
chtag -t -c iso8859-1 ascii_file
```

Once a file has been tagged, you can turn on automatic codepage conversion with the shell command:

```
export _BPXK_AUTOCVT=ON
```

When you edit the tagged file with OEDIT, or display it with the cat shell command, it will be displayed in EBCDIC.

## Appendix C: The Installation Manager web interface

IBM Installation Manager Version 1.8 includes a web interface that allows you to invoke Installation Manager on z/OS from a web browser running on another system.

**Note that the web interface is NOT enabled for all software products;** for example, it cannot be used to install WebSphere Application Server for z/OS. But even if your product is not enabled for the web interface, you can still use it to explore available and installed products, and look at Installation Manager logs.

To start the Installation Manager web interface:

1. Log in to the Unix System Services shell under the Installation Manager user ID.
2. Change to the **eclipse/web** subdirectory of the Installation Manager binaries directory:

```
cd /InstallationManager/bin/eclipse/web
```

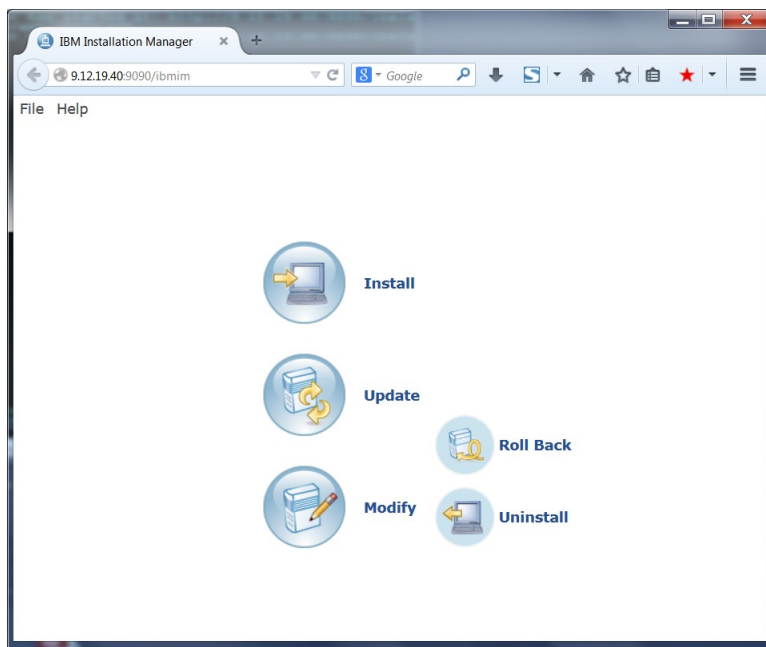
3. Issue the **ibmim-web** command:

