10.0

Installing and migrating IBM MQ

Note

Before using this information and the product it supports, read the information in “Notices” on page 509.

This edition applies to version 9 release 4 of IBM® MQ and to all subsequent releases and modifications until otherwise indicated in new editions.

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Installing and migrating

You perform a range of tasks to install, uninstall, maintain, and migrate IBM MQ. These tasks are platform-specific where needed.

About this task

To get started with installing and migrating IBM MQ, see the following topics.

Procedure

- “Installing and uninstalling IBM MQ” on page 5
- “Maintaining and migrating IBM MQ” on page 287

Installing and uninstalling IBM MQ

Before you start installing IBM MQ, consider how you want to use it. Use these topics to help you to prepare for installation, install the product, and verify the installation. There is also information to help you to uninstall the product.

About this task

To get started with installing IBM MQ, see the topics for the platforms that your enterprise uses. For concepts and considerations relating to installation, see “IBM MQ installation overview” on page 6.

You can also apply and remove maintenance to IBM MQ. See “Applying maintenance to IBM MQ” on page 291.

Attention: The information in this section applies to both Continuous Delivery (CD) and Long Term Support (LTS) releases.

Any information that applies specifically to an LTS or CD release is marked with the appropriate icon.

ALW For tutorials to help you with installing and upgrading, see A collection of tutorials for installing and upgrading IBM MQ on AIX®, Linux®, and Windows. The tutorials cover:

- Preparing a host for IBM MQ.
- Downloading the IBM MQ code.
- Installing and uninstalling the IBM MQ code, and applying fix packs.
- Upgrading from one version of IBM MQ to another, and moving a queue manager from one host to another.

Procedure

1. To find information on installing IBM MQ, see the appropriate sections for the platform, or platforms, that your enterprise uses:
   - AIX “Installing and uninstalling IBM MQ on AIX” on page 34
   - Linux “Installing IBM MQ on Linux using rpm” on page 108
   - Windows “Installing and uninstalling IBM MQ on Windows” on page 156
   - z/OS “Installing IBM MQ for z/OS” on page 268

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2. To find out about concepts and considerations relating to installation, see “IBM MQ installation overview” on page 6.

IBM MQ installation overview

An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

Related concepts

“Multiple installations on AIX, Linux, and Windows” on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

“Installation considerations for IBM MQ Telemetry” on page 248
IBM MQ Telemetry is a component of the main IBM MQ product. You can choose to install IBM MQ Telemetry when you first install IBM MQ, or when you modify an existing IBM MQ installation.

“Managed File Transfer product options” on page 240
Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. These options are Managed File Transfer Agent, Managed File Transfer Service, Managed File Transfer Logger, or Managed File Transfer Tools.

Related tasks

“Maintaining and migrating IBM MQ” on page 287
Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

Installing Advanced Message Security
Use the information for your platform to guide you through installing the Advanced Message Security (AMS) component.

IBM MQ components and features

You can select the components or features that you require when you install IBM MQ.

Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. For more information, see “License requirements” on page 8 and IBM MQ license information.

Also review the information on hardware and software requirements for the platform on which you are planning to install IBM MQ. For more information, see “Where to find product requirements and support information” on page 11.

Installation of IBM MQ on Multiplatforms

IBM MQ can be installed as a server or a client. The installation images can be downloaded. See “Where to find downloadable installation images” on page 12.

Separate client eImages are no longer available for downloading from Passport Advantage. Instead, you can either get the client eImage from inside the main IBM MQ server eImage, which includes the server and client, or you can download the IBM MQ client components from Fix Central. Follow the links in Resource adapter, clients and other resources.

An IBM MQ server is an installation of one or more queue managers that provide queuing services to one or more clients. All the IBM MQ objects, for example queues, exist only on the queue manager machine (the IBM MQ server machine), and not the client. An IBM MQ server can also support local IBM MQ applications.

An IBM MQ MQI client is a component that allows an application running on one system to communicate with a queue manager running on another system. The output from the call is sent back to the client, which passes it back to the application.

For detailed explanations of all the components that you can install, see:

- AIX "IBM MQ components for AIX systems" on page 35
- IBM i "IBM MQ components for IBM i" on page 64
- Linux "IBM MQ rpm components for Linux systems" on page 108
- Linux "IBM MQ Debian components for Linux Ubuntu systems" on page 126
- Windows "IBM MQ features for Windows systems" on page 156

For information about how to install IBM MQ on each supported platform, see the links in the following table:

Table 1. Where to find IBM MQ installation information for each platform

Platform	IBM MQ server	IBM MQ client
AIX AIX	"Installing IBM MQ server on AIX" on page 45	"Installing an IBM MQ client on AIX" on page 49
IBM i IBM i	"Installing IBM MQ server on IBM i" on page 68	"Installing an IBM MQ client on IBM i" on page 80
Linux Linux	"Installing the first IBM MQ installation on Linux using the rpm command" on page 112	"Installing an IBM MQ client on Linux using rpm" on page 120
Linux Linux	"Installing an IBM MQ server on Linux Ubuntu using Debian packages" on page 130	"Installing an IBM MQ client on Linux Ubuntu using Debian packages " on page 135
Windows Windows	"Installing IBM MQ server on Windows" on page 174	"Installing an IBM MQ client on Windows" on page 200

MQ Adv. For more information about installing IBM MQ Advanced for Multiplatforms, see "Installing IBM MQ Advanced for Multiplatforms" on page 232.

Note: HPE NonStop V8.1 Up to and including IBM MQ 8.0, IBM WebSphere® MQ for HP NonStop Server was also a component platform. Since then, this component has been supplied and supported separately as IBM MQ for HPE NonStop V8.1, which provides IBM MQ on HPE NonStop L-series platforms. The documentation is here: IBM MQ for HPE NonStop V8.1.

Installing IBM MQ clients and servers

Multi

A client can be installed on its own, on a separate machine from the base product and server. It is also possible to have both a server and a client installation on the same system.

To install an IBM MQ client on a system that is already running an IBM MQ server, you must use the appropriate Server eImage downloaded from Passport Advantage. See "Where to find downloadable installation images" on page 12.

Separate client eImages are no longer available for downloading from Passport Advantage. Instead, you can either get the client eImage from inside the main IBM MQ server eImage, which includes the server and client, or you can download the IBM MQ client components from Fix Central. Follow the links in Resource adapter, clients and other resources.

Even if your client and server are installed on the same system, you must still define the MQI channel between them. See Defining MQI channels for details.

Advanced Message Security, Managed File Transfer, IBM MQ Telemetry, and Replicated data queue managers (RDQM)

Advanced Message Security, Managed File Transfer, IBM MQ Telemetry, and RDQM are separately installed components of IBM MQ. Make sure that you purchase a license for using IBM MQ Advanced before installing any of these components (see IBM MQ license information). See “Installing IBM MQ Advanced for Multiplatforms” on page 232 for installation instructions.

Installation of IBM MQ on z/OS

z/OS

For information on installation options for IBM MQ for z/OS, see “Installing IBM MQ for z/OS” on page 268.

For information on installation options for IBM MQ Advanced for z/OS, see “Installing IBM MQ Advanced for z/OS” on page 278.

MQ Adv. VUE For information on installation options for IBM MQ Advanced for z/OS Value Unit Edition, see “Installing IBM MQ Advanced for z/OS Value Unit Edition” on page 279.

Related concepts

“Planning considerations for installation on Multiplatforms” on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

“Where to find downloadable installation images” on page 12
You download installation images for IBM MQ from Passport Advantage, Fix Central, or (for z/OSsystems) the ShopZ website. A number of IBM MQ components including fix packs, CSUs, clients, and the resource adapter are also available for downloading from Fix Central and elsewhere.

License requirements

You must have purchased sufficient licenses for your installation. The details of the license agreement is stored on your system at installation time so that you can read it at any time. IBM MQ supports IBM License Metric Tool (ILMT).

Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. See IBM MQ license information for more details.

License files

At installation, the license agreement files are copied into the `/licenses` directory under the *MQ_INSTALLATION_PATH*. You can read them at any time.

IBM i On IBM i, you can use the WRKSFWAGR command to view the software licenses.

If you have installed a trial license, follow the instructions for converting a trial license on the platform, or platforms, your enterprise uses.

ILMT

ILMT automatically detects IBM MQ, if you are using it, and checks with it each time a queue manager is started. You do not need to take any further action. You can install ILMT before or after IBM MQ.

The automatic detection applies to both the IBM MQ server and IBM MQ Java products.

Related concepts

“Hardware and software requirements on Linux systems” on page 95
Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

“Hardware and software requirements on IBM i systems” on page 65

Check that the server environment meets the prerequisites for installing IBM MQ for IBM i.

“Hardware and software requirements on Windows systems” on page 166
Check that the server environment meets the prerequisites for installing IBM MQ for Windows and install any prerequisite software that is missing from your system.

Related tasks

“Checking requirements on Windows” on page 166
Before you install IBM MQ on Windows, you must check for the latest information and system requirements.

“Accepting the license on IBM MQ for Linux” on page 107
You can choose to accept the license before or after installing the product on Linux platforms.

AIX *Converting a trial license on AIX*

Convert a trial license to a full license without reinstalling IBM MQ.

When the trial license expires, the "count-down" displayed by the **strmqm** command informs you the license has expired, and the command does not run.

Before you begin

1. IBM MQ is installed with a trial license.
2. You have access to the installation media of a fully licensed copy of IBM MQ.

About this task

Run the **setmqprd** command to convert a trial license to a full license.

If you do not want to apply a full license to your trial copy of IBM MQ, you can uninstall it at any time.

Procedure

1. Obtain the full license from the fully licensed installation media.

   The full license file is `amqpcert.lic`. On AIX, it is in the */MediaRoot*`/licenses` directory on the installation media.
2. Run the **setmqprd** command from the installation that you are upgrading:

   ```
   MQ_INSTALLATION_PATH/bin/setmqprd /MediaRoot/licenses/amqpcert.lic
   ```

Related reference

setmqprd

IBM i *Converting a trial license on IBM i*

Convert a trial license to a full license without reinstalling IBM MQ.

When the trial license expires, the "count-down" displayed by the **strmqm** command informs you the license has expired, and the command does not run.

Before you begin

1. IBM MQ is installed with a trial license.
2. You have access to the installation media of a fully licensed copy of IBM MQ.

About this task

Run the **setmqprd** command to convert a trial license to a full license.

If you do not want to apply a full license to your trial copy of IBM MQ, you can uninstall it at any time.

Procedure

1. Obtain the full license from the fully licensed installation media.

   The full license file is `amqpcert.lic`.
2. Run the **setmqprd** command from the installation that you are upgrading:

   ```
   CALL PGM(QMQM/SETMQPRD) PARM('LICENSE_PATH/amqpcert.lic')
   ```

   where *LICENSE_PATH* is the path to the `amqpcert.lic` file that you obtained.

Related reference
setmqprd

Linux *Converting a trial license on Linux*

Convert a trial license to a full license without reinstalling IBM MQ.

When the trial license expires, the "count-down" displayed by the **strmqm** command informs you the license has expired, and the command does not run.

Before you begin

1. IBM MQ is installed with a trial license.
2. You have access to the installation media of a fully licensed copy of IBM MQ.

About this task

Run the **setmqprd** command to convert a trial license to a full license.

If you do not want to apply a full license to your trial copy of IBM MQ, you can uninstall it at any time.

Procedure

1. Obtain the full license from the fully licensed installation media.

   The full license file is `amqpcert.lic`. On Linux, it is in the */MediaRoot*`/licenses` directory on the installation media.
2. Run the **setmqprd** command from the installation that you are upgrading:

   ```
   MQ_INSTALLATION_PATH/bin/setmqprd /MediaRoot/licenses/amqpcert.lic
   ```

Related reference
setmqprd

Windows *Converting a trial license on Windows*

Convert a trial license to a full license without reinstalling IBM MQ.

When the trial license expires, the "count-down" displayed by the **strmqm** command informs you the license has expired, and the command does not run.

Before you begin

1. IBM MQ is installed with a trial license.
2. You have access to the installation media of a fully licensed copy of IBM MQ.

About this task

Run the **setmqprd** command to convert a trial license to a full license.

If you do not want to apply a full license to your trial copy of IBM MQ, you can uninstall it at any time.

Procedure

1. Obtain the full license from the fully licensed installation media.

   The full license file is `amqpcert.lic`. On Windows it is in the `\`*`MediaRoot`*`\licenses` directory on the installation media. It is installed into the `bin` directory on the IBM MQ installation path.
2. Run the **setmqprd** command from the installation that you are upgrading:

```
MQ_INSTALLATION_PATH\bin\setmqprd \MediaRoot\licenses\amqpcert.lic
```

Related reference

setmqprd

Where to find product requirements and support information

Before you install IBM MQ, you must check for the latest information and system requirements.

You can consult the following sources to check that you have the information that you need to help you with planning your installation, including information on hardware and software requirements:

IBM MQ System Requirements website
: For details of the supported operating systems, and the prerequisites, supported software, and hardware requirements for each supported operating system, go to the System Requirements for IBM MQ website and follow the links to the Detailed System Requirements report for the version of IBM MQ that you are installing. You can select a report for a specific operating system or for a specific component. In both cases, there are separate reports for Long Term Support and Continuous Delivery.

Product readme file
: The product readme file includes information about last minute changes and known problems and workarounds. The latest version is available at the IBM MQ, WebSphere MQ, and MQSeries® product readmes web page. Always check to see that you have the latest version of the product readme file.

Support information
: The IBM MQ support web page is regularly updated with the latest product support information. For example, if you are migrating from an earlier version, look under the heading *Solve a problem* for the document *Problems and solutions when migrating*.

Related concepts

“IBM MQ installation overview” on page 6
An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

“Hardware and software requirements on AIX systems” on page 39
Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

“Hardware and software requirements on IBM i systems” on page 65
Check that the server environment meets the prerequisites for installing IBM MQ for IBM i.

“Hardware and software requirements on Linux systems” on page 95
Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

“Hardware and software requirements on Windows systems” on page 166
Check that the server environment meets the prerequisites for installing IBM MQ for Windows and install any prerequisite software that is missing from your system.

Related tasks

“Applying maintenance to IBM MQ” on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

“Installing IBM MQ for z/OS” on page 268

Installation tasks that are associated with installing IBM MQ on z/OS systems are grouped in this section.

Where to find downloadable installation images

You download installation images for IBM MQ from Passport Advantage, Fix Central, or (for z/OSsystems) the ShopZ website. A number of IBM MQ components including fix packs, CSUs, clients, and the resource adapter are also available for downloading from Fix Central and elsewhere.

Note: This topic gives background information on the various types of downloadable images, and the various sites from which you can download them. If you are already familiar with this information, and are ready to download the latest images, go to Downloading IBM MQ 10.0 then click the **CD** tab for the latest Continuous Delivery release or Cumulative Security Update (CSU), or the **LTS** tab for the latest Long Term Support fix pack or CSU.

Passport Advantage (for multiplatforms releases)

Multi There are two Passport Advantage offerings. Passport Advantage is designed for larger enterprises and enterprises with multiple sites. Passport Advantage Express is designed for smaller enterprises and single-site enterprises.

See the Passport Advantage and Passport Advantage Express website for further information on how you:

- Acquire new IBM software licenses.
- Renew Software Subscription and Support and Fixed Term Licenses.
- Buy and renew technical support for some Selected Open Source and other non-warranted applications.
- Subscribe to IBM SaaS offerings and acquire IBM Appliances.

You download IBM MQ Server eAssemblies for the full release on all supported platforms from Passport Advantage. The eImages that make up the full release can be downloaded individually if you do not need the full release.

The initial release is IBM MQ 10.0.0. For LTS users, it brings you up to date with the new functions that were incrementally added into IBM MQ 9.4 by the CD releases. For CD users, it is the next CD release after IBM MQ 9.4.5.

A free 90-day trial version of the LTS release, for each of the last two IBM MQ major versions, is available for download here: https://www.ibm.biz/ibmmqtrial. This is useful if you want to try out IBM MQ, or if you are waiting for a full version purchase to complete. When your purchase completes, you can convert your trial installation to a full production copy.

Separate client eImages are no longer available for downloading from Passport Advantage. Instead, you can either get the client eImage from inside the main IBM MQ server eImage, which includes the server and client, or you can download the IBM MQ client components from Fix Central. Follow the links in Resource adapter, clients and other resources.

Linux MQ Adv. CD Also available from Passport Advantage (subject to entitlement) is the IBM Aspera faspio Gateway.

Note: Linux MQ Adv. CD Prior to 1Q 2023, non-install images for building your own IBM MQ queue manager container images were available from Passport Advantage. These images are now available on Fix Central. Follow the link in Resource adapter, clients and other resources.

For more information and download links, go to Downloading IBM MQ 10.0 then select the CD or LTS tab.

Fix Central (for Multiplatforms Fix Packs and CSUs)

Multi You download IBM MQ for Multiplatforms Fix Packs and CSUs from Fix Central. For more information and download links, go to Downloading IBM MQ 10.0, then select the CD or LTS tab.

Shopz (for z/OS releases and fixes)

z/OS IBM MQ for z/OS downloads are available from the Shopz website. You have two options:

- Order the features as a new product installation.
- Apply PTFs to a previously installed release.

For more information and download links, go to Downloading IBM MQ 10.0, then select the CD or LTS tab.

For complete information on IBM MQ for z/OS product packaging, see the Release For Announcement (RFA) on the IBM Offering Information site.

Resource adapter, clients and other resources

Multi A number of IBM MQ resources are also made available on Fix Central and elsewhere.

Clients:

- IBM MQ C and .NET clients
- IBM MQ Message Service Client (XMS) for C/C++ (IA94 SupportPac) and IA94 SupportPac documentation (1 book)
- IBM MQ Java / JMS client
- IBM MQ Java client components (on Maven)
- IBM MQ redistributable clients
- IBM MQ Resource Adapter - For use with any Java EE 7 or Jakarta EE compliant application server
- IBM MQ redistributable Managed File Transfer (MFT) Agents
- IBM MQ classes for .NET Standard (on NuGet)
- IBM MQ classes for XMS .NET Standard (on NuGet)

Components:

- IBM MQ Internet Pass-Thru (MQIPT)
- IBM MQ Explorer stand-alone install image - CD only, but can be used to perform administration on any supported release of IBM MQ.
- IBM MQ Native HA on AWS
- IBM MQ Kafka Connectors
- IBM MQ Web Server stand-alone install image
- IBM Instana® Tracing Exit for IBM MQ

Containers:

- Prebuilt: IBM MQ Advanced Container (subject to entitlement).
- Build your own: https://github.com/ibm-messaging/mq-container. This works in conjunction with the non-install (unzippable) IBM MQ images to build an IBM MQ container image that can run under the Red Hat® OpenShift® `anyuid` security context constraint (SCC).
  - For production environments the three non-install images for Linux (subject to entitlement) are available here:
    - IBM MQ Advanced non-install images for Linux
  - For development environments the non-install packages can be found at the following locations:
    - IBM MQ Advanced for Developers non-install image for Linux x86-64
    - IBM MQ Advanced for Developers non-install image for Linux PPCLE
    - IBM MQ Advanced for Developers non-install image for Linux systemZ
    - IBM MQ Advanced for Developers non-install image for Linux ARM64

  - A sample helm chart is available here: https://github.com/ibm-messaging/mq-helm

Development:

- IBM MQ Advanced for Developers is available for the Windows and Linux platforms listed in the IBM MQ 10.0 system requirements, running on x86-64 architectures. Also available (as-is, see the readme) is a 32-bit version for Raspberry Pi. Download from the following locations: Windows / Linux / Ubuntu / Raspberry Pi
- The IBM MQ Mac Toolkit for Development allows the execution of IBM MQ commands (for example MQSC commands) on macOS devices (both ARM64 and x86-64). It also contains client libraries that facilitate the development of macOS client applications that are executed on macOS devices (both ARM64 and x86-64). The client is used in the Get started with IBM MQ tutorials.
- A pre-built IBM MQ Advanced for Developers container image is available from the IBM Container Registry. It runs on Linux/x86-64. Or you can build your own container image to run on ARM64 and x86-64 architectures.

SupportPacs

IBM MQ SupportPacs provide downloadable code and documentation that complements the IBM MQ family of products. Each SupportPac supplies a particular function or service that can be used with one or more of the IBM MQ products.

- SupportPacs for IBM MQ and other project areas
- IBM MQ - SupportPacs by Product

Related concepts

“IBM MQ code signatures” on page 14
For IBM MQ 10.0, downloadable `.zip`, and `.tar.gz` files are signed. Installable `.rpm` and `.deb` files are also signed. Where possible the signature is embedded in the file. For file formats that do not allow this, a separate `.sig` file is made available containing the signatures and the public keys to verify them.

“IBM MQ components and features” on page 6
You can select the components or features that you require when you install IBM MQ.

Related tasks

Downloading IBM MQ classes for .NET Standard from the NuGet repository

Downloading IBM MQ classes for XMS .NET Standard from the NuGet repository

Related reference

IBM MQ license information

Related information

IBM MQ downloads for developers

IBM MQ code signatures

For IBM MQ 10.0, downloadable `.zip`, and `.tar.gz` files are signed. Installable `.rpm` and `.deb` files are also signed. Where possible the signature is embedded in the file. For file formats that do not allow this, a separate `.sig` file is made available containing the signatures and the public keys to verify them.

IBM MQ public certificates, checksums, pgp key and `.sig` files can be downloaded from the extra download packages at https://ibm.biz/mq10signatures.

*.zip files

IBM MQ deliverables in `.zip` file form contain an embedded digital signature that can be verified by using a recent Java Development Kit (JDK) as shown in the following example:

```
jarsigner -certs -verify 10.0.0.0-IBM-MQC-Redist-Java.zip
    jar verified.
```

Note: More details, including the signer, can be found by running with the verbose option.

*.tar.gz files

IBM MQ deliverables in `*.tar.gz` file form are signed by IBM MQ and their digital signatures are provided in the extra downloadable package. To verify a file's signature, use **openssl** as shown in the following example for `10.0.0.0-IBM-MQC-Redist-LinuxX64.tar.gz`:

```
openssl dgst -sha256 -verify ibm_mq_public.pem -signature 10.0.0.0-IBM-MQC-Redist-
LinuxX64.tar.gz.sig 9.3.0.0-IBM-MQC-Redist-LinuxX64.tar.gz
Verified OK
```

*.rpm

The IBM-provided RPMs are signed with a digital signature, and systems will not recognize the signing key without it being authorized. Obtain the IBM MQ public signing gpg key from the extra downloadable package and install it into rpm. This only needs to be done once per system.

```
rpm --import ibm_mq_public.pgp
```

The validity of any of the IBM MQ RPMs can then be verified, for example:

```
# rpm -Kv MQSeriesRuntime-10.0.0-0.x86_64.rpm
MQSeriesRuntime-10.0.0-0.x86_64.rpm:
    Header V3 RSA/SHA256 Signature, key ID 0209b828: OK
    Header SHA1 digest: OK
    V3 RSA/SHA256 Signature, key ID 0209b828: OK
    MD5 digest: OK
```

Note: If you skip this step, then a harmless warning might be issued during RPM installation to indicate there is a signature but the system does not recognize the signing key, for example:

```
warning: MQSeriesRuntime-10.0.0-0.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID 0209b828:
NOKEY
```

*.deb

The IBM provided debian type packages are signed with an embedded digital signature. To verify a package you will need the IBM MQ public signing gpg key from the additional package, and the "debsigs" operating system package installed.

1. Import the gpg key and identify its gpg key value:

   ```
   # gpg --import ibm_mq_public.pgp
   gpg: keybox '/root/.gnupg/pubring.kbx' created
   gpg: /root/.gnupg/trustdb.gpg: trustdb created
   gpg: key D2D53B4E0209B828: public key "IBM MQ signing key <psirt@us.ibm.com>" imported
   gpg: Total number processed: 1
   gpg:               imported: 1
   ```

   From this, the key value would be `D2D53B4E0209B828` and the certificate alias would be "`IBM MQ signing key <psirt@us.ibm.com>`". The following instructions use those values – replace them with the ones calculated from your import.

2. Export the certificate alias into the system keyrings:

   ```
   mkdir /usr/share/debsig/keyrings/D2D53B4E0209B828/
   cd /usr/share/debsig/keyrings/D2D53B4E0209B828/
   gpg --output IBMMQ.bin --export "IBM MQ signing key <psirt@us.ibm.com>"
   ```

3. Set up the system to enable a signing policy for this key:

   ```
   mkdir /etc/debsig/policies/D2D53B4E0209B828/
   cd /etc/debsig/policies/D2D53B4E0209B828/
   ```

Create a file called `IBM-MQ.pol` in this directory with the following contents. Note that only the 'id' fields need changing to the key value from step 1.

```
<?xml version="1.0"?>
<!DOCTYPE Policy SYSTEM "https://www.debian.org/debsig/1.0/policy.dtd">
<Policy xmlns="https://www.debian.org/debsig/1.0/">
  <Origin Name="IBM MQ signing key" id="D2D53B4E0209B828" Description="IBM MQ signing key"/>
  <Selection>
    <Required Type="origin" File="IBMMQ.bin" id="D2D53B4E0209B828"/>
  </Selection>
  <Verification MinOptional="0">
    <Required Type="origin" File="IBMMQ.bin" id="D2D53B4E0209B828"/>
  </Verification>
</Policy>
```

4. Validate packages individually using the debsig-verify utility:

```
# debsig-verify ibmmq-runtime_10.0.0.0_amd64.deb
debsig: Verified package from 'IBM MQ signing key' (IBM MQ signing key)
```

Note: Whilst it is possible to configure dpkg to verify signatures during installation, this is not advisable as it will cause dpkg to reject the installation of unsigned Debian files.

Related tasks

"Installing the first IBM MQ installation on Linux using the rpm command" on page 112
You can install an IBM MQ server on a 64-bit Linux system using rpm. The instructions in this topic are for the first installation of IBM MQ on a Linux system.

"Installing an IBM MQ client on Linux using rpm" on page 120
Installing an IBM MQ client on a 64 bit Linux system.

"Installing IBM MQ on Linux Red Hat using dnf" on page 122
You can install IBM MQ on Linux Red Hat by using the `dnf` installer.

Multi Planning considerations for installation on Multiplatforms

Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

Before you start installing, consider how you want to use IBM MQ and review the information in this section, and also the information in the general Planning section.

When planning your installation, make sure that you check the hardware and software requirements for your system. For more information, see "Where to find product requirements and support information" on page 11.

Note: z/OS This information is about planning an installation on IBM MQ for Multiplatforms. For information about planning an installation on z/OS, see "Planning to install IBM MQ for z/OS" on page 271.

ALW *Installation name on AIX, Linux, and Windows*

Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

You can choose the installation name and make it meaningful to you. For example, you might call a test system *testMQ*.

If you do not specify an installation name when the product is installed, a default installation name is automatically assigned. For the first installation, this name is *Installation1*. For the second installation, the name is *Installation2*, and so on. The installation name cannot be changed after the product is installed.

Linux AIX On AIX and Linux systems, the first IBM MQ installation is automatically given an installation name of *Installation1*.

Note: For subsequent installations, you can use the **crtmqinst** command to set the installation name before installing the product.

Windows On Windows systems, you can choose the installation name during the installation process.

The installation name can be up to 16 bytes and must be a combination of alphabetic and numeric characters in the ranges a-z, A-Z, and 0-9. You cannot use blank characters. The installation name must be unique, regardless of whether uppercase or lowercase characters are used. For example, the names `INSTALLATIONNAME` and `InstallationName` are not unique.

You can find out what installation name is assigned to an installation in a particular location using the **dspmqinst** command.

Installation descriptions

Each installation can also have an installation description. This description can give more detailed information about an installation in cases where the installation name cannot provide enough information. These descriptions can be up to 64 single-byte characters, or 32 double-byte characters. The default installation description is blank. You can set the installation description using the **setmqinst** command.

Related concepts

“Planning considerations for installation on Multiplatforms” on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

“Primary installation on AIX, Linux, and Windows” on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

“Installation location on Multiplatforms” on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

“IBM MQ components and features” on page 6
You can select the components or features that you require when you install IBM MQ.

Related reference

dspmqinst
setmqinst
crtmqinst

Multi ***Installation location on Multiplatforms***

You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

Default location

The default location for the IBM MQ product code is shown in the following table:

Table 2. Installation location of IBM MQ

Platform	Installation location
AIX AIX	`/usr/mqm`
IBM i IBM i	`/QIBM/ProdData/mqm`
Linux Linux	`/opt/mqm`

Table 2. Installation location of IBM MQ (continued)	
Platform	**Installation location**
Windows Windows systems	`C:\Program Files\IBM\MQ`
Windows Windows data directories	`C:\ProgramData\IBM\MQ`

Important: Windows For Windows installations, the directories are as stated, unless there is a previous installation of the product that still contains registry entries or queue managers, or both. In this situation, the new installation uses the old data directory location. For more information, see Program and data directory locations.

IBM i On IBM i, IBM MQ can only be installed in the default location. For more information about the directory structure of IBM i, see Directory structure on IBM i

Linux AIX On AIX and Linux systems, working data is stored in `/var/mqm`, but you cannot change this location. For more information about the directory structure of AIX and Linux systems, see Directory structure on AIX and Linux systems.

Custom location installation

For an installation into a custom location, the path specified must either be an empty directory, or a path that does not exist. The length of the path is limited to 256 bytes. Permissions on the path must be such that the user mqm and users in the mqm group can access the directories.

- Linux AIX On AIX and Linux systems, the path must not contain spaces.
- AIX On AIX, the product is installed into a User Specified Installation Location (USIL), which can be either an existing USIL or a new USIL that is automatically created by the installation process. If a custom location is specified, the product location is the path specified during installation, plus `/usr/mqm`.

  For example, the path specified is `/usr/custom_location`. The *MQ_INSTALLATION_PATH* is `/usr/custom_location/usr/mqm`.

  Access permissions for the USIL directory should be set to rwx for user and r-x for group and others (755).
- On the following platforms, the product location is the same path as specified during installation:
  - Linux Linux
  - Windows Windows

  For example, on Linux, the path specified is `/opt/custom_location`. The *MQ_INSTALLATION_PATH* is `/opt/custom_location`.

  Note: Use `rpm --prefix` to specify the value of *MQ_INSTALLATION_PATH*. See step "6" on page 114 in *Installing the first IBM MQ installation on Linux using the rpm command* for an example of using `rpm --prefix`.
- Linux On Linux, you can install IBM MQ into a non-empty MQ_INSTALLATION_PATH directory. You do this by setting the environment variable AMQ_OVERRIDE_EMPTY_INSTALL_PATH to 1 before starting the installation.

For each installation, all of the IBM MQ components that you require must be installed in the same location.

For more information about how to install to a custom location, see the installation topics for the appropriate platform.

Additional location restrictions

New IBM MQ installations should not be located in the following paths:

- In a path that is a subdirectory of another existing installation.
- In a path that is part of the direct path to an existing installation.

  If IBM MQ is installed in `/opt/IBM/MQ/installations/1`, you cannot install in `/opt/IBM/MQ/installations/1/a`. Additionally, you should not install a new installation to `/opt/IBM/MQ`. However, you can install a new installation in `/opt/IBM/MQ/installations/2` or `/opt/IBM/MQnew` because neither of these is a part of the direct path `/opt/IBM/MQ/installations/1`.
- In a path that is a subdirectory of the default location, for example:
  - AIX `/usr/mqm` on AIX.
  - Linux `/opt/mqm` on Linux.

  The reason an installation should not be located in a path that is a subdirectory of the default location is to avoid the risk if you later decide to install IBM MQ into the default location, and cannot then do so. If you do subsequently install into the default location, because IBM MQ has full access rights over the installation directory, existing files might be replaced or deleted. Scripts that you might subsequently run to uninstall IBM MQ might remove the installation directory at the end of the script.
- In a directory or subdirectory that is, or might later be used by another product, for example, an IBM Db2® installation, or operating system component.

  You must not install to any directory located under `/opt/IBM/db2` where `/opt/IBM/db2` is an example.
- In a directory or subdirectory that the mqm user or mqm group does not have authority to write to.

Related concepts

"Planning considerations for installation on Multiplatforms" on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

"Installation name on AIX, Linux, and Windows" on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

"Primary installation on AIX, Linux, and Windows" on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

"IBM MQ components and features" on page 6
You can select the components or features that you require when you install IBM MQ.

ALW *Multiple installations on AIX, Linux, and Windows*

On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

You can choose where each copy of IBM MQ is installed, but each copy must be in a separate installation location. A maximum of 128 installations of IBM MQ can exist on a single machine at a time. You have a choice:

- Keep the simplicity of maintaining and managing a single installation of IBM MQ on a machine.
- Take advantage of the flexibility that is offered by enabling multiple IBM MQ installations.

Decisions to make before installing

Before you install multiple copies of IBM MQ, you must make several decisions:

Where will you install each copy of IBM MQ?
You can choose the installation location for your installations in IBM MQ. For more information, see “Installation location on Multiplatforms” on page 17.

Do you need a primary installation?
A primary installation is an installation to which system-wide locations refer.

For more information, see “Primary installation on AIX, Linux, and Windows” on page 20.

How will your applications connect?
You need to consider how your applications locate the appropriate IBM MQ libraries. For more information, see Connecting applications in a multiple installation environment, and Connecting .NET applications in a multiple installation environment.

Do your existing exits need changing?
If IBM MQ is not installed in the default location, your exits need to be updated. For more information, see Writing exits and installable services on AIX, Linux, and Windows .

Which queue manager will be associated with which installation?
Each queue manager is associated with a particular installation. The installation that a queue manager is associated with limits that queue manager so that it can be administered only by commands from that installation. For more information, see Associating a queue manager with an installation.

How will you set up your environment to work with each installation?
With multiple installations on a system, you need to consider how you will work with particular installations, and how you will issue commands from that installation. You can either specify the full path to the command, or you can use the **setmqenv** or **crtmqenv** command to set environment variables. Setting the environment variables allows you to omit the path to the commands for that installation. For more information, see setmqenv, and crtmqenv.

When you have answered these questions, you can install IBM MQ after you have read “IBM MQ installation overview” on page 6.

If you have existing installations of IBM MQ and you want to use the multiple installation capability to migrate from one version of IBM MQ to another version, see “Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374.

The IBM message service client for .NET support pack and multiple installations

For multiple version support, on IBM MQ, the "Java and .NET Messaging and Web Services" feature must be installed with the IBM MQ product. For more information about installing the .NET feature, see Installing IBM MQ classes for .NET.

Related tasks
Configuring multiple installations
Finding installations of IBM MQ on a system
“Migrating on AIX and Linux: side-by-side” on page 424
“Migrating on AIX and Linux: multi-stage” on page 427
“Choosing MSI Instance IDs for multiple server installations” on page 178
For multiple silent installations, for each version that is installed you must find an MSI instance ID that is available to use for that installation.

“Choosing MSI Instance IDs for multiple client installations” on page 203
For multiple silent installations, for each version that is installed you must find an MSI instance ID that is available to use for that installation.

ALW *Primary installation on AIX, Linux, and Windows*

On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

You can install multiple versions of IBM MQ on AIX, Linux, and Windows. You can have more than one installation of IBM MQ on one of these systems at any time and, optionally, configure one of these

installations as the primary installation. Environment variables and symbolic links pointing to a single installation are less meaningful when multiple versions exist. However, some functions require these system-wide locations to work. For example, custom user scripts for administering IBM MQ, and third party products. These functions work only on the primary installation.

Linux AIX On AIX and Linux systems, if you set an installation as the primary installation, symbolic links to the external libraries and control commands of that installation are added into `/usr/lib`, and `/usr/bin`. If you do not have a primary installation, the symbolic links are not created. For a list of the symbolic links that are made to the primary installation, see "External library and control command links to primary installation on AIX and Linux" on page 25.

Windows On Windows systems, the global environmental variables point to the directories into which the primary installation is installed. These environment variables are used to locate IBM MQ libraries, control commands, and header files. Additionally, on Windows systems, some features of the operating system require the central registration of interface libraries that are then loaded into a single process. With multiple versions of IBM MQ, there would be conflicting sets of IBM MQ libraries. The features would try to load these conflicting sets of libraries into a single process. Therefore, such features can be used only with the primary installation. For more information, see "Features that can be used only with the primary installation on Windows" on page 27.

Table 3. Primary installation options

Options	**Valid installation configurations**		**More information**
	Primary	Non-primary	
Single installation	Version 7.1 or later	None	If you want to continue working with a single installation in the same way as previous releases, configure your installation as the primary installation. For more information, see "Single installation of IBM MQ configured as the primary installation" on page 22.
	None	Version 7.1 or later	If you want to continue working with a single installation, but do not want symbolic links or global environment variables created for you, configure your installation as non-primary. For more information,, see "Single installation of IBM MQ configured as non-primary" on page 23.
Multiple installations	Version 7.1 or later	Version 7.1 or later	If you want to have multiple installations of IBM MQ, you can choose whether to make one of the installations primary. For more information, see "Multiple installations of IBM MQ" on page 24.
	None	Version 7.1 or later.	

Related concepts

"Single installation of IBM MQ configured as the primary installation" on page 22
Marking an IBM MQ installation as primary adds symbolic links, or global environment variables to the system so that the IBM MQ commands and libraries used by applications are automatically available with minimum system setup required.

"Single installation of IBM MQ configured as non-primary" on page 23
If you install IBM MQ as non-primary you might have to configure a library path for applications to load IBM MQ libraries. On Windows, some product capabilities are available only when IBM MQ is configured as primary.

"Multiple installations of IBM MQ" on page 24

You can choose to have one of the IBM MQ installations configured as the primary installation. Your choice depends on how applications locate libraries.