```
ibmim-web
```

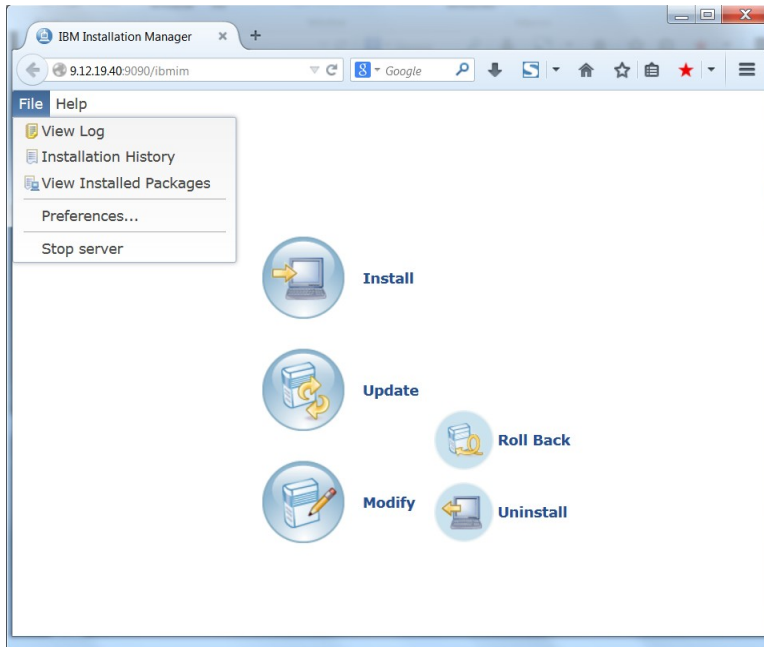
When the web interface starts, you should see a message like the following:

IBM Installation Manager web server has started at: <http://9.12.19.40:9090/ibmim>

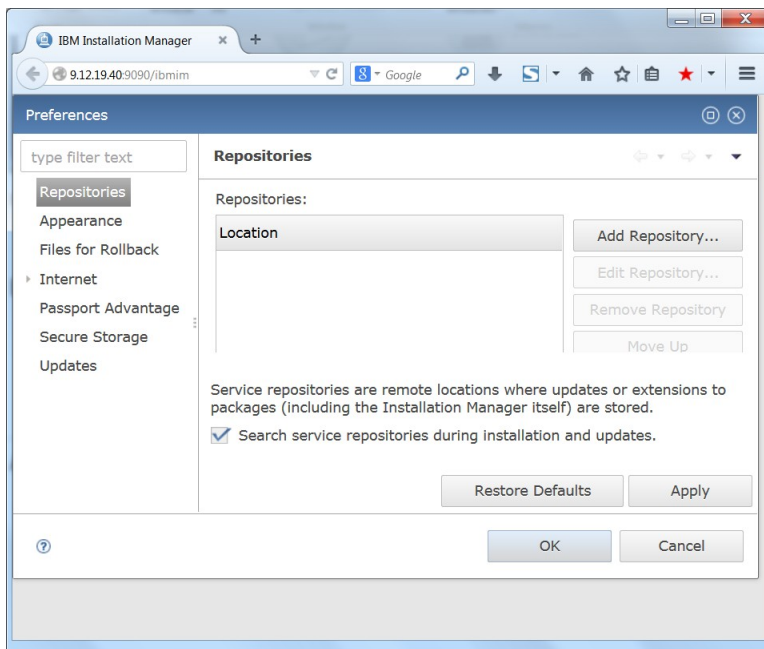
Point a web browser at the indicated URL on your z/OS system, and you should see the following:



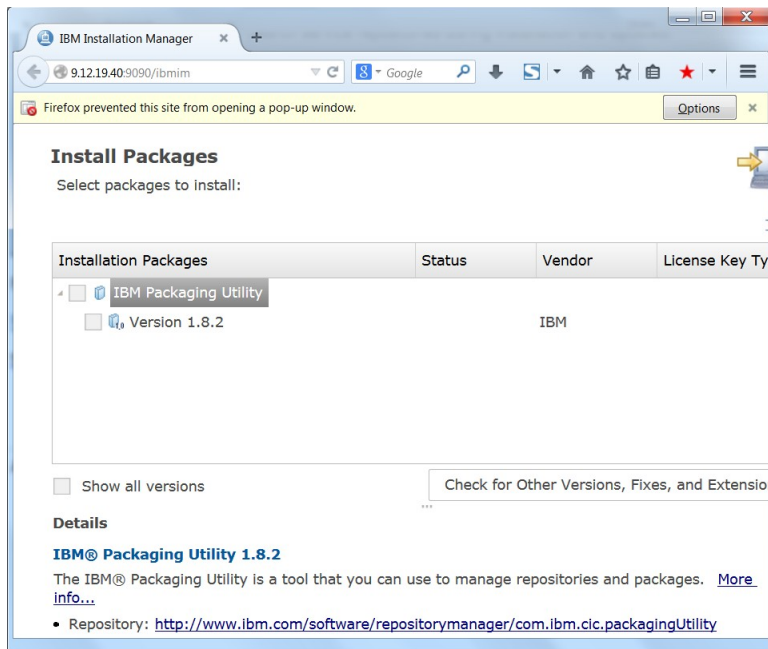
If you click on **File**, in the upper left, you can view installed packages and Installation Manager logs (as well as stop the server when you are done).



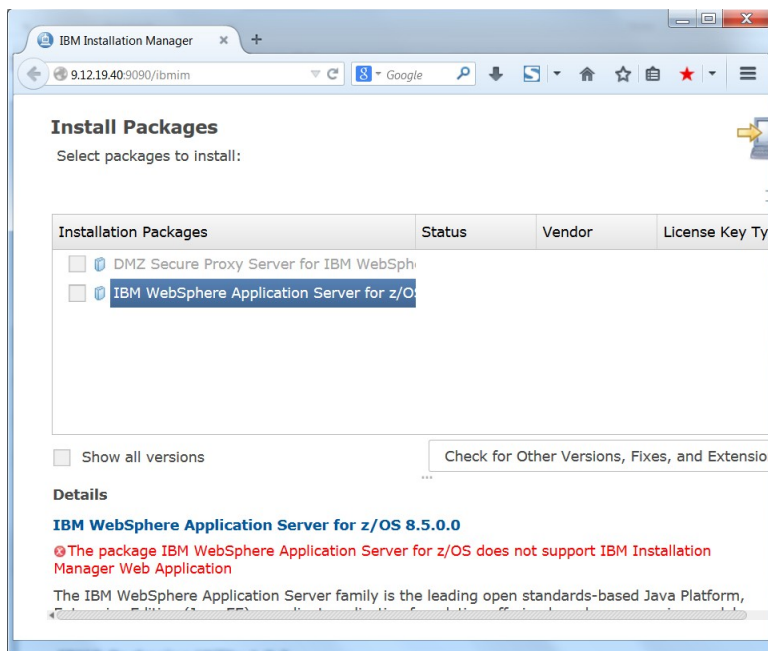
If you select **Preferences**, you can edit your repository list and set various internet options.



From the main panel, you can install, update, modify, and uninstall products. For example, if you add <http://www.ibm.com/software/repositorymanager/com.ibm.cic.packagingUtility> to your repository list, then select **Install** from the main panel, this is what you should see:



If, on the other hand, a product is not enabled for the web interface, you will receive an error message like the one shown here in red:



To shut down the server, select **File > Stop server** in the browser session.

The primary drawback to the Installation Manager web interface is security. By default, no credentials are required for login, so we do not recommend the use of the web interface without the **-secure** option:

```
ibmim-web -secure
```

which will prompt you for a server password which must be specified in the browser when logging in.

For more information about the Installation Manager web interface, see:

[http://www-01.ibm.com/support/knowledgecenter/SSDV2W\\_1.8.2/com.ibm.cic.agent.console.doc/topics/c\\_web\\_work\\_web\\_browser.html](http://www-01.ibm.com/support/knowledgecenter/SSDV2W_1.8.2/com.ibm.cic.agent.console.doc/topics/c_web_work_web_browser.html)

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