“Installation location on Multiplatforms” on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

“Planning considerations for installation on Multiplatforms” on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

“Installation name on AIX, Linux, and Windows” on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

Related tasks

Changing the primary installation

ALW *Single installation of IBM MQ configured as the primary installation*

Marking an IBM MQ installation as primary adds symbolic links, or global environment variables to the system so that the IBM MQ commands and libraries used by applications are automatically available with minimum system setup required.

You decide where to install IBM MQ.

Where possible, configure applications and scripts to use the system search path to find the IBM MQ control commands or IBM MQ libraries. This configuration of applications and scripts provides maximum flexibility for undertaking future tasks such as migrating to the next release of IBM MQ, or installing a second installation. For more information about options for connecting your applications, see Connecting applications in a multiple installation environment.

Linux AIX On AIX and Linux, the first installation onto a system must be manually configured to be the primary installation.

Windows On Windows, the first installation is automatically configured as the primary installation.

Set the primary installation using the **setmqinst** command. For more information, see “Uninstalling, upgrading, and maintaining the primary installation” on page 28.

Related concepts

“Installation location on Multiplatforms” on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

“Planning considerations for installation on Multiplatforms” on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

“Installation name on AIX, Linux, and Windows” on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

Related tasks

Changing the primary installation

ALW *Single installation of IBM MQ configured as non-primary*

If you install IBM MQ as non-primary you might have to configure a library path for applications to load IBM MQ libraries. On Windows, some product capabilities are available only when IBM MQ is configured as primary.

AIX and Linux systems

Linux AIX

The implications of running a non-primary installation on AIX and Linux systems are as follows:

- Applications that locate their IBM MQ libraries using an embedded library path, for example, RPATH, cannot find those libraries if the following conditions are true:
  - IBM MQ is installed in a different directory from the directory specified in the RPATH
  - There are no symbolic links in `/usr`
- Where applications locate their libraries using an external library path, for example, LD_LIBRARY_PATH, you must configure the external library path to include the *MQ_INSTALLATION_PATH*`/lib` or *MQ_INSTALLATION_PATH*`/lib64` directory. The **setmqenv** and **crtmqenv** commands can configure a number of environment variables in the current shell, including the external library path.
- Most IBM MQ processes run as setuid/setgid. As a result, when loading user exits they ignore the external library path. User exits that reference IBM MQ libraries can find those libraries only if they are found in the library path embedded within them. They would be resolved if there were a symbolic link in `/usr`. User exits that are intended to be run on IBM WebSphere MQ 7.1, or later, can now be built so that they do not refer to IBM MQ libraries at all. Instead they rely on IBM MQ to pass in function pointers to the IBM MQ functions that the exit can then use. For more information, see Writing exits and installable services on AIX, Linux, and Windows .

For more information about options for connecting your applications, see Connecting applications in a multiple installation environment.

On AIX and Linux platforms, the first installation onto a system is not automatically configured as the primary installation. However, a single symbolic link is included in `/usr/bin` to locate the **dspmqver** command. If you do not want any symbolic links, you must remove this link using the following command:

```
setmqinst -x -p MQ_INSTALLATION_PATH
```

Windows systems

Windows

The implications of running a non-primary installation on Windows are:

- Applications normally find their libraries using the external library path, PATH. There is no concept of an embedded library path or explicit library location. If the installation is non-primary, the global PATH environment variable does not contain the IBM MQ installation directory. For applications to find IBM MQ libraries, update the PATH environment variable to reference the IBM MQ installation directory. The **setmqenv** and **crtmqenv** commands can configure a number of environment variables in the current shell, including the external library path.
- Some product capabilities are available only when an installation is configured as the primary installation; see “Features that can be used only with the primary installation on Windows” on page 27.

By default, on Windows, the first installation is automatically configured as primary. You must manually deselect it as the primary installation.

Related concepts

“Installation location on Multiplatforms” on page 17

You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

"Planning considerations for installation on Multiplatforms" on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

"Installation name on AIX, Linux, and Windows" on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

Related tasks

Changing the primary installation

Related reference

setmqenv

crtmqenv

ALW *Multiple installations of IBM MQ*

You can choose to have one of the IBM MQ installations configured as the primary installation. Your choice depends on how applications locate libraries.

The IBM MQ libraries, such as mqm, which ship with the product automatically use libraries of the level required by the queue manager to which they are connecting. This means that provided an application locates its IBM MQ libraries from an IBM MQ installation, it can connect to any queue manager on that system. Having one installation configured as primary ensures that if the application finds its IBM MQ interface library, the application can connect to any queue manager.

For more information about connecting applications in a multiple installation environment, see Connecting applications in a multiple installation environment.

The primary installation is not automatically changed when you uninstall the primary installation. If you want another installation to be the primary installation, you must manually set the primary installation using the **setmqinst** command. For more information, see "Uninstalling, upgrading, and maintaining the primary installation" on page 28.

Related concepts

"Installation location on Multiplatforms" on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

"Multiple installations on AIX, Linux, and Windows" on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

"Planning considerations for installation on Multiplatforms" on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

"Installation name on AIX, Linux, and Windows" on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

Related tasks

Changing the primary installation

Linux AIX *External library and control command links to primary installation on AIX and Linux*

On AIX and Linux platforms the primary installation is the one to which links from the `/usr` file system are made. However, only a subset of those links created with previous releases are now made.

No links are created from `/usr/include` to any installation and only links to external libraries and documented control commands are made from `/usr/lib`, and where appropriate, `/usr/lib64` (external libraries) and `/usr/bin` (control commands).

In order to run these commands you must complete the following steps:

1. provide a full path to the command in an available IBM MQ installation,
2. use the `setmqenv` script to update your shell environment,
3. manually add the bin directory from an IBM MQ installation directory to your PATH,
4. run the **`setmqinst`** command as root to make one of your existing IBM MQ installations the primary installation.

External libraries

Links are made to the following external libraries, both 32-bit and 64-bit:

- libmqm
- libmqm_r
- libmqmxa
- libmqmxa_r
- libmqmax
- libmqmax_r
- libmqmcb
- libmqmcb_r
- libmqic
- libmqic_r
- libmqcxa
- libmqcxa_r
- libmqicb
- libmqicb_r
- libimqb23ca[1]
- libimqb23ca_r[1]
- libimqc23ca[1]
- libimqc23ca_r[1]
- libimqs23ca[1]
- libimqs23ca_r[1]
- libimqb23ia[2]
- libimqb23ia_r[2]
- libimqc23ia [2]
- libimqc23ia_r[2]
- libimqs23ia[2]
- libimqs23ia_r[2]
- libmqmzf
- libmqmzf_r

Notes:

1. Libraries whose name contains "ca" were built with the IBM Open XL C/C++ for AIX 17 compiler.
2. Libraries whose name contains "ia" were built with the IBM XL C/C++ for AIX 16 compiler.
   Deprecated Support for this compiler was deprecated in IBM MQ 9.4.0 (for Long Term Support releases, and IBM MQ 9.3.5 for Continuous Delivery releases). Removed V 9.4.2 This compiler was removed in IBM MQ 9.4.2.

The following 64-bit only libraries are also linked to:

- libmqmxa64
- libmqmxa64_r
- libmqcxa64
- libmqcxa64_r

Control commands

The following control commands are linked to from /usr/bin:

- addmqinf
- amqcrs6a
- amqcrsta
- amqmfsck
- crtmqinst
- dltmqinst
- dspmqinst
- setmqinst
- crtmqcvx
- crtmqm
- dltmqm
- dmpmqaut
- dmpmqlog
- dspmq
- dspmqaut
- dspmqcsv
- dspmqfls
- dspmqinf
- dspmqrte
- dspmqtrc
- dspmqtrn
- dspmqver
- endmqcsv
- endmqlsr
- endmqm
- endmqtrc
- rcdmqimg
- rcrmqobj
- rmvmqinf

- rsvmqtrn
- runmqchi
- runmqchl
- runmqdlq
- runmqktool
- runmqlsr
- runmqsc
- runmqtmc
- runmqtrm
- setmqaut
- setmqenv
- setmqm
- setmqprd
- strmqcsv
- strmqm
- strmqtrc

Related concepts

“Primary installation on AIX, Linux, and Windows” on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

“Features that can be used only with the primary installation on Windows” on page 27
Some Windows operating-system features can be used only with the primary installation. This restriction is due to the central registration of interface libraries, which might conflict as a result of multiple versions of IBM MQ being installed.

Windows *Features that can be used only with the primary installation on Windows*

Some Windows operating-system features can be used only with the primary installation. This restriction is due to the central registration of interface libraries, which might conflict as a result of multiple versions of IBM MQ being installed.

The .NET monitor

The IBM MQ .NET monitor can run in two different modes: transactional and non-transactional. The transactional mode uses MSDTC transaction coordination and requires that the .NET monitor is registered with COM+. The .NET monitor from the primary installation is the only .NET monitor that is registered with COM+.

Any attempt to run the .NET monitor in transactional mode with a non-primary installation results in the failure of the .NET monitor to enlist with MSDTC. The .NET monitor receives an `MQRC_INSTALLATION_MISMATCH` error, which in turn results in an AMQ8377 error message on the console.

Related concepts

“Primary installation on AIX, Linux, and Windows” on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

“External library and control command links to primary installation on AIX and Linux” on page 25

On AIX and Linux platforms the primary installation is the one to which links from the `/usr` file system are made. However, only a subset of those links created with previous releases are now made.

ALW *Uninstalling, upgrading, and maintaining the primary installation*

On all platforms, if you uninstall the primary installation, it ceases to be the primary installation. You must run the **setmqinst** command to select a new primary installation. On Windows, if you update the primary installation, it continues to be the primary installation. If you apply a fix pack to the primary installation, it continues to be the primary installation.

Be cautious about the effect uninstalling or upgrading the primary installation has on applications. Applications might be using the linkage library of the primary installation to switch to the linkage library of another installation. If such an application is running, you might not be able to uninstall the primary installation. The operating system might have locked the link library of the primary installation on behalf of the application. If the primary installation has been uninstalled, an application that loads the IBM MQ libraries it requires by linking to the primary installation is not able to start.

The solution is to switch the primary installation to another installation before uninstalling. Stop, and restart applications that are linked through the previous primary installation before uninstalling it.

Windows

Windows

If you update the primary installation, it stops being the primary installation at the beginning of the update procedure. If, by the end of the update procedure, you have not made another installation primary, the upgraded installation is made primary again.

Maintenance

If you apply a fix pack to the primary installation, it stops being the primary installation at the beginning of the maintenance procedure. If, by the end of the maintenance procedure, you have not made another installation primary, the upgraded installation is made primary again.

Related concepts

“Primary installation on AIX, Linux, and Windows” on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

Changing the primary installation

“Applying maintenance to IBM MQ” on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

ALW *Server-to-server links on AIX, Linux, and Windows*

For verifying a server-to-server verification, the communication links between the two systems must be checked. Before you can do the verification, you must ensure that the communications protocol is installed and configured on both systems.

The examples used in the verification tasks listed in this topic for AIX, Linux, and Windows use TCP/IP.

The various communication protocols used by the supported platforms are as follows.

AIX **AIX**

IBM MQ supports both TCP and SNA. If you do not use TCP, see Setting up communication on AIX and Linux systems.

Linux **Linux**

IBM MQ for Linux supports TCP on all Linux platforms. On x86 platforms and Power platforms, SNA is also supported. If you want to use the SNA LU6.2 support on these platforms, you need the IBM

Communications Server for Linux 6.2. The Communications Server is available as a PRPQ product from IBM. For more details, see Communications Server.

If you do not use TCP, see Setting up communication on AIX and Linux systems.

Windows **Windows**

IBM MQ for Windows supports TCP, SNA, NetBios, and SPX. If you do not use TCP, see Setting up communication for Windows .

Related tasks

"Verifying an IBM MQ installation on AIX" on page 51
The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on AIX systems.

"Verifying an IBM MQ installation on Linux" on page 138
The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on Linux systems.

"Verifying an IBM MQ installation on Windows" on page 214
The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on Windows systems.

Windows Linux Redistributable IBM MQ clients

An IBM MQ redistributable client is a collection of runtime files that are provided in a `.zip` or `.tar` file that can be redistributed to third parties under redistributable license terms. This provides a simple way of distributing applications and the runtime files that they require in a single package.

For information about redistributable license terms for the redistributable IBM MQ clients, see IBM MQ Redistributable Components.

What are the IBM MQ redistributable clients?

The redistributable client that is supplied with IBM MQ is also a non-installed and relocatable image. Maintenance of a redistributable, non-installed image, is achieved through replacement; that is, you download newer versions of the runtime components when they are shipped.

- A *redistributable* client implies distributing the required run time with an application both inside and outside of your environment.
- A *relocatable* client implies putting the files somewhere else other than a fixed default location. For example, instead of installing into `/opt/` installing into `/usr/local`.
- A *non-installed* client implies that you are not required to lay down client files, and that these files can be copied as required.

Native redistributable client runtime libraries are provided for Linux x86-64 and Windows 64-bit platforms to make it simple to distribute both applications and the required IBM MQ runtime libraries. A third package, which is not platform-specific, contains the runtime files that are required for the Java/JMS applications, including the IBM MQ resource adapter for JMS applications that are running under an application server.

Note: For important considerations about bundling the relocatable JAR files for IBM MQ classes for JMS, see What is installed for IBM MQ classes for JMS.

You can use the files that are contained in the redistributable images to run the following client applications:

- Native IBM MQ applications using the MQI written in C, C++, and COBOL.
- IBM MQ applications using the IBM MQ classes for Java and IBM MQ classes for JMS.
- Windows IBM MQ using fully managed and unmanaged .NET classes.

XMS .NET is shipped as part of the redistributable client. XMS .NET requires the IBM MQ .NET client (`amqmdnet.dll`). If unmanaged mode is to be used, then the IBM MQ C client libraries are also needed along with `amqmdnet.dll`.

Managed File Transfer Agent is optionally provided as an individual redistributable component, available to be downloaded as a `tar` package on Linux, or as `zip` package on Windows. This option enables developers to download, configure and test a Managed File Transfer Agent, to ensure it connects to an existing Managed File Transfer configuration and then make the configured agent bundle available to many users within their organization. Users who are unfamiliar with how Managed File Transfer works, can easily set up the pre-configured agent on their local environment and quickly connect to the relevant IBM MQ network. The users do not have to install IBM MQ to be able to transfer files. For more information, see Configuring the Redistributable Managed File Transfer Agent.

Downloading the redistributable client packages

You can download the redistributable client packages from Fix Central:

- IBM MQ redistributable clients
- IBM MQ redistributable Managed File Transfer Agents

The file names describe the file contents and equivalent maintenance levels.

For V10R0M0, the downloadable packages for the native redistributable client runtime libraries and JMS and Java runtime files are available under the following file names:

Linux **Long Term Support: 10.0.0 IBM MQ C redistributable client for Linux x86-64**
`10.0.0.0-IBM-MQC-Redist-LinuxX64.tar.gz`

Windows **Long Term Support: 10.0.0 IBM MQ C and .NET redistributable client for Windows x64**
`10.0.0.0-IBM-MQC-Redist-Win64.zip`

Long Term Support: 10.0.0 IBM MQ JMS and Java redistributable client
`10.0.0.0-IBM-MQC-Redist-Java.zip`

For IBM MQ 10.0, the downloadable packages for the Redistributable Managed File Transfer Agent are available under the following file names:

Linux **Long Term Support: 10.0.0 Redistributable IBM MQ Managed File Transfer Agent for Linux X86-64**
`10.0.0.0-IBM-MQFA-Redist-LinuxX64`

Linux **Long Term Support: 10.0.0 Redistributable IBM MQ Managed File Transfer Agent for Linux on z Systems**
`10.0.0.0-IBM-MQFA-Redist-LinuxS390X`

Linux **Long Term Support: 10.0.0 Redistributable IBM MQ Managed File Transfer Agent for Linux PPC (Little Endian)**
`10.0.0.0-IBM-MQFA-Redist-LinuxPPC64LE`

Windows **Long Term Support: 10.0.0 Redistributable IBM MQ Managed File Transfer Agent for Windows x64**
`10.0.0.0-IBM-MQFA-Redist-Win64`

The IBM IPLA license agreement is extended for IBM MQ to enable you to download a number of additional runtime files from Fix Central.

Note: See Downloading and configuring Redistributable Managed File Transfer components for details on upgrading those components.

Related concepts

“Planning considerations for installation on Multiplatforms” on page 16

Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

"Installation location on Multiplatforms" on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

"Redistributable clients on Linux" on page 154
The Linux x86-64 image is shipped in a `LinuxX64.tar.gz` file.

"Redistributable clients on Windows" on page 230
The Windows 64-bit image is shipped in a `Win64.zip` file.

".NET application runtime - Windows only" on page 231
Considerations when using the .NET application.

Related tasks

Configuring the Redistributable Managed File Transfer Agent

Upgrading Redistributable Managed File Transfer components

Windows Linux *Limitations and other considerations for redistributable clients*

There are a number of points to consider when installing the IBM MQ C redistributable client for Linux x86-64 and the IBM MQ C and .NET redistributable client for Windows x64 packages.

Limitations

IBM Global Security Kit (GSKit) objects

No new GSKit objects are shipped. Only the runtime files are shipped, both in a regular installation and with the redistributable client.

IBM JREs

No IBM JREs are provided with the redistributable client.

If you want to run Java/JMS applications, you must provide your own runtime environment. Your JRE, that applications run under, must meet the current SOE requirements and are bound by any restrictions or limitations that apply.

Developing applications

Before IBM MQ 9.2.0, all other files that support the development and distribution of applications (including copybooks, header files, and sample source code) are not available in any of the redistributable client packages, including the IBM MQ C redistributable client packages, and are not licensed for redistribution. If you need to develop IBM MQ applications, you still need to perform a traditional installation so that you obtain the SDK files that are required to build client applications.

From IBM MQ 9.2.0, this limitation no longer applies to the IBM MQ C redistributable client packages. From IBM MQ 9.2.0, the IBM MQ C redistributable client packages include the elements that are required to build the application that is, the header files and copybooks. However, the sample source code is still not included in these packages.

Windows **Windows C runtime libraries**

You might have these libraries on your machine already, but if you do not, you need to download and install the following Microsoft C/C++ runtime libraries:

- Microsoft Visual C++ Redistributable 2008
- Microsoft Visual C++ Redistributable 2012

The download links for the redistributable downloads for each of these libraries can be found at The latest supported Visual C++ downloads.

The redistributable Java client does not include any of the files that are related to the JMSAdmin tool

A client that is installed by unpacking the redistributable Java client does not contain the JMSAdmin tool, or its prerequisite JAR files `fscontext.jar` and `providerutil.jar`. This means that the

client cannot connect to any file system contexts (`.bindings` files) created by a different installation that does have the JMSAdmin tool.

If you want to use a pre-existing file system context (`.bindings` file) with the redistributable Java client, you can obtain these prerequisite JAR files from Maven:

- https://mvnrepository.com/artifact/com.sun.jndi/providerutil/1.2
- https://mvnrepository.com/artifact/com.sun.jndi/fscontext

From IBM MQ 9.2.0 Fix Pack 2 for Long Term Support and IBM MQ 9.2.2 for Continuous Delivery, the self-extracting JAR file *version*`-IBM-MQ-Install-Java-All.jar` includes all of the files that are related to the JMSAdmin tool. For more information, see Obtaining the IBM MQ classes for JMS separately.

Choosing the files to distribute with an application

A script file named **genmqpkg** is provided by the redistributable client under the `bin` directory. You can use the **genmqpkg** script to generate a smaller subset of files that are tailored to the needs of the application for which the files are intended to be distributed.

When you run the script, you are asked a series of interactive `Yes` or `No` questions to determine the runtime requirements for an IBM MQ application. Finally, **genmqpkg** asks you to supply a new target directory, where the script duplicates the required directories and files.

The **genmqpkg** script that is shipped with the IBM MQ C redistributable client packages includes an additional question asking whether the runtime requires the SDK to compile applications. For the IBM MQ C redistributable client packages, responses can be given programmatically. All the interactive prompts can be bypassed by setting environment variables and executing the command with a `-b` flag to indicate a batch mode.

Important: IBM Support is only able to provide assistance with either the full redistributable client package, or self-consistent smaller packages created with the **genmqpkg** utility. Manually selecting a subset of files from the package is unsupported, as library dependencies might change between releases. To aid IBM Support in providing diagnostic assistance, it is strongly recommended that the `'ras'` option is always selected when creating a smaller package with the **genmpkg** utility, as this ensures that the relevant diagnostic tools are included.

Home directory

A `${HOME}/.mqm` directory is created when using an unregistered or non-installed version of IBM MQ, such as the redistributable client.

The directory is created so that IBM MQ has a reliable way of accessing its socket files using a path that fits within the **sun_path** length. If IBM MQ cannot write to the HOME directory you receive an error message.

Classpath changes

The classpath used by **dspmqver**, **setmqenv**, and **crtmqenv** commands adds the `com.ibm.mq.allclient.jar` and `com.ibm.mq.jakarta.client.jar` to the environment, immediately following the `com.ibm.mq.jar`, and `com.ibm.mqjms.jar`.

Modular applications using IBM MQ classes for JMS or IBM MQ classes for Jakarta Messaging

You can configure modular applications to use IBM MQ classes for JMS and IBM MQ classes for Jakarta Messaging by requiring the appropriate module within your application, and including the appropriate directory in the module-path. For more information, see Configuring your modular application to use IBM MQ classes for JMS or IBM MQ classes for Jakarta Messaging.

Other considerations

The default data path of a non-installed client is:

Linux **Linux x86-64**
`$HOME/IBM/MQ/data`

Windows **Windows**
`%HOMEDRIVE%\%HOMEPATH%\IBM\MQ\data`

On AIX and Linux systems, the length of the path must not contain spaces.

Important: A redistributable client runtime co-exists with a full IBM MQ client or server installation, provided that they are installed in different locations. However, unpacking a redistributable image into the same location as a full IBM MQ installation is not supported.

On Linux the `ccsid.tbl` used to define the supported CCSID conversions is traditionally expected to be found in the `UserData` directory structure, along with error logs, trace files, and so on. The `UserData` directory structure is populated by unpacking the redistributable client, and so, if the file is not found in its usual location, the redistributable client falls back to locate the file in the `/lib` subdirectory of the installation.

`dspmqver` output examples

Linux An example of **`dspmqver`** output from the redistributable client on Linux:

```
Name:        IBM MQ
Version:     8.0.0.4
Level:       p800-804-L150909
BuildType:   IKAP - (Production)
Platform:    IBM MQ for Linux (x86-64 platform)
Mode:        64-bit
O/S:         Linux 2.6.32.59-0.7-default
InstName:    MQNI08000004
InstDesc:    IBM MQ V8.0.0.4 (Redistributable)
Primary:     No
InstPath:    /Development/johndoe/unzip/unpack
DataPath:    /u/johndoe/IBM/MQ/data
MaxCmdLevel: 802
```

Windows An example of **`dspmqver`** output from the redistributable client on Windows:

```
Name:        IBM MQ
Version:     8.0.0.4
Level:       p800-804-L150909
BuildType:   IKAP - (Production)
Platform:    IBM MQ for Windows (x64 platform)
Mode:        64-bit
O/S:         Windows 7 Professional x64 Edition, Build 7601: SP1
InstName:    MQNI08000004
InstDesc:    IBM MQ V8.0.0.4 (Redistributable)
Primary:     No
InstPath:    C:\Users\johndoe\Desktop\Redist
DataPath:    C:\Users\johndoe\IBM\MQ\data
MaxCmdLevel: 802
```

Related concepts

“Redistributable IBM MQ clients” on page 29
An IBM MQ redistributable client is a collection of runtime files that are provided in a `.zip` or `.tar` file that can be redistributed to third parties under redistributable license terms. This provides a simple way of distributing applications and the runtime files that they require in a single package.

“.NET application runtime - Windows only” on page 231

Considerations when using the .NET application.

Linux IBM MQ non-install images

IBM MQ non-install images provide the IBM MQ product in a `tar.gz` format that can be unzipped and has no further installation steps. The purpose of this packaging of IBM MQ is to deliver the IBM MQ product in a format that can be used for building container images.

Note: These packages are provided only for building container images and are not supported for any other use cases.

Copies of these packages are provided with Developer, Non-Production and Production license terms for Linux x86-64, Linux on IBM Z and Linux on PPCLE. The Github mq-container project is a working example with documentation on how to build a container image using these packages. It is made available under an Apache V2 license and may be copied and customized for your own purposes.

To download the packages, go to IBM MQ downloads and follow the link to the IBM MQ release specific download document. Production and Non-Production packages are on IBM Fix Central and the Developer packages are on IBM Downloads.

The main differences between the installable and non-install IBM MQ packages are as follows:

Security

- The user that starts the queue manager will be the user that the queue manager is running as.
- The primary group of the user starting the queue manager will be considered the administrative group rather than "mqm".
- No setuid on any IBM MQ executables. IBM MQ executables are required to run as a non-root user.
- It is no longer possible to authenticate incoming IBM MQ client users using local user credentials. IBM MQ is not authorized to access this operating system information, so only LDAP/UserExternal authorization can be used.

Install

(If you using the IBM MQ Operator on OpenShift, this is handled transparently by the IBM MQ Operator.)

As no installer technology is used:

- The installation is not registered with the operating system.
- Initial data directory structures do not exist and should be created with `<MQ_INSTALLATION_PATH>/bin/crtmqdir -a -f`.

The product data directory is within the running user's home directory rather than `/var/mqm`. You can change the default directory of the data path by using the **MQ_OVERRIDE_DATA_PATH** environment variable.

Note: You must create the directory first, as the directory is not created automatically.

The **setmqenv** command can be used to initialize the current command environment, making it easier to work with the package.

Related reference

setmqenv (set IBM MQ environment)

AIX Installing and uninstalling IBM MQ on AIX

Installation tasks that are associated with installing IBM MQ on AIX systems are grouped in this section.

About this task

To prepare for installation and to install the IBM MQ components, complete the following tasks.

For information about how to uninstall IBM MQ, see “Uninstalling or modifying IBM MQ on AIX” on page 62.

If product fixes or updates are made available, see “Applying maintenance to IBM MQ” on page 291.

Procedure

1. Check the system requirements.
   See “Checking requirements on AIX” on page 38.
2. Plan your installation.
   - As part of the planning process, you must choose which components to install and where to install them. See “IBM MQ components for AIX systems” on page 35.
   - You must also make some platform-specific choices. See “Planning to install IBM MQ on AIX” on page 40.
3. Prepare your system for installation of IBM MQ.
   See “Preparing the system on AIX” on page 40.
4. Install IBM MQ server.
   See “Installing IBM MQ server on AIX” on page 45.
5. Optional: Install an IBM MQ client.
   See “Installing an IBM MQ client on AIX” on page 49.
6. Verify your installation. See “Verifying an IBM MQ installation on AIX” on page 51.

AIX IBM MQ components for AIX systems

You can select the components that you require when you install IBM MQ.

Important: For details of what each purchase of IBM MQ entitles you to install, see IBM MQ license information.

On AIX each component of IBM MQ is represented by a fileset. Table 4 on page 35 shows the filesets that are available when installing an IBM MQ server or client on an AIX system:

Table 4. IBM MQ filesets for AIX systems

Component	Description	Server media	Client media	Fileset name
Runtime	Contains files that are common to both server and client installations. **Note:** This component must be installed.	✓	✓	mqm.base.runtime
Server	You can use the server to run queue managers on your system and connect to other systems over a network. Provides messaging and queuing services to applications, and support for IBM MQ client connections.	✓		mqm.server.rte

Table 4. IBM MQ filesets for AIX systems (continued)

Component	Description	Server media	Client media	Fileset name
Standard Client	The IBM MQ MQI client is a small subset of IBM MQ, without a queue manager, that uses the queue manager and queues on other (server) systems. It can be used only when the system it is on is connected to another system that is running a full server version of IBM MQ. The client and the server can be on the same system if required.	✓	✓	mqm.client.rte
SDK	The SDK is required for compiling applications. It includes sample source files, and the bindings (files .H, .LIB, .DLL, and others), that you need to develop applications to run on IBM MQ.	✓	✓	mqm.base.sdk
Sample programs	The sample application programs are needed if you want to check your IBM MQ installation using the verification procedures.	✓	✓	mqm.base.samples
Java messaging	The files needed for messaging using Java (includes Java Message Service).	✓	✓	mqm.java.rte
Man pages	AIX man pages, in U.S. English, for: control commands MQI calls MQSC commands	✓	✓	mqm.man.en_US.data
Java JRE	A Java runtime environment that is used by those parts of IBM MQ that are written in Java.	✓	✓	mqm.jre.rte
Message Catalogs	For available languages, see the table of message catalogs that follows.	✓	✓	
IBM Global Security Kit (GSKit)	IBM Global Security Kit (GSKit) V8 Certificate and TLS, Base Runtime.	✓	✓	mqm.gskit.rte

Table 4. IBM MQ filesets for AIX systems (continued)

Component	Description	Server media	Client media	Fileset name
IBM MQ Telemetry Service	IBM MQ Telemetry supports the connection of Internet Of Things (IOT) devices (that is, remote sensors, actuators and telemetry devices) that use the MQ Telemetry Transport (MQTT) protocol. The telemetry (MQXR) service enables a queue manager to act as an MQTT server, and communicate with MQTT client apps. A set of MQTT clients is available from the Eclipse Paho downloads page. These sample clients help you write your own MQTT client apps that IOT devices use to communicate with MQTT servers. See also “Installation considerations for IBM MQ Telemetry” on page 248.	✓		mqm.xr.service
Managed File Transfer	MQ Managed File Transfer transfers files between systems in a managed and auditable way, regardless of file size or the operating systems used. For information about the function of each component, see “Managed File Transfer product options” on page 240.	✓		mqm.ft.agent mqm.ft.base mqm.ft.logger mqm.ft.service mqm.ft.tools
Advanced Message Security	Provides a high level of protection for sensitive data flowing through the IBM MQ network, while not impacting the end applications. You must install this component on all IBM MQ installations that host queues you want to protect. You must install the IBM Global Security Kit (GSKit) component on any IBM MQ installation that is used by a program that puts or gets messages to or from a protected queue, unless you are using only Java client connections. You must install the **Java JRE** component to install this component.	✓		mqm.ams.rte
AMQP Service	Install this component to make AMQP channels available. AMQP channels support AMQP 1.0 APIs. You can use AMQP channels to give AMQP applications access to the enterprise-level messaging facilities provided by IBM MQ.	✓		mqm.amqp.rte
REST API and Console	Adds HTTP based administration for IBM MQ through the REST API and IBM MQ Console.	✓		mqm.web.rte

Table 5. IBM MQ message catalogs for AIX systems	
Message catalog language	**Component name**
Brazilian Portuguese	mqm.msg.pt_BR
Czech	mqm.msg.cs_CZ
French	mqm.msg.fr_FR
German	mqm.msg.de_DE
Hungarian	mqm.msg.hu_HU
Italian	mqm.msg.it_IT
Japanese	mqm.msg.ja_JP, mqm.msg.Ja_JP
Korean	mqm.msg.ko_KR
Polish	mqm.msg.pl_PL
Spanish	mqm.msg.es_ES
Simplified Chinese	mqm.msg.zh_CN, mqm.msg.Zh_CN
Traditional Chinese	mqm.msg.zh_TW, mqm.msg.Zh_TW
U.S. English	mqm.msg.en_US

Related concepts

"IBM MQ components and features" on page 6
You can select the components or features that you require when you install IBM MQ.

"Planning considerations for installation on Multiplatforms" on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

AIX Checking requirements on AIX

Before you install IBM MQ on AIX, you must check for the latest information and system requirements.

About this task

A summary of the tasks that you must complete to check system requirements is listed here with links to further information.

Procedure

1. Check that you have the latest information, including information on hardware and software requirements.
   See "Where to find product requirements and support information" on page 11.
2. Check that your systems meet the initial hardware and software requirements for AIX.
   See "Hardware and software requirements on AIX systems" on page 39.
3. Check that your systems have sufficient disk space for the installation.
   See Disk space requirements.
4. Check that you have the correct licenses.
   See "License requirements" on page 8 and IBM MQ license information.

What to do next

When you have completed these tasks, you are ready to start preparing your system for installation. For the next steps in installing IBM MQ, see “Preparing the system on AIX” on page 40.

Related concepts

“IBM MQ installation overview” on page 6

An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

Related tasks

“Applying maintenance to IBM MQ” on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

AIX *Hardware and software requirements on AIX systems*

Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

For hardware and software requirements, see System Requirements for IBM MQ.

Host names

IBM MQ does not support host names that contain spaces. If you install IBM MQ on a system with a host name that contains spaces, you are unable to create any queue managers.

32-bit client support

Attention: There is no separate 32-bit client installation package. The client installation package and redistributable client contain both 32-bit and 64-bit IBM MQ client libraries. The included 32-bit libraries can be used by 32-bit applications on supported platforms where 32-bit support is offered by the operating system.

Java Message Service

JM 3.0 From IBM MQ 9.3.0, Jakarta Messaging 3.0 is supported for developing new applications. IBM MQ 9.3.0 and later continue to support JMS 2.0 for existing applications. It is not supported to use both the Jakarta Messaging 3.0 API and the JMS 2.0 API in the same application. For more information, see Using IBM MQ classes for JMS/Jakarta Messaging.

Java 8 is bundled with IBM MQ 9.0, but client components are built with Java 7 compatibility flags on.

For development, a JDK is required, and a JRE is required for running. The JRE does not need to be the JRE installed with IBM MQ, but has to be one from the supported list.

For a list of supported JDKs, see System Requirements for IBM MQ.

You can check the version installed using the following command:

```
java -version
```

Transport Layer Security (TLS)

If you want to use the TLS support, you need the IBM Global Security Kit (GSKit) version 8 package. This package is supplied with IBM MQ as one of the components available for installation.

Unicode support on AIX

If you need to convert data to and from Unicode on your system, you must install the following file sets:

```
bos.iconv.ucs.com   Unicode converters for AIX sets
bos.iconv.ucs.ebcdic Unicode converters for EBCDIC sets
bos.iconv.ucs.pc   Unicode converters for PC sets
```

AIX Planning to install IBM MQ on AIX

Before you install IBM MQ on AIX, you must choose which components to install and where to install them. You must also make some platform-specific choices.

About this task

The following steps provide links to additional information to help you with planning your installation of IBM MQ on AIX.

As part of your planning activities, make sure that you review the information on hardware and software requirements for the platform on which you are planning to install IBM MQ. For more information, see “Checking requirements on AIX” on page 38.

Procedure

- Decide which IBM MQ components and features to install.

  See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.

  Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. For more information, see “License requirements” on page 8 and IBM MQ license information.
- Review the options for naming your installation.

  In some cases, you can choose an installation name to use instead of the default name. See “Installation name on AIX, Linux, and Windows” on page 16.
- Review the options and restrictions for choosing an installation location for IBM MQ.

  For more information, see “Installation location on Multiplatforms” on page 17.
- If you plan to install multiple copies of IBM MQ, see “Multiple installations on AIX, Linux, and Windows” on page 19.
- If you already have a primary installation, or plan to have one, see “Primary installation on AIX, Linux, and Windows” on page 20.
- Make sure that the communications protocol needed for server-to-server verification is installed and configured on both systems that you plan to use.

  For more information, see “Server-to-server links on AIX, Linux, and Windows” on page 28.

AIX Preparing the system on AIX

On AIX systems, you might have to complete several tasks before you install IBM MQ. You might also want to complete other tasks, depending on your installation intentions.

About this task

The tasks that you perform to prepare your systems for installation are listed here. Complete the appropriate tasks for your platform before installing.

Procedure

1. Set up a user ID of the name `mqm`, with a primary group of `mqm`.

   See “Setting up the user and group on AIX” on page 41.

   Note: If the group `mqm` and/or user `mqm` do not exist, during the installation of the product, the installer creates group `mqm` and user `mqm` with a home directory of `/var/mqm`.

2. Create file systems for both the product code and working data to be stored. See “Creating file systems on AIX” on page 42.
3. Configure any additional settings needed for your AIX system.

   See “Configuring and tuning the operating system on AIX” on page 44.

What to do next

When you have completed the tasks to prepare the system, you are ready to start installing IBM MQ. To install a server, see “Installing IBM MQ server on AIX” on page 45. To install a client, see “Installing an IBM MQ client on AIX” on page 49.

Related tasks

Planning

“Maintaining and migrating IBM MQ” on page 287

Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

“Applying maintenance to IBM MQ” on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

AIX *Setting up the user and group on AIX*

On AIX systems, IBM MQ requires a user ID of the name `mqm`, with a primary group of `mqm`. The `mqm` user ID owns the directories and files that contain the resources associated with the product.

Creating the user ID and group

Set the primary group of the `mqm` user to the group `mqm`.

Note: If the group `mqm` and/or user `mqm` do not exist, during the installation of the product, the installer creates group `mqm` and user `mqm` with a home directory of `/var/mqm`

If you are installing IBM MQ on multiple systems you might want to ensure each UID and GID of `mqm` has the same value on all systems. If you are planning to configure multi-instance queue managers, it is essential the UID and GID are the same from system to system. It is also important to have the same UID and GID values in virtualization scenarios.

You can use the System Management Interface Tool (`smit`), for which you require root authority.

1. To create the `mqm` group, display the required window using this sequence:

   ```
   Security & Users
   Groups
   Add a Group
   ```

   Set the group name field to `mqm`.
2. To create the user `mqm`, display the required window using this sequence:

   ```
   Security & Users
   Users
   Add a User
   ```

   Set the user name field to `mqm`.
3. To add a password to the new user ID, display the required window using this sequence:

   ```
   Security & Users
   Passwords
   Change a User's Password
   ```

   Set the password as required.

Adding existing user IDs to the group

If you want to run administration commands, for example **crtmqm** (create queue manager) or **strmqm** (start queue manager), your user ID must be a member of the mqm group. This user ID must not be longer than 12 characters.

Users do not need mqm group authority to run applications that use the queue manager; it is needed only for the administration commands.

You can use smit to add an existing user ID to the mqm group. Display the required menu using this sequence:

```
Security & Users
Users
Change / Show Characteristics of a User
```

Type the name of the user in the **User Name** field and press **Enter**. Add mqm to the **Group SET** field, which is a comma-separated list of the groups to which the user belongs. Users do not need to have their primary group set to mqm. If mqm is in their set of groups, they can use the administration commands.

Log files created by IBM MQ Telemetry service

The **umask** setting of the user ID that creates a queue manager will determine the permissions of the Telemetry log files generated for that queue manager. Even though the ownership of the log files will be set to mqm.

Related concepts

"Creating file systems on AIX" on page 42
Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation directory for the product code can be changed at installation time, but the working data location cannot be changed.

"Configuring and tuning the operating system on Linux" on page 102
Use this topic when you are configuring IBM MQ on Linux systems.

Related tasks

"Configuring and tuning the operating system on AIX" on page 44
When installing IBM MQ on AIX systems, there are some additional settings that must be configured.

AIX *Creating file systems on AIX*

Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation directory for the product code can be changed at installation time, but the working data location cannot be changed.

Determining the size of a server installations file system

To determine the size of the /var/mqm file system for a server installation, consider:

- The maximum number of messages in the system at one time.
- Contingency for message buildups, if there is a system problem.
- The average size of the message data, plus 500 bytes for the message header.
- The number of queues.
- The size of log files and error messages.
- The amount of trace that is written to the /var/mqm/trace directory.

Storage requirements for IBM MQ also depend on which components you install, and how much working space you need. For more details, see Disk space requirements.

Creating a file system for the working data

Before you install IBM MQ, create and mount a file system called `/var/mqm` which is owned by the user `mqm` in the group `mqm`; see "Setting up the user and group on AIX" on page 41. This file system is used by all installations of IBM MQ on a system. If possible, use a partition strategy with a separate volume for the IBM MQ data. This means that other system activity is not affected if a large amount of IBM MQ work builds up. Configure the directory permissions to permit the `mqm` user to have full control, for example, file mode 755. These permissions will then be updated during the IBM MQ installation to match the permissions required by the queue manager.

Creating separate file systems for errors and logs

You can also create separate file systems for your log data (`/var/mqm/log`) and error files (`/var/mqm/errors`). If possible, place these directories on different physical disks from the queue manager data (`/var/mqm/qmgrs`) and from each other.

If you create separate file systems the `/var/mqm/errors` directory can be NFS mounted. However, if you choose to NFS-mount `/var/mqm/errors`, the error logs might be lost if the network fails.

You can protect the stability of your queue manager by having separate file systems for:

- `/var/mqm/errors`
- `/var/mqm/trace`
- `/var/mqm/qmgrs`
- `/var/mqm/log`

In the case of `/var/mqm/errors`, it is rare that this directory receives large quantities of data. But it is sometimes seen, particularly if there is a severe system problem leading to IBM MQ writing a lot of diagnostic information in to `.FDC` files. In the case of `/var/mqm/trace`, files are only written here when you use **`strmqtrc`** to start tracing IBM MQ.

You can obtain better performance of normal IBM MQ operations (for example, syncpoints, MQPUT, MQGET of persistent messages) by placing the following on separate disks:

- `/var/mqm/qmgrs`
- `/var/mqm/log`

In the rare event that you need to trace an IBM MQ system for problem determination, you can reduce performance impact by placing the `/var/mqm/trace` file system on a separate disk.

If you are creating separate file systems, allow a minimum of 30 MB of storage for `/var/mqm`, 100 MB of storage for `/var/mqm/log`, and 10 MB of storage for `/var/mqm/errors`. The 100 MB minimum allowance of storage for `/var/mqm/log` is the absolute minimum required for a single queue manager and is not a recommended value. The size of a file system must be scaled according to the number of queue managers that you intend to use, the number of pages per log file, and the number of log files per queue manager.

For more information about file systems, see File system support.

The size of the log file depends on the log settings that you use. The minimum sizes are for circular logging using the default settings. For more information about log sizes, see Calculating the size of the log.

Related concepts

"Setting up the user and group on AIX" on page 41
On AIX systems, IBM MQ requires a user ID of the name `mqm`, with a primary group of `mqm`. The `mqm` user ID owns the directories and files that contain the resources associated with the product.

Related tasks

"Configuring and tuning the operating system on AIX" on page 44

When installing IBM MQ on AIX systems, there are some additional settings that must be configured.

AIX *Configuring and tuning the operating system on AIX*

When installing IBM MQ on AIX systems, there are some additional settings that must be configured.

About this task

When you install IBM MQ on AIX systems, you must configure the following operating system settings:

- File descriptors
- System resource limits

Procedure

- Increase the process limit for the number of file descriptors.

  When running a multi-threaded process such as the agent process, you might reach the soft limit for file descriptors. This limit gives you the IBM MQ reason code `MQRC_UNEXPECTED_ERROR (2195)` and, if there are enough file descriptors, an IBM MQ FFST file.

  To avoid this problem, increase the process limit for the number of file descriptors. You must alter the `nofiles` attribute in `/etc/security/limits` to 10,000 for the `mqm` user ID, or in the default stanza. To alter the number of file descriptors, complete the following steps:

  a) Check the maximum number of file descriptors available to a process running as `mqm`:

  ```
  lsuser -a nofiles mqm
  ```

  b) Set the value to at least 10240:

  ```
  chuser nofiles=10240 mqm
  chuser nofiles_hard=10240 mqm
  ```

- Set the system resource limit for data segment and stack segment to unlimited using the following commands in a command prompt:

  ```
  ulimit -d unlimited
  ulimit -s unlimited
  ```

  Attention: For an `mqm` user ID other than root, the value `unlimited` might not be permitted.

What to do next

You can check your system configuration using the mqconfig command.

During high load IBM MQ can use virtual memory (swap space). If virtual memory becomes full it could cause IBM MQ processes to fail or become unstable, affecting the system.

To prevent this situation your IBM MQ administrator should ensure that the system has been allocated enough virtual memory as specified in the operating system guidelines.

For more information on configuring your system, see How to configure AIX and Linux systems for IBM MQ.

Related concepts

"Setting up the user and group on AIX" on page 41
On AIX systems, IBM MQ requires a user ID of the name `mqm`, with a primary group of `mqm`. The `mqm` user ID owns the directories and files that contain the resources associated with the product.

"Creating file systems on AIX" on page 42
Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation

directory for the product code can be changed at installation time, but the working data location cannot be changed.

AIX Installing IBM MQ server on AIX

You can install an IBM MQ server on AIX either interactively or silently.

Before you begin

- Before you start the installation procedure, make sure that you complete the necessary steps that are outlined in "Preparing the system on AIX" on page 40.
- IBM MQ can be installed into System Workload Partitions (WPARs) with both shared and private file systems. For installation into private file systems, IBM MQ can be installed directly into the System WPAR by using the procedure that is outlined in this topic. There are some limitations for shared `/usr` file systems:
  - The **dspmqinst** and **dspmqver** commands might report the primary installation incorrectly when compared with the symbolic links in `/usr/bin`. To synchronize the reporting of the primary installation in a System WPAR and the global environment, run **setmqinst** with the **-i** or **-x** parameter, on the individual zones.
  - You cannot change the primary installation within a WPAR. You must change the primary installation through the global environment, which has appropriate write access to `/usr/bin`.

  Note: During installation to a non-default location, ATTENTION messages that relate to **errupdate** or **trcupdate** are produced. These messages are not errors. However, AIX system trace for IBM MQ is not supported for installations in a non-default location, and IBM MQ trace must be used for problem determination.
- If you install a copy of IBM MQ server for AIX by using a downloadable installation image, obtained from Passport Advantage, you need to:
  1. Decompress the tar file, by using the following command:

     ```
     uncompress IBM_MQ_9.4.0_AIX.tar.Z
     ```

  2. Extract the installation files from the tar file, by using the following command:

     ```
     tar -xvf IBM_MQ_9.4.0_AIX.tar
     ```

  3. Use the installation tools **installp** or **smit** to install the IBM MQ server for AIX.

Tip: If you find that the Function keys do not work in SMIT, try pressing Esc and the Function key number to emulate the required Function key.

About this task

IBM MQ is supplied as a set of filesets that are installed by using the standard AIX installation tools. The procedure uses the system management interface tool (SMIT), but you can choose to use **installp**, **geninstall** or the web-based System Manager. You can select which components you want to install. The components and file sets are listed in "IBM MQ components for AIX systems" on page 35.

This procedure installs IBM MQ into the default location of `/usr/mqm`.

Use the procedure that is described in "Installing the IBM MQ server silently on AIX" on page 47 if you want to install IBM MQ in any one of the following situations:

- As the first installation on your system by using **installp**
- As the first installation on your system, and you are installing the product to a location that is not the default location
- Alongside an existing installation

If you want to carry out a side-by-side installation, alongside an existing installation of IBM MQ in the default location, you must install the second version of the product in a location that is not the default. To create the non-default installation location you must use the **mkusil** command, which is available only from the command line.

You can then use **installp** (see "Installing the IBM MQ server silently on AIX" on page 47), or SMIT if you select the **Relocatable Software Installation** menu item.

If you want to carry out a single stage migration, refer to "Migrating on AIX and Linux: single-stage" on page 420.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. Select the required `smit` window by using the following sequence:

   ```
   Software Installation and Maintenance
   Install and Update Software
   Install and Update from ALL Available Software
   ```
4. Specify the input directory in the **INPUT device / directory for software** field.
   a) Enter a period character `.`
   b) Press the **Enter** key
5. List the software in the **SOFTWARE to install** field:
   a) Enter `.`
   b) Press **F4**
6. Select the file sets to install from the list. If you require messages in a language different from the language that is specified by the locale that is selected on your system, ensure that you include the appropriate message catalog. Enter **ALL** to install all applicable filesets.
7. View the license agreement:
   a) Change **Preview new LICENSE agreements?** to **yes**
   b) Press **Enter**
8. Accept the license agreements and install IBM MQ:
   a) Change **ACCEPT new license agreements?** to **yes**
   b) Change **Preview new LICENSE agreements?** to **no**
   c) Press **Enter**

What to do next

- If you chose this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.

You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.

- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. For more information, see "Verifying an IBM MQ installation on AIX" on page 51.

Related concepts

"Installation location on Multiplatforms" on page 17
You can install IBM MQ into the default location. Alternatively, you can install into a custom location during the installation process. The location where IBM MQ is installed is known as the *MQ_INSTALLATION_PATH*.

"Multiple installations on AIX, Linux, and Windows" on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

"Primary installation on AIX, Linux, and Windows" on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

"Installing the IBM MQ server silently on AIX" on page 47
You can carry out a non-interactive installation of the IBM MQ server from the command line using the AIX **installp** command. A non-interactive installation is also known as a silent, or unattended installation.

"Uninstalling or modifying IBM MQ on AIX" on page 62
On AIX, you can uninstall the IBM MQ server or client using the System Management Interface Tool (SMIT) or the **installp** command. You can also modify an installation by uninstalling a subset of the file sets.

Changing the primary installation

Related reference

setmqinst

AIX *Installing the IBM MQ server silently on AIX*

You can carry out a non-interactive installation of the IBM MQ server from the command line using the AIX **installp** command. A non-interactive installation is also known as a silent, or unattended installation.

Before you begin

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in "Preparing the system on AIX" on page 40.

Note: During installation, errors relating to **errupdate** or **trcupdate** might occur. This can caused by installing to a non-default location, if so these errors can be safely ignored. However, native trace for IBM MQ is only supported when installed in the default location.

About this task

You can use this method to install to a non-default location, and can select which components you want to install. The components and filesets are listed in "IBM MQ components and features" on page 6.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. Install the product in one of the following ways:
   - Install the whole product in the default location:

     ```
     installp -acgXYd . all
     ```
   - Install selected file sets in the default location:

     ```
     installp -acgXYd . list of file sets
     ```
   - Install the whole product in a non-default location using the -R flag:

     ```
     installp -R USIL_Directory -acgXYd . all
     ```
   - Install selected file sets in a non-default location using the -R flag:

     ```
     installp -R USIL_Directory -acgXYd . list of file sets
     ```

   where *USIL_Directory* is a directory which exists before the command is run; it must not contain any spaces or `usr/mqm`. IBM MQ is installed underneath the directory specified. For example, if `/USIL1` is specified, the IBM MQ product files are located in `/USIL1/usr/mqm`. This location is known as the *MQ_INSTALLATION_PATH*.

What to do next

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ . For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. See “Verifying an IBM MQ installation on AIX” on page 51, for more information.

Related concepts

“Multiple installations on AIX, Linux, and Windows” on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

“Primary installation on AIX, Linux, and Windows” on page 20

On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

"Installing IBM MQ server on AIX" on page 45
You can install an IBM MQ server on AIX either interactively or silently.

"Uninstalling or modifying IBM MQ on AIX" on page 62
On AIX, you can uninstall the IBM MQ server or client using the System Management Interface Tool (SMIT) or the **installp** command. You can also modify an installation by uninstalling a subset of the file sets.

Changing the primary installation

Related reference

setmqinst

User Specified Installation Location (USIL)

AIX Installing an IBM MQ client on AIX

You can interactively install the IBM MQ client for AIX using `smit`.

Before you begin

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in "Preparing the system on AIX" on page 40.

About this task

IBM MQ is supplied as a set of filesets that are installed using the standard AIX installation tools. The procedure uses the System Management Interface Tool (`smit`), but you can choose to use **installp**, **geninstall** or the web-based System Manager. You can select which components you want to install. The components and filesets are listed in "IBM MQ components for AIX systems" on page 35. You must install at least the Runtime and Client components.

This procedure installs IBM MQ into the default location. If you want to install to a non-default location, you must use **installp**, see "Installing an IBM MQ client silently on AIX" on page 50.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. Select the required `smit` window using the following sequence:

   ```
   Software Installation and Maintenance
   Install and Update Software
   Install and Update from ALL Available Software
   ```
4. Click **List** to display the input device or directory for the software and select the location that contains the installation images.
5. Select the **SOFTWARE to install** field to obtain a list of available filesets, and select the filesets you want to install. Ensure that you include the appropriate message catalog if you require messages in

a language different from the language specified by the locale specified on your system. Enter **ALL** to install all applicable filesets.

6. Change **Preview new LICENSE agreements?** to **yes** and press Enter to view the license agreements.
7. If you have a previous version of the product on your system, change the **Automatically install requisite software** to **no**.
8. Change **ACCEPT new license agreements?** to **yes** and press Enter to accept the license agreements.
9. Change **Preview new LICENSE agreements?** to **no** and press Enter to install IBM MQ.

What to do next

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see "Testing communication between a client and a server on AIX" on page 59.

Related tasks

"Uninstalling or modifying IBM MQ on AIX" on page 62
On AIX, you can uninstall the IBM MQ server or client using the System Management Interface Tool (SMIT) or the **installp** command. You can also modify an installation by uninstalling a subset of the file sets.

AIX *Installing an IBM MQ client silently on AIX*

You can carry out a non-interactive, or silent, installation of an IBM MQ client from the command line using the AIX **installp** command.

Before you begin

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in "Preparing the system on AIX" on page 40.

Note: Installation to a non-default location is not supported on systems that have the AIX Trusted Computing Base (TCB) enabled.

About this task

You can use this method to install to a non-default location, and can select which components you want to install. The components and filesets are listed in "IBM MQ components and features" on page 6. You must install at least the Runtime and Client components.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
2. Set your current directory to the location of the installation packages.

The location might be a network location, or a local file system directory. See Where to find downloadable installation images.

3. Install the product in one of the following ways:
   - Install the whole product in the default location:
     ```
     installp -acgXYd . all
     ```
   - Install selected filesets in the default location:
     ```
     installp -acgXYd . list of file sets
     ```
   - Install the whole product in a non-default location using the -R flag:
     ```
     installp -R USIL_Directory -acgXYd . all
     ```
   - Install selected filesets in a non-default location using the -R flag:
     ```
     installp -R USIL_Directory -acgXYd . list of file sets
     ```

   where the directory specified with the `-R` flag is an AIX User Specified Installation Location (USIL) directory which exists before the command is run; it must not contain any spaces or `usr/mqm`.

   IBM MQ is installed underneath the directory specified. For example, if `/USIL1` is specified, the IBM MQ product files are located in `/USIL1/usr/mqm`. This location is known as the *MQ_INSTALLATION_PATH*.

What to do next

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:
  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```
  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see “Testing communication between a client and a server on AIX” on page 59.

AIX Verifying an IBM MQ installation on AIX

The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on AIX systems.

About this task

You can verify a local (stand-alone) server installation or a server-to-server installation of the IBM MQ server:

- A local server installation has no communication links with other IBM MQ installations.
- A server-to-server installation does have links to other installations.

You can also verify that your IBM MQ MQI client installation completed successfully and that the communication link is working.

Procedure

- To verify a local server installation, see “Verifying a local server installation using the command line on AIX” on page 52.
- To verify a server-to-server installation, see “Verifying a server-to-server installation using the command line on AIX” on page 53.
- To verify a client installation, see “Verifying a client installation using the command line on AIX” on page 56.

AIX *Verifying a local server installation using the command line on AIX*

On AIX systems, you can verify a local server installation by using the command line to create a simple configuration of one queue manager and one queue.

Before you begin

To verify the installation, you must first install the samples package.

Before beginning the verification procedure, you might want to check that you have the latest fixes for your system. For more information about where to find the latest updates, see “Checking requirements on AIX” on page 38.

About this task

Use the following steps to configure your default queue manager from the command line. After the queue manager is configured, use the `amqsput` sample program to put a message on the queue. You then use the `amqsget` sample program to get the message back from the queue.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. On an AIX system, log in as a user in the `mqm` group.
2. Set up your environment:
   a) Set up environment variables for use with a particular installation by entering one the following command:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   b) Check that the environment is set up correctly by entering the following command:

      ```
      dspmqver
      ```

      If the command completes successfully, and the expected version number and installation name are returned, the environment is set up correctly.
3. Create a queue manager called `QMA` by entering the following command:

   ```
   crtmqm QMA
   ```

   Messages indicate when the queue manager is created, and when the default IBM MQ objects are created.
4. Start the queue manager by entering the following command:

   ```
   strmqm QMA
   ```

   A message indicates when the queue manager starts.
5. Start MQSC by entering the following command:

```
runmqsc QMA
```

A message indicates when MQSC starts. MQSC has no command prompt.

6. Define a local queue called QUEUE1 by entering the following command:

```
DEFINE QLOCAL (QUEUE1)
```

A message indicates when the queue is created.

7. Stop MQSC by entering the following command:

```
end
```

Messages are shown, followed by the command prompt.

Note: Subsequent steps require that the samples package is installed.

8. Change into the *MQ_INSTALLATION_PATH*/samp/bin directory, which contains the sample programs.

MQ_INSTALLATION_PATH represents the high-level directory in which IBM MQ is installed.

9. Put a message on the queue by entering the following commands

```
./amqsput QUEUE1 QMA
```

The following messages are shown:

```
Sample AMQSPUT0 start
target queue is QUEUE1
```

10. Type some message text on one or more lines, where each line is a different message. Enter a blank line to end the message input.

The following message is shown:

```
Sample AMQSPUT0 end
```

Your messages are now on the queue and the command prompt is shown.

11. Get the messages from the queue, by entering the following command:

```
./amqsget QUEUE1 QMA
```

The sample program starts, and your messages are displayed.

Results

You have successfully verified your local installation.

AIX *Verifying a server-to-server installation using the command line on AIX*

You can verify a server-to-server installation using two servers, one as a sender and one as a receiver.

Before you begin

- On AIX, IBM MQ supports both TCP and SNA.

  The examples in this task use TCP/IP. If you do not use TCP, see Setting up communication on AIX and Linux.
- If you are using TCP/IP, make sure that TCP/IP and IBM MQ are installed on both servers.
- Make sure that you are a member of the IBM MQ administrators group (**mqm**) on each server.
- Decide which installation is the sender server and which installation is the receiver server. The installations might be on the same system, or on different systems.

About this task

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. On the **receiver** server:
   a) On AIX, log in as a user in the mqm group.
   b) Check which ports are free, for example by running **netstat**. For more information about this command, see the documentation of your operating system.

      If port 1414 is not in use, make a note of 1414 to use as the port number in step 2 h. Use the same number for the port for your listener later in the verification. If it is in use, note a port that is not in use; for example 1415.
   c) Set up the environment for the installation you are using by entering the following command at the command prompt:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   d) Create a queue manager called QMB by entering the following command at the command prompt:

      ```
      crtmqm QMB
      ```

      Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.
   e) Start the queue manager by entering the following command:

      ```
      strmqm QMB
      ```

      A message tells you when the queue manager has started.
   f) Start MQSC by entering the following command:

      ```
      runmqsc QMB
      ```

      A message tells you that MQSC has started. MQSC has no command prompt.
   g) Define a local queue called RECEIVER.Q by entering the following command:

      ```
      DEFINE QLOCAL (RECEIVER.Q)
      ```

      A message tells you the queue has been created.
   h) Define a listener by entering the following command:

```
DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT ( PORT_NUMBER )
```

      Where *port_number* is the name of the port the listener runs on. This number must be the same as the number used when defining your sender channel.
   i) Start the listener by entering the following command:

      ```
      START LISTENER (LISTENER1)
      ```

      Note: Do not start the listener in the background from any shell that automatically lowers the priority of background processes.
   j) Define a receiver channel by entering the following command:

      ```
      DEFINE CHANNEL (QMA.QMB) CHLTYPE (RCVR) TRPTYPE (TCP)
      ```

A message tells you when the channel has been created.

k) End MQSC by typing:

```
end
```

Some messages are displayed, followed by the command prompt.

2. On the **sender** server:

a) As the sender server is an AIX system, log in as a user in the `mqm` group.

b) Set up the environment for the installation you are using by entering the following command at the command prompt:

```
. MQ_INSTALLATION_PATH/bin/setmqenv -s
```

where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.

c) Create a queue manager called `QMA` by entering the following command at the command prompt:

```
crtmqm QMA
```

Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.

d) Start the queue manager, by entering the following command:

```
strmqm QMA
```

A message tells you when the queue manager has started.

e) Start MQSC by entering the following command:

```
runmqsc QMA
```

A message tells you that an MQSC session has started. MQSC had no command prompt.

f) Define a local queue called `QMB` (to be used as a transmission queue) by entering the following command:

```
DEFINE QLOCAL (QMB) USAGE (XMITQ)
```

A message tells you when the queue has been created.

g) Define a local definition of the remote queue with by entering the following command:

```
DEFINE QREMOTE (LOCAL.DEF.OF.REMOTE.QUEUE) RNAME (RECEIVER.Q) RQMNAME ('QMB') XMITQ (QMB)
```

h) Define a sender channel by entering one of the following commands:

con-name is the TCP/IP address of the receiver system. If both installations are on the same system, the *con-name* is `localhost`. *port* is the port you noted in 1 b. If you do not specify a port, the default value of 1414 is used.

```
DEFINE CHANNEL (QMA.QMB) CHLTYPE (SDR) CONNAME ('CON-NAME(PORT)') XMITQ (QMB) TRPTYPE (TCP)
```

i) Start the sender channel by entering the following command:

```
START CHANNEL(QMA.QMB)
```

The receiver channel on the receiver server starts automatically when the sender channel starts.

j) Stop MQSC by entering the following command:

```
end
```

Some messages are displayed, followed by the command prompt.

k) If the sender server is a Linux or AIX system, change into the *MQ_INSTALLATION_PATH*/samp/bin directory. This directory contains the sample programs. *MQ_INSTALLATION_PATH* represents the high-level directory in which IBM MQ is installed.

l) If both the sender server and receiver server are installations on the same system, check that the queue managers have been created on different installations by entering the following command:

```
dspmq -o installation
```

If the queue managers are on the same installation, move either QMA to the sender installation or QMB to the receiver installation by using the **setmqm** command. For more information, see setmqm.

m) Put a message on the local definition of the remote queue, which in turn specifies the name of the remote queue. Enter one of the following commands:

- On AIX and Linux:

```
./amqsput LOCAL.DEF.OF.REMOTE.QUEUE QMA
```

- On Windows:

```
amqsput LOCAL.DEF.OF.REMOTE.QUEUE QMA
```

A message tells you that amqsput has started.

n) Type some message text on one or more lines, followed by a blank line.

A message tells you that amqsput has ended. Your message is now on the queue and the command prompt is displayed again.

3. On the **receiver** server:

a) As your receiver server is an AIX system, change into the *MQ_INSTALLATION_PATH*/samp/bin directory.

This directory contains the sample programs. *MQ_INSTALLATION_PATH* represents the high-level directory in which IBM MQ is installed.

b) Get the message from the queue on the receiver by entering the following command:

```
./amqsget RECEIVER.Q QMB
```

The sample program starts, and your message is displayed. After a pause, the sample ends. Then the command prompt is displayed.

Results

You have now successfully verified the server-to-server installation.

AIX *Verifying a client installation using the command line on AIX*

You can verify a client installation using the command line. On the server you create a queue manager, a local queue, a listener, and a server-connection channel. You must also apply security rules to allow the client to connect and make use of the queue defined. On the client you create a client-connection channel, and then use the sample PUT and GET programs to complete the verification procedure.

About this task

The verification procedure shows how to create a queue manager called queue.manager.1, a local queue called QUEUE1, and a server-connection channel called CHANNEL1 on the server.

It shows how to create the client-connection channel on the IBM MQ MQI client workstation. It then shows how to use the sample programs to put a message onto a queue, and get the message from the queue.

The example does not address any client security issues. See Setting up IBM MQ MQI client security for details if you are concerned with IBM MQ MQI client security issues.

The verification procedure assumes that:

- The full IBM MQ server product has been installed on a server.
- The server installation is accessible on your network.
- The IBM MQ MQI client software has been installed on a client system.
- The IBM MQ sample programs have been installed.
- TCP/IP has been configured on the server and client systems. For more information, see Configuring connections between the server and client.

Procedure

1. Set up the server using the command line, using the instructions in "Setting up the server using the command line on AIX" on page 57.
2. Set up the client, using the instructions in "Connecting to a queue manager, using the MQSERVER environment variable on AIX" on page 58.
3. Test the communications between client and server, using the instructions in "Testing communication between a client and a server on AIX" on page 59.

AIX *Setting up the server using the command line on AIX*

Follow these instructions to create a queue manager, queue, and channel on the server. You can then use these objects to verify the installation.

About this task

These instructions assume that no queue manager or other IBM MQ objects have been defined.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Create a user ID on the server that is not in the `mqm` group.

   This user ID must exist on the server and client. This is the user ID that the sample applications must be run as, otherwise a 2035 error is returned.
2. Log in as a user in the mqm group.
3. You must set various environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

```
. MQ_INSTALLATION_PATH/bin/setmqenv -s
```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
4. Create a queue manager called `QUEUE.MANAGER.1` by entering the following command:

```
crtmqm QUEUE.MANAGER.1
```

   You see messages telling you that the queue manager has been created.
5. Start the queue manager by entering the following command:

```
strmqm QUEUE.MANAGER.1
```

   A message tells you when the queue manager has started.
6. Start MQSC by entering the following command:

```
runmqsc QUEUE.MANAGER.1
```

   A message tells you that an MQSC session has started. MQSC has no command prompt.

7. Define a local queue called QUEUE1 by entering the following command:

   ```
   DEFINE QLOCAL(QUEUE1)
   ```

   A message tells you when the queue has been created.
8. Allow the user ID that you created in step 1 to use QUEUE1 by entering the following command:

   ```
   SET AUTHREC PROFILE(QUEUE1) OBJTYPE(QUEUE) PRINCIPAL(' non_mqm_user ') AUTHADD(PUT,GET)
   ```

   where *non_mqm_user* is the user ID created in step 1. A message tells you when the authorization has been set. You must also run the following command to give the user ID authority to connect:

   ```
   SET AUTHREC OBJTYPE(QMGR) PRINCIPAL(' non_mqm_user ') AUTHADD(CONNECT)
   ```

   If this command is not run, a 2305 stop error is returned.
9. Define a server-connection channel by entering the following command:

   ```
   DEFINE CHANNEL (CHANNEL1) CHLTYPE (SVRCONN) TRPTYPE (TCP)
   ```

   A message tells you when the channel has been created.
10. Allow your client channel to connect to the queue manager and run under the user ID that you created in step 1, by entering the following MQSC command:

    ```
    SET CHLAUTH(CHANNEL1) TYPE(ADDRESSMAP) ADDRESS(' client_ipaddr ') MCAUSER(' non_mqm_user ')
    ```

    where *client_ipaddr* is the IP address of the client system, and *non_mqm_user* is the user ID created in step 1. A message tells you when the rule has been set.
11. Define a listener by entering the following command:

    ```
    DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT (port_number)
    ```

    where *port_number* is the number of the port the listener is to run on. This number must be the same as the number used when defining your client-connection channel in "Installing an IBM MQ client on AIX" on page 49.

    Note: If you omit the port parameter from the command, a default value of 1414 is used for the listener port. If you want to specify a port other than 1414, you must include the port parameter in the command, as shown.
12. Start the listener by entering the following command:

    ```
    START LISTENER (LISTENER1)
    ```
13. Stop MQSC by entering:

    ```
    end
    ```

    You see some messages, followed by the command prompt.

What to do next

Follow the instructions to set up the client. See "Connecting to a queue manager, using the MQSERVER environment variable on AIX" on page 58.

AIX *Connecting to a queue manager, using the MQSERVER environment variable on AIX*

When an IBM MQ application is run on the IBM MQ MQI client, it requires the name of the MQI channel, the communication type, and the address of the server to be used. Provide these parameters by defining the MQSERVER environment variable.

Before you begin

Before you start this task, you must complete the task, "Setting up the server using the command line on AIX" on page 57, and save the following information:

- The host name or IP address of the server and port number that you specified when creating the listener.
- The channel name of the server-connection channel.

About this task

This task describes how to connect an IBM MQ MQI client, by defining the MQSERVER environment variable on the client.

You can give the client access to the generated client channel definition table, `amqclchl.tab` instead; see Accessing client-connection channel definitions.

Procedure

1. Log in as the userid that you created in Step 1 of "Verifying a client installation using the command line on AIX" on page 56.
2. Check the TCP/IP connection. From the client, enter one of the following commands:
   - `ping server-hostname`
   - `ping n.n.n.n`

     `n.n.n.n` represents the network address. You can set the network address in IPv4 dotted decimal form, for example, `192.0.2.0`. Alternatively, set the address in IPv6 hexadecimal form, for example `2001:0DB8:0204:acff:fe97:2c34:fde0:3485`.

   If the **ping** command fails, correct your TCP/IP configuration.
3. Set the MQSERVER environment variable. From the client, enter the following command:

   ```
   export MQSERVER=CHANNEL1/TCP/'server-address (port)'
   ```

   Where:
   - *CHANNEL1* is the server-connection channel name.
   - *server-address* is the TCP/IP host name of the server.
   - *port* is the TCP/IP port number the server is listening on.

   If you do not give a port number, IBM MQ uses the one specified in the `qm.ini` file, or the client configuration file. If no value is specified in these files, IBM MQ uses the port number identified in the TCP/IP services file for the service name `MQSeries`. If an `MQSeries` entry in the services file does not exist, a default value of 1414 is used. It is important that the port number used by the client and the port number used by the server listener program are the same.

What to do next

Use the sample programs to test communication between the client and server; see "Testing communication between a client and a server on AIX" on page 59.

AIX *Testing communication between a client and a server on AIX*

On the IBM MQ MQI client workstation, use the `amqsputc` sample program to put a message on the queue at the server workstation. Use the `amqsgetc` sample program to get the message from the queue back to the client.

Before you begin

Complete the previous topics in this section:

- Set up a queue manager, channels, and queue.
- Open a command window.
- Set system environment variables.

About this task

Note that IBM MQ object definitions are case-sensitive. Text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Change to the *MQ_INSTALLATION_PATH*/samp/bin directory, which contains the sample programs.

   MQ_INSTALLATION_PATH represents the high-level directory in which IBM MQ is installed.
2. You must set certain environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   . MQ_INSTALLATION_PATH/bin/setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
3. Start the PUT program for QUEUE1 on QUEUE.MANAGER.1 by entering the following command:

   ```
   ./amqsputc QUEUE1 QUEUE.MANAGER.1
   ```

   If the command is successful, the following messages are displayed:

   ```
   Sample AMQSPUT0 start target queue is QUEUE1
   ```

   Tip: You might get the error, MQRC_NOT_AUTHORIZED (2035). By default, channel authentication is enabled when a queue manager is created. Channel authentication prevents privileged users accessing a queue manager as an IBM MQ MQI client. For verifying the installation, you can either change the MCA user ID to a non-privileged user, or disable channel authentication. To disable channel authentication run the following MQSC command:

   ```
   ALTER QMGR CHLAUTH(DISABLED)
   ```

   When you finish the test, if you do not delete the queue manager, re-enable channel authentication:

   ```
   ALTER QMGR CHLAUTH(ENABLED)
   ```
4. Type some message text, then press **Enter** twice.

   The following message is displayed:

   ```
   Sample AMQSPUT0 end
   ```

   Your message is now on the queue that is on the server queue manager.
5. Start the GET program for QUEUE1 on QUEUE.MANAGER.1 by entering the following command:

   ```
   ./amqsgetc QUEUE1 QUEUE.MANAGER.1
   ```

   The sample program starts, and your message is displayed. After a short pause (approximately 30 seconds), the sample ends and the command prompt is displayed again.

Results

You have now successfully verified the client installation.

What to do next

1. You must set various environment variables on the server so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   .  MQ_INSTALLATION_PATH/bin/setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
2. On the server, stop the queue manager by entering the following command:

```
endmqm QUEUE.MANAGER.1
```

3. On the server, delete the queue manager by entering the following command:

```
dltmqm QUEUE.MANAGER.1
```

AIX *Selecting a national language for displaying messages on AIX*

To display messages from a different national language message catalog, you must install the appropriate catalog and set the **LANG** environment variable.

About this task

Messages in the language specified by the locale selected on your machine at installation time are installed by default.

To find out which language is currently in use, run the **locale** command.

If this returns a language which is not one of the national languages provided by IBM MQ, you must select a national language, otherwise you will not get a message catalog installed on your system.

Message catalogs for all languages are installed in *MQ_INSTALLATION_PATH*/msg/*language identifier*, where *language identifier* is one of the identifiers in Table 6 on page 61. If you require messages in a different language, perform the following steps:

Procedure

1. Install the appropriate message catalog (see “IBM MQ components and features” on page 6).
2. To select messages in a different language, ensure the **LANG** environment variable is set to the identifier for the language you want to install:

Table 6. Language identifiers

Identifier	**Language**
cs_CZ	Czech
de_DE	German
es_ES	Spanish
fr_FR	French
hu_HU	Hungarian
it_IT	Italian
ja_JP	Japanese
ko_KR	Korean
pl_PL	Polish
pt_BR	Brazilian Portuguese
zh_CN	Simplified Chinese
zh_TW	Traditional Chinese

AIX has some additional message catalogs:

Table 7. AIX specific language identifiers

Identifier	**Language**
Ja_JP	Japanese

Table 7. AIX specific language identifiers (continued)	
Identifier	**Language**
Zh_CN	Simplified Chinese
Zh_TW	Traditional Chinese

AIX Uninstalling or modifying IBM MQ on AIX

On AIX, you can uninstall the IBM MQ server or client using the System Management Interface Tool (SMIT) or the **installp** command. You can also modify an installation by uninstalling a subset of the file sets.

Before you begin

If any updates have been applied, remove them before starting the uninstallation or modification procedure. For more information, see "Reverting to the previous maintenance level on AIX" on page 295.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling or modifying, if you have not already done so.
2. For a server installation, end any IBM MQ activity associated with the installation you are uninstalling or modifying:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall or modify. Enter the following command:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   c) Display the state of all queue managers on the system. Enter the following command:

      ```
      dspmq -o installation
      ```

   d) Stop all running queue managers associated with the installation you want to uninstall or modify. Enter the following command for each queue manager:

      ```
      endmqm QMgrName
      ```

   e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

      ```
      endmqlsr -m QMgrName
      ```

3. Log in as root.
4. Uninstall or modify IBM MQ using either **installp** or **smit**. If IBM MQ was installed in a non-default location, you must use **installp**.
   - To uninstall or modify IBM MQ by using **installp**, enter one of the following commands:
     – To uninstall an installation in the default location `/usr/mqm`:

       ```
       installp -u mqm
       ```

     – To uninstall an installation in a non-default location:

```
installp -R usil -u mqm
```

where *usil* is the path of the User Specified Installation Location (USIL) specified when the product was installed.

– To modify an installation in a non-default location:

```
installp -R usil -u list of file sets
```

where *usil* is the path of the User Specified Installation Location (USIL) specified when the product was installed.

- To uninstall or modify IBM MQ by using **smit**, complete the following steps:

  a. Select the required **smit** window using the following sequence:

  ```
  Software Installation and Maintenance
  Software Maintenance and Utilities
  Remove Installed Software
  ```

  b. List the software in the **SOFTWARE name** field:

  i) Enter **.**

  ii) Press **F4**

  c. Select the file sets to uninstall from the list (those beginning with mqm):

  – For a complete uninstall, select all file sets.

  – To modify the installation, select a subset of the file sets.

  After selecting the file sets, press **Enter**. There is an option at this stage to do a preview. Leave the option set to the default value of **Yes** to preview the file sets you are uninstalling, or select **No** to not preview these file sets.

  d. Press **Enter** on the **Remove Installed Software** panel, it asks whether you are sure, press **Enter**.

Results

After uninstallation, certain files under the directory trees `/var/mqm` and `/etc/opt/mqm` are not removed. These files contain user data and remain so subsequent installations can reuse the data. Most of the remaining files contain text, such as INI files, error logs, and FDC files. The directory tree `/var/mqm/shared` contains files that are shared across installations, including the executable shared libraries `libmqzsd.a` and `libmqzsd_r.a`.

What to do next

- If the product successfully uninstalled, you can delete any files and directories contained in the `/usr/mqm` directory under the User Specified Installation Location (USIL) specified in the **installp** uninstallation command.
- Use the **lslpp** command to check for other products installed in the USIL. If there are no other products installed in the USIL and you do not intend to use it again, you can delete the USIL using the **rmusil** command.
- If there are no other IBM MQ installations on the system, and you are not planning to reinstall or migrate, you can delete the `/var/mqm` and `/etc/opt/mqm` directory trees, including the files `libmqzsd.a` and `libmqzsd_r.a`. Deleting these directories destroys all queue managers and their associated data.
- You can optionally remove installations, once IBM MQ is uninstalled, from the Installation configuration file, mqinst.ini using the commands listed.

  Note: If you are not going to install another version of IBM MQ, you can delete the existing installations using the **dltmqinst** command. Otherwise, if you install IBM MQ to the same location, the old installation name is applied.

IBM i Installing and uninstalling IBM MQ on IBM i

Installation tasks that are associated with installing IBM MQ on IBM i systems are grouped in this section.

About this task

To prepare for installation and to install the IBM MQ components, complete the following tasks.

For information about how to uninstall IBM MQ, see “Uninstalling IBM MQ for IBM i” on page 89.

If product fixes or updates are made available, see “Applying maintenance to IBM MQ” on page 291.

Procedure

1. Check the system requirements.
   See “Hardware and software requirements on IBM i systems” on page 65.
2. Plan your installation.
   - As part of the planning process, you must choose which components to install and where to install them. See “IBM MQ components for IBM i” on page 64.
   - You must also make some platform-specific choices. See “Planning to install IBM MQ on IBM i” on page 66.
3. Prepare your system for installation of IBM MQ.
   See “Preparing the system on IBM i” on page 66.
4. Install IBM MQ server.
   See “Installing IBM MQ server on IBM i” on page 68.
5. Optional: Install an IBM MQ client.
   See “Installing an IBM MQ client on IBM i” on page 80.
6. Verify your installation. See “Verifying an IBM MQ installation on IBM i” on page 85.

IBM i IBM MQ components for IBM i

The IBM MQ components that are available for IBM i.

Important: For details of what each purchase of IBM MQ entitles you to install, see IBM MQ license information.

The components are as follows:

Server (Base)
Support to enable you to create and support your own applications. This includes the runtime component that provides support for external applications. It also includes support for client connections from IBM MQ installations on other computers.

Samples (Option 1)
Sample application programs. The source is supplied in the QMQMSAMP library and executable files are supplied in the QMQM library.

AMS (Option 2)
The AMS component.

IBM MQ Console and REST API (Option 3)
Adds HTTP based administration for IBM MQ through the REST API and IBM MQ Console.

To use this feature, you must install the following prerequisites:

- 5724L26 IBM MQ Java Messaging and Web Services
- 5770JV1 Java SE 8

Managed File Transfer (MFT) components

***BASE**
Support to enable you to create and support your own MFT applications. It also includes support for client connections from IBM MQ MFT installations on other computers.

2
Tools support

3
Agent

4
Services

You must install *BASE first because the other three options depend on *BASE. Note that option 4 requires that option 3 is installed.

Related concepts
"IBM MQ components and features" on page 6
You can select the components or features that you require when you install IBM MQ.

IBM i Hardware and software requirements on IBM i systems

Check that the server environment meets the prerequisites for installing IBM MQ for IBM i.

Before installation, you must check that your system meets the hardware and software requirements set out in the IBM MQ system requirements page. See System Requirements for IBM MQ.

Storage requirements for IBM MQ server

The storage requirements for IBM i depend on which components you install, and how much working space you need. The storage requirements also depend on the number of queues that you use, the number and size of the messages on the queues, and whether the messages are persistent. You also require archiving capacity on disk, tape, or other media. For more information, see System Requirements for IBM MQ.

Disk storage is also required:

- Prerequisite software
- Optional software
- Your application programs

Installing prerequisite software

To install the prerequisite software that is provided in the IBM MQ server installation image, choose one of the following options:

- Navigate to the root of the server installation image, then double-click `setup.exe`. The IBM MQ Installation Launchpad window is displayed. From this window, click the **Software Prerequisites** option. Use this option to check what prerequisite software is already installed, then install any missing software.
- Navigate to the `Prereqs` folder of the server installation image. Select the folder for the software item to be installed, then start the installation program.

Prerequisite PTFs for multiple certificate support

You are not limited to a single certificate for TLS channels. To use multiple certificates on IBM i platforms, you must install the following program temporary fixes (PTFs):

MF57749
MF57889

SI52214
MF58003

See Digital certificate labels: understanding the requirements for details about how to select certificates by using certificate labels.

Related concepts

“License requirements” on page 8
You must have purchased sufficient licenses for your installation. The details of the license agreement is stored on your system at installation time so that you can read it at any time. IBM MQ supports IBM License Metric Tool (ILMT).

“Where to find product requirements and support information” on page 11
Before you install IBM MQ, you must check for the latest information and system requirements.

IBM i Planning to install IBM MQ on IBM i

Before you install IBM MQ on IBM i, you must choose which components to install and where to install them. You must also make some platform-specific choices.

About this task

The following steps provide links to additional information to help you with planning your installation of IBM MQ on IBM i.

Procedure

1. As part of your planning activities, make sure that you review the information on hardware and software requirements for the platform on which you are planning to install IBM MQ.

   For more information, see “Hardware and software requirements on IBM i systems” on page 65.
2. Decide which IBM MQ components and features to install.

   See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.

   Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. For more information, see “License requirements” on page 8 and IBM MQ license information.

IBM i Preparing the system on IBM i

On IBM i systems, you might have to complete several tasks before you install IBM MQ. You might also want to complete other tasks, depending on your installation intentions.

About this task

The tasks that you perform to prepare your systems for installation are listed here. Complete the appropriate tasks for your platform before installing.

Procedure

Configure any additional settings needed for your IBM i system.

See “Configuring and tuning the operating system on IBM i” on page 67.

What to do next

When you have completed the tasks to prepare the system, you are ready to start installing IBM MQ. To install a server, see “Installing IBM MQ server on IBM i” on page 68. To install a client, see “Installing an IBM MQ client on IBM i” on page 80.

Related tasks

Planning

"Maintaining and migrating IBM MQ" on page 287
Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

"Applying maintenance to IBM MQ" on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

IBM i *Configuring and tuning the operating system on IBM i*

Before installing IBM MQ for IBM i, there are several system values which need to be checked using the DSPSYSVAL command. If necessary, reset the values using the CHGSYSVAL command.

Check the following values and change if required:

QCCSID

Every message has a coded-character set identifier (CCSID) in its header. The CCSID tag identifies the code page and character set of the source.

A queue manager obtains its CCSID from the job that created it. If the job CCSID is not a valid value in the range 1-65534, the queue manager uses the default CCSID value (65535) instead. You can change the CCSID used by the IBM MQ queue manager by using the CL command **CHGMQM**.

Note: The CCSID must be either single-byte character set (SBCS), or mixed, that is SBCS and DBCS. It must not be DBCS only.

QSYSLIBL

Ensure that QSYS2 is included in the list of libraries that make up the system part of the library list. IBM MQ uses programs in this library for data conversion and SNA LU 6.2 communication.

Note: Do not have QMQM as part of the system or user portion of the library list.

QALWOBJRST

Ensure that the QALWOBJRST system value is set to *ALL or *ALWPGMADP before you install MQ. If it is set to *NONE, installation fails.

After installation, reset QALWOBJRST to its original value to maintain system security.

QSHRMEMCTL

Ensure that the QSHRMEMCTL system value is set to 1 (Allowed).

A value of 1 is used in environments where pointers can be shared amongst programs between different jobs.

IBM MQ requires this setting to use the shared memory APIs shmat and shmget and to share its pointers across jobs.

If it is not set correctly, initialization of IBM MQ fails with system return code "3401" (Permission denied), and commands such as CRTMQM, STRMQM, ENDMQM, TRCMQM fail.

QFRCCVNRST

Ensure that the QFRCCVNRST system value is set to 0 (Restore all objects without conversion), or 1 (Objects with validation errors are converted), before you install MQ. If it is not set, installation fails.

QMLTTHDACN

Optionally set this to control the generation of messages into joblogs. Set QMLTTHDACN to 2 to get messages generated in a joblog; set it to 1 to avoid the messages. For example, the message CPD000D is an informational message that is generated when a command that is not thread-safe is issued from a multi-threaded application. Setting QMLTTHDACN to 1 avoids the message.

Related concepts

"Hardware and software requirements on IBM i systems" on page 65
Check that the server environment meets the prerequisites for installing IBM MQ for IBM i.

"License requirements" on page 8

You must have purchased sufficient licenses for your installation. The details of the license agreement is stored on your system at installation time so that you can read it at any time. IBM MQ supports IBM License Metric Tool (ILMT).

Related tasks

"Installing IBM MQ server on IBM i" on page 68
You install IBM MQ for IBM i by installing the IBM MQ server in its primary language, installing samples and installing additional languages.

IBM i Installing IBM MQ server on IBM i

You install IBM MQ for IBM i by installing the IBM MQ server in its primary language, installing samples and installing additional languages.

Before you begin

Note: Installing the latest version of the IBM MQ server includes client capabilities. Only install the stand-alone client if you do not need the server capabilities.

You have completed planning the installation, downloaded the installation eImage, and set the system values. See "Configuring and tuning the operating system on IBM i" on page 67.

For a complete list of IBM MQ installable services and components for IBM i systems, see Installable services and components for IBM i

About this task

How to install the base IBM MQ server in its primary language, install samples, and install translated versions from a choice of national-languages.

You can install only one instance of IBM MQ for IBM i in each partition of your server.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Install the IBM MQ for IBM i base product, and primary language.

   ```
   RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
   ```

   where the parameters of RSTLICPGM are,

   LICPGM(5724H72)
   The product identifier for IBM i.

   DEV(*installation device*)
   The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

   OPTION (*BASE)
   Install the IBM MQ for IBM i base product.

   Unspecified parameters
   Unspecified parameters, such as **RSTOBJ** (*ALL), revert to defaults. The command installs both IBM MQ and the language files for the primary language of your system. For installing additional languages, see step 4.
3. Optional: Install the samples using the command:

   ```
   RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (1) OUTPUT (*PRINT)
   ```

   Where the parameters of RSTLICPGM are,

   LICPGM (5724H72)
   The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (1)
Install the samples for IBM i.

OUTPUT (*PRINT)
The output is printed with the spooled output of the job.

4. Optional: Install the AMS component by using the following command:

```
RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (2) OUTPUT (*PRINT)
```

Where the parameters of RSTLICPGM are,

LICPGM (5724H72)
The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (2)
Install AMS for IBM i.

OUTPUT (*PRINT)
The output is printed with the spooled output of the job.

5. Optional: Install the WEB component by using the following command:

```
RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (3) OUTPUT (*PRINT)
```

Where the parameters of RSTLICPGM are,

LICPGM (5724H72)
The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (3)
Install the WEB component for IBM i.

OUTPUT (*PRINT)
The output is printed with the spooled output of the job.

Note: To use this feature, you must install the following prerequisites:

- 5724L26 IBM MQ Java Messaging and Web Services
- 5770JV1 Java SE 8

6. Optional: To install additional languages, sign on to the system with a user profile that has *ALLOBJ special authority. Choose a language code from the table.

Table 8. Globalizations of IBM MQ for IBM i.

Language ID	Language
2909	Belgian English
2966	Belgian French MNCS (Multi-National Character Set)
2980	Brazilian Portuguese
2981	Canadian French MNCS
2975	Czech
2924	English uppercase and lowercase
2984	English US DBCS
2938	English US uppercase DBCS

Table 8. Globalizations of IBM MQ for IBM i. (continued)	
Language ID	**Language**
2928	French
2940	French MNCS
2929	German
2939	German MNCS
2976	Hungarian
2932	Italian
2942	Italian MNCS
2962	Japanese
2930	Japanese Universal
2986	Korean
2978	Polish
2989	Simplified Chinese
2931	Spanish

- If installing Japanese language feature code 2962, ensure the CCSID of the job installing the product is set to 939 and not 930. Do this to avoid problems with invariant lowercase characters in CCSID 930

  ```
  CHGJOB CCSID(939)
  ```

- If the language feature code is not in the table then the product has not been translated into your language. You must choose one of the available language feature codes and install that version instead. You must manually change the system library list to use IBM MQ in that language load.

  ```
  CHGSYSLIBL LIB(QSYS2924)
  ```

  See also *How a language of your choice is displayed for licensed programs* in How a language is displayed for IBM i functions in the IBM i product documentation.
- If you are using Korean DBCS and you configure your terminal emulators to 24*80 sessions you might find that EDTF incorrectly displays DBCS characters in MQ error log messages that extend beyond 80 columns. To avoid this, configure your terminal emulators to use sessions capable of displaying 132 columns, for example 27*132.
- Issue the following command specifying the appropriate language ID:

  ```
  RSTLICPGM LICPGM(5724H72) DEV( installation device ) RSTOBJ(*LNG) LNG( language ID )
  ```

  This installs the commands, message file, and panel groups into the relevant QSYS library for the language. For example, library QSYS2928 is used for French. If this QSYS29nn library does not exist, it is created by the RSTLICPGM command.

7. To ensure that the product has loaded correctly, issue the Display Software Resources (DSPSFWRSC) command and check that the licensed program 5724H72 is listed. If you have installed the base and the optional samples, you see:

```
Resource
ID       Option Feature Description
5724H72  *BASE  5050    IBM MQ for IBM i
5724H72  *BASE  2924    IBM MQ for IBM i
5724H72  1      5050    IBM MQ for IBM i - Samples
```

8. Press F11, while viewing the Display Software Resources screen, and you see the library and version number of the products installed:

```
Resource         Feature
ID       Option Feature  Type    Library  Release
5724H72  *BASE  5050     *CODE   QMQM     V10R0M0
5724H72  *BASE  2924     *LNG    QMQM     V10R0M0
5724H72  1      5050     *CODE   QMQMSAMP V10R0M0
```

9. If you have installed additional language versions, you also see entries for these versions. For example, if you have installed the French version, for which the language ID is 2928, you see:
   a)

```
Resource
ID       Option Feature Description
5724H72  *BASE  2928    IBM MQ for IBM i
```

   b) and when you press F11:

```
Resource         Feature
ID       Option Feature  Type    Library   Release
5724H72  *BASE  2928     *LNG    QSYS2928  V10R0M0
```

10. Use the command DSPMQMVER to check exactly what version you have installed. For V10R0M0 with the latest fix pack applied, it reports:

```
Version: 10.0.0.1
```

11. Do the post installation tasks of checking for updates, checking program authorities and starting the IBM MQ subsystem, see “Performing post installation tasks for IBM MQ on IBM i” on page 78.

What to do next

If you want to see how the installation went in more detail, perform one or more of the following tasks:

- View the log file using the DSPJOBLOG command.
- View the spoolfile generated from the RSTLICPGM command.

If the installation of IBM MQ fails, see “Handling installation failures for IBM i” on page 79.

Related concepts

“Uninstalling IBM MQ for IBM i” on page 89
There are two ways of uninstalling IBM MQ for IBM i.

IBM i *Installing IBM MQ server silently on IBM i*

You can perform a non-interactive installation of IBM MQ using the CALL PGM(QSYS/QLPACAGR) command. A non-interactive installation is also known as a silent, or unattended installation.

Before you begin

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in “Preparing the system on IBM i” on page 66.

About this task

This topic describes the non-interactive installation of a server.

Procedure

1. Pre-agree the license terms and conditions for the base by running the command,

```
CALL PGM  ( QSYS/QLPACAGR) PARM ('5724H72' 'V9R2M0' '0000' 0)
```

Where the parameters of **PARM** are,

5724H72
The product identifier for IBM i.

V10R0M0
The version, release, and modification level.

0000
The option number for the IBM MQ product.

0
Unused error structure.

2. Optionally pre-agree the license terms and conditions for the samples by running the command,

```
CALL PGM (QSYS/QLPACAGR) PARM ('5724H72' 'V9R2M0' '0001' 0)
```

Where the parameters of **PARM** are,

5724H72
The product identifier for IBM i.

V10R0M0
The version, release, and modification level.

0001
The option number for the IBM MQ product.

0
Unused error structure.

3. Install the IBM MQ for IBM i base product, and primary language.

```
RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
```

where the parameters of RSTLICPGM are,

LICPGM(5724H72)
The product identifier for IBM i.

DEV(*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (*BASE)
Install the IBM MQ for IBM i base product.

Unspecified parameters
Unspecified parameters, such as **RSTOBJ** (*ALL), revert to defaults. The command installs both IBM MQ and the language files for the primary language of your system. For installing additional languages, see step 4.

4. Optional: Install the samples using the command:

```
RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (1) OUTPUT (*PRINT)
```

Where the parameters of RSTLICPGM are,

LICPGM (5724H72)
The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (1)
Install the samples for IBM i.

OUTPUT (*PRINT)
The output is printed with the spooled output of the job.

5. Optional: To install additional languages, sign on to the system with a user profile that has *ALLOBJ special authority. Choose a language code from the table.

Table 9. Globalizations of IBM MQ for IBM i.	
Language ID	**Language**
2909	Belgian English
2966	Belgian French MNCS (Multi-National Character Set)
2980	Brazilian Portuguese
2981	Canadian French MNCS
2975	Czech
2924	English uppercase and lowercase
2984	English US DBCS
2938	English US uppercase DBCS
2928	French
2940	French MNCS
2929	German
2939	German MNCS
2976	Hungarian
2932	Italian
2942	Italian MNCS
2962	Japanese
2930	Japanese Universal
2986	Korean
2978	Polish
2989	Simplified Chinese
2931	Spanish

- If installing Japanese language feature code 2962, ensure the CCSID of the job installing the product is set to 939 and not 930. Do this to avoid problems with invariant lowercase characters in CCSID 930

  ```
  CHGJOB CCSID(939)
  ```

- If the language feature code is not in the table then the product has not been translated into your language. You must choose one of the available language feature codes and install that version instead. You must manually change the system library list to use IBM MQ in that language load.

  ```
  CHGSYSLIBL LIB(QSYS2924)
  ```

  See also *How a language of your choice is displayed for licensed programs* in How a language is displayed for IBM i functions in the IBM i product documentation.
- If you are using Korean DBCS and you configure your terminal emulators to 24*80 sessions you might find that EDTF incorrectly displays DBCS characters in MQ error log messages that extend beyond 80 columns. To avoid this, configure your terminal emulators to use sessions capable of displaying 132 columns, for example 27*132.
- Issue the following command specifying the appropriate language ID:

```
RSTLICPGM LICPGM(5724H72) DEV( installation device ) RSTOBJ(*LNG) LNG( language ID )
```

This installs the commands, message file, and panel groups into the relevant QSYS library for the language. For example, library QSYS2928 is used for French. If this QSYS29nn library does not exist, it is created by the RSTLICPGM command.

6. To ensure that the product has loaded correctly, issue the Display Software Resources (DSPSFWRSC) command and check that the licensed program 5724H72 is listed. If you have installed the base and the optional samples, you see:

```
Resource
ID       Option Feature Description
5724H72  *BASE  5050    IBM MQ for IBM i
5724H72  *BASE  2924    IBM MQ for IBM i
5724H72  1      5050    IBM MQ for IBM i - Samples
```

7. Press F11, while viewing the Display Software Resources screen, and you see the library and version number of the products installed:

```
Resource         Feature
ID       Option Feature  Type    Library  Release
5724H72  *BASE  5050     *CODE   QMQM     V10R0M0
5724H72  *BASE  2924     *LNG    QMQM     V10R0M0
5724H72  1      5050     *CODE   QMQMSAMP V10R0M0
```

8. If you have installed additional language versions, you also see entries for these versions. For example, if you have installed the French version, for which the language ID is 2928, you see:

   a)
   ```
   Resource
   ID       Option Feature Description
   5724H72  *BASE  2928    IBM MQ for IBM i
   ```

   b) and when you press F11:

   ```
   Resource         Feature
   ID       Option Feature  Type    Library   Release
   5724H72  *BASE  2928     *LNG    QSYS2928  V10R0M0
   ```

9. Use the command DSPMQMVER to check exactly what version you have installed. For V10R0M0 with the latest fix pack applied, it reports:

```
Version: 10.0.0.1
```

10. Do the post installation tasks of checking for updates, checking program authorities and starting the IBM MQ subsystem, see “Performing post installation tasks for IBM MQ on IBM i” on page 78.

What to do next

If you want to see how the installation went in more detail, perform one or more of the following tasks:

- View the log file using the DSPJOBLOG command.
- View the spoolfile generated from the RSTLICPGM command.

If the installation of IBM MQ fails, see “Handling installation failures for IBM i” on page 79.

IBM i *Installing Managed File Transfer on IBM i*

Install IBM MQ Managed File Transfer for IBM i by installing IBM MQ Java Messaging and Web Services server in its primary language, and installing additional options.

Before you begin

Note: Installing the latest version of IBM MQ Managed File Transfer includes client capabilities.

You have completed planning the installation, downloaded the installation image, and set the system values. See “Configuring and tuning the operating system on IBM i” on page 67.

You have installed the following components:

Table 10. Software requirements for IBM MQ Managed File Transfer		
Program	**Option**	**Description**
5761JV1	14 or 15	Java SE 7 32 bit or Java SE 7 64 bit
5770SS1	39	International Components for Unicode
5724L26	*BASE	IBM MQ Java Messaging and Web Services

About this task

How to install base Managed File Transfer in its primary language, and install the other options.

You can install only one instance of Managed File Transfer for IBM i in each partition of your server.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Install Managed File Transfer for IBM i, base product.

   ```
   RSTLICPGM LICPGM (5725M50) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
   ```

   where the parameters of RSTLICPGM are,

   LICPGM (5725M50)
   The product identifier for Managed File Transfer for IBM i.

   DEV (*installation device*)
   The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

   OPTION (*BASE)
   Install Managed File Transfer for IBM i for the IBM MQ base product.

   Unspecified parameters
   Unspecified parameters such as **RSTOBJ** (*ALL), revert to defaults. The command installs both IBM MQ and the language files for the primary language of your system.
3. Optional: Install the tools using the command:

   ```
   RSTLICPGM LICPGM(5725M50) DEV(installation device) OPTION(2) OUTPUT(*PRINT)
   ```

   Where the parameters of RSTLICPGM are,

   LICPGM (5725M50)
   The product identifier for Managed File Transfer for IBM i.

   DEV (*installation device*)
   The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

   OPTION (2)
   Install the tools for Managed File Transfer for IBM i.

   OUTPUT (*PRINT)
   The output is printed with the spooled output of the job.

   Repeat step “3” on page 75 for options 3 (agent) and 4 (services)
4. To ensure that the product has loaded correctly, issue the Display Software Resources (DSPSFWRSC) command and check that the licensed program 5725M50 is listed. If you have installed the base and the optional tools, you see:

```
Resource
ID       Option  Feature  Description
5725M50  *BASE   5050     Managed File Transfer for IBM i
5725M50  *BASE   2924     Managed File Transfer for IBM i
5725M50  2       5050     Managed File Transfer for IBM i - Tools
```

5. Press F11, while viewing the Display Software Resources screen, and you see the library and version number of the products installed:

```
Resource
ID       Option  Feature  Type   Library  Release
5725M50  *BASE   5050     *CODE  QMQMMFT  V10R0M0
5725M50  *BASE   2924     *LNG   QMQMMFT  V10R0M0
5725M50  2       5050     *CODE  MFTTOOL  V10R0M0
```

6. Do the post installation tasks of checking for updates, checking program authorities, and starting the Managed File Transfer subsystem.

What to do next

If you want to see how the installation went in more detail, perform one or more of the following tasks:

- View the log file using the DSPJOBLOG command.
- View the spoolfile generated from the RSTLICPGM command.

If the installation of IBM MQ fails, see “Handling installation failures for IBM i” on page 79.

IBM i *Installing IBM MQ for IBM i from a downloaded installation image*

You can perform an installation of IBM MQ for IBM i from an installation image downloaded from IBM.

Before you begin

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in “Preparing the system on IBM i” on page 66.

About this task

Two installation images are provided as zip files, a client and server image. These images contain all the licensed programs, and a client only image for the clients only.

The client and server image contains all seven compressed IBM i save files (**SAVF**), while the client image contains four save files. The save files are:

- MQ92BASE - IBM MQ client and server base program objects
- MQ92SAMP - IBM MQ client & server samples
- MQ92EN24 - IBM MQ client and server English US (2924) language objects

plus the client only images:

- MQ92CBASE - IBM MQ client
- MQ92CSAMP - IBM MQ client samples
- MQ92JBASE - IBM MQ Java
- MQ92JSAMP - IBM MQ Java samples

Procedure

1. Download one of the installation images and extract it to a temporary directory.
2. On IBM i, create a library containing sufficient empty save files to hold the uploaded files by using the commands:

```
CRTLIB LIB(MQ92PROD)
CRTSAVF FILE(MQ92PROD/MQ92BASE) /* Server and Client */
CRTSAVF FILE(MQ92PROD/MQ92SAMP) /* Server and Client Samples */
CRTSAVF FILE(MQ92PROD/MQ92EN24) /* 2924 English */
CRTSAVF FILE(MQ92PROD/MQ92CBASE) /* Standalone Client */
CRTSAVF FILE(MQ92PROD/MQ92CSAMP) /* Standalone Client Samples */
CRTSAVF FILE(MQ92PROD/MQ92JBASE) /* Java and JMS Classes */
CRTSAVF FILE(MQ92PROD/MQ92JSAMP) /* Java and JMS Samples */
```

For additional languages

```
CRTSAVF FILE(MQ92PROD/MQ92EN09) /* 2929 Belgian English */
CRTSAVF FILE(MQ92PROD/MQ92FR28) /* 2928 French */
CRTSAVF FILE(MQ92PROD/MQ92JA30) /* 2930 Japanese */
CRTSAVF FILE(MQ92PROD/MQ92ES31) /* 2931 Spanish */
CRTSAVF FILE(MQ92PROD/MQ92IT32) /* 2932 Italian */
CRTSAVF FILE(MQ92PROD/MQ92EN38) /* 2938 English DBCS UPPERCASE */
CRTSAVF FILE(MQ92PROD/MQ92FR40) /* 2940 French MNCS */
CRTSAVF FILE(MQ92PROD/MQ92IT42) /* 2942 Italian MNCS */
CRTSAVF FILE(MQ92PROD/MQ92FR66) /* 2966 French MNCS */
CRTSAVF FILE(MQ92PROD/MQ92FR81) /* 2981 French MNCS */
CRTSAVF FILE(MQ92PROD/MQ92EN84) /* 2984 English DBCS */
CRTSAVF FILE(MQ92PROD/MQ92CZ75) /* 2975 Czech */
CRTSAVF FILE(MQ92PROD/MQ92HU76) /* 2976 Hungarian */
CRTSAVF FILE(MQ92PROD/MQ92PL78) /* 2978 Polish */
CRTSAVF FILE(MQ92PROD/MQ92PT80) /* 2980 Portugese/Brazilian */
CRTSAVF FILE(MQ92PROD/MQ92JA62) /* 2962 Japanese */
CRTSAVF FILE(MQ92PROD/MQ92KO86) /* 2986 Korean */
CRTSAVF FILE(MQ92PROD/MQ92ZH89) /* 2989 Chinese */
CRTSAVF FILE(MQ92PROD/MQ92DE29) /* 2929 German */
CRTSAVF FILE(MQ92PROD/MQ92DE39) /* 2939 German */
```

3. Start an ftp session to your IBM i machine and upload the required save files with the commands:

```
ftp (your_ibmi_hostname)
bin
put MQ92BASE MQ92PROD/MQ92BASE
put MQ92SAMP MQ92PROD/MQ92SAMP
put MQ92EN24 MQ92PROD/MQ92EN24
put MQ92CBASE MQ92PROD/MQ92CBASE
put MQ92CSAMP MQ92PROD/MQ92CSAMP
put MQ92JBASE MQ92PROD/MQ92JBASE
put MQ92JSAMP MQ92PROD/MQ92JSAMP
```

For additional language loads:

```
put MQ92EN09 MQ92PROD/MQ92EN09
put MQ92FR28 MQ92PROD/MQ92FR28
put MQ92JA30 MQ92PROD/MQ92JA30
put MQ92ES31 MQ92PROD/MQ92ES31
put MQ92IT32 MQ92PROD/MQ92IT32
put MQ92EN38 MQ92PROD/MQ92EN38
put MQ92FR40 MQ92PROD/MQ92FR40
put MQ92IT42 MQ92PROD/MQ92IT42
put MQ92FR66 MQ92PROD/MQ92FR66
put MQ92FR81 MQ92PROD/MQ92FR81
put MQ92EN84 MQ92PROD/MQ92EN84
put MQ92CZ75 MQ92PROD/MQ92CZ75
put MQ92HU76 MQ92PROD/MQ92HU76
put MQ92PL78 MQ92PROD/MQ92PL78
put MQ92RU79 MQ92PROD/MQ92RU79
put MQ92PT80 MQ92PROD/MQ92PT80
put MQ92JA62 MQ92PROD/MQ92JA62
put MQ92KO86 MQ92PROD/MQ92KO86
put MQ92ZH89 MQ92PROD/MQ92ZH89
put MQ92DE29 MQ92PROD/MQ92DE29
put MQ92DE39 MQ92PROD/MQ92DE39
```

4. To prepare for installation of IBM MQ for IBM i, sign on to your IBM i machine and ensure that you have followed the instructions detailed in “Preparing the system on IBM i” on page 66.
5. Enter the **RSTLICPGM** commands, specifying the installation device as *SAVF and naming the save file containing the options that you want to install.

The IBM MQ Java licensed program can be installed stand-alone or can coexist with any of the other licensed programs.

The IBM MQ client can be installed standalone, but it can only coexist with the IBM MQ Java on the same system.

Attempting to install the IBM MQ server on a system where the IBM MQ client is already installed performs a slip installation upgrade, replacing the client with the server licensed program.

Attempting to install the IBM MQ client stand-alone over the top of an existing server licensed program is not possible, and the installation fails.

For example:

```
/* IBM MQ Client and Server program objects */
RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ92PROD/MQ92BASE) +
RSTOBJ(*PGM) OPTION(*BASE) OUTPUT(*PRINT)

/* IBM MQ Client & Server English 2924 Language Load */
RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ92PROD/MQ92EN24) +
RSTOBJ(*LNG) LNG(2924) OUTPUT(*PRINT)

/* Additional languages - alter SAVF and LNG parameters... */
/* IBM MQ Client & Server Japanese 2930 Language Load */
RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ92PROD/MQ92JA30) +
RSTOBJ(*LNG) LNG(2930) OUTPUT(*PRINT)

/* IBM MQ Client & Server Samples */
RSTLICPGM LICPGM(5724H72) DEV(*SAVF) SAVF(MQ92PROD/MQ92SAMP) +
OPTION(1) OUTPUT(*PRINT)

/* IBM MQ Java */
RSTLICPGM LICPGM(5724L26) DEV(*SAVF) SAVF(MQ92PROD/MQ92JBASE) +
OPTION(*BASE) OUTPUT(*PRINT)

/* IBM MQ Java Samples */
RSTLICPGM LICPGM(5724L26) DEV(*SAVF) SAVF(MQ92PROD/MQ92JSAMP) +
OPTION(1) OUTPUT(*PRINT)

/* IBM MQ Client */
RSTLICPGM LICPGM(5725A49) DEV(*SAVF) SAVF(MQ92PROD/MQ92CBASE) +
OPTION(*BASE) OUTPUT(*PRINT)

/* IBM MQ Client Samples */
RSTLICPGM LICPGM(5725A49) DEV(*SAVF) SAVF(MQ92PROD/MQ92CSAMP) +
OPTION(1) OUTPUT(*PRINT)
```

6. Do the post installation tasks of checking for updates, checking program authorities and starting the IBM MQ subsystem, see “Performing post installation tasks for IBM MQ on IBM i” on page 78.

What to do next

If you want to see how the installation went in more detail, perform one or more of the following tasks:

- View the log file using the DSPJOBLOG command.
- View the spoolfile generated from the RSTLICPGM command.

If the installation of IBM MQ fails, see “Handling installation failures for IBM i” on page 79.

IBM i *Performing post installation tasks for IBM MQ on IBM i*

Tasks to perform after you have installed IBM MQ for IBM i, and before using it.

About this task

When you have correctly installed IBM MQ for IBM i on your system:

Procedure

1. See the IBM MQ website at IBM MQ product page for the latest product information.
2. Install and apply all fix packs.

3. Where you have more than one system and a mixture of releases of OS/400 or IBM i, and IBM MQ, you must take care when compiling CL programs. You must compile CL programs either on the system they are to run on, or on one with an identical combination of releases of OS/400 or IBM i, and IBM MQ. When you install later versions of IBM MQ, delete all IBM MQ commands from previous releases in any QSYSVvRrMm libraries using the QSYS/DLTCMD command.
4. If you have not installed IBM MQ on your system before, you must add user profiles to the QMQMADM group profile. Make all user profiles that are to be used for creating and administering queue managers members of the QMQMADM group profile, using the command CHGUSRPRF.
   a) Start the IBM MQ subsystem, by issuing the command:

```
STRSBS SBSD(QMQM/QMQM)
```

   Note: The subsystem must be started after each IPL of the system, so you might choose to start it as part of your system startup process.

5. Create the system-default objects. The system-default objects are created automatically when you issue the CRTMQM command to create a queue manager. For example: CRTMQM MQMNAME(QMGRNAME) ASP(*SYSTEM). You can refresh them using the STRMQM command (Warning: this command will replace any existing default objects). For example: STRMQM MQMNAME(QMGRNAME) RDEFSYS(*YES). Refer to the onscreen help for information about using this command.

   Note: on the command STRMQM MQMNAME(QMGRNAME) RDEFSYS(*YES):

   - The command does not re-create the objects, it performs a CRTxxxx REPLACE(*YES) for all of the SYSTEM.* objects.
   - This means that it refreshes the parameters on the objects back to their defaults. So if, for example, on the SYSTEM.DEFAULT.LOCAL.QUEUE object, TRGENBL had previously been changed to *YES, then, when the command is run, it is changed back to TRGENBL(*NO).
   - If any messages exist on a queue, they are not removed, because the queues are not physically deleted.
   - The contents of the SYSTEM.AUTH.DATA.QUEUE are untouched when this command is run.
   - So, if the contents of this (or any other significant queue) become corrupt, it must be physically deleted and re-created either from scratch, or from a backup.

Results

You are now ready to start using IBM MQ for IBM i.

Note: When you install IBM MQ for IBM i, two user profiles are created:

- QMQM
- QMQMADM

These two objects are central to the correct running of IBM MQ for IBM i. Do not alter or delete them. If you do, IBM cannot guarantee correct behavior of your product.

If you uninstall IBM MQ and data, these profiles are deleted. If you uninstall IBM MQ only, these profiles are retained.

IBM i *Handling installation failures for IBM i*

If the installation of IBM MQ Server or Client for IBM i fails, you must remove the installed and partially installed objects before attempting reinstallation.

Procedure

1. Delete installed options using DLTLICPGM LICPGM(5725A49)OPTION(*ALL).

2. Delete partially installed options by deleting the QMQM library (and the QMQMSAMP libraries if necessary).
3. Delete the IFS directory /QIBM/ProdData/mqm and its subdirectories using the EDTF command, for example: EDTF STMF('/QIBM/ProdData') and select **option 9** for the mqm directory.

   If the installation of IBM MQ Java fails, remove the partly installed objects before attempting reinstallation:

   a. Delete the QMQMJAVA library.

   b. Delete the IFS directory /QIBM/ProdData/mqm/java and its subdirectories using the **EDTF** command, for example:

   ```
   EDTF STMF ('/QIBM/ProdData/mqm')
   ```

   Select option 9 against the Java directory.

IBM i Installing an IBM MQ client on IBM i

The IBM MQ client for IBM i is a part of the IBM MQ product.

Before you begin

Attention: If you have already installed the IBM MQ server, you already have a client and must not attempt to install the stand-alone client.

You can install only one instance of IBM MQ client for IBM i in each partition of your server.

When you install IBM MQ client for IBM i two user profiles are created:

- QMQM
- QMQMADM

These two objects are central to the correct running of IBM MQ for IBM i. Do not alter or delete them. If you do, IBM cannot guarantee correct behavior of your product. These profiles are retained when the product is deleted.

About this task

This procedure covers the installation of both the client and the client samples. If you do not want to install the client samples, then do not complete the steps specific to the samples.

After following the optional step to pre-agree the license, and then issuing the **RSTLICPGM** command, the installation runs without requiring any interactive input.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Optional: Pre-agree the license terms and conditions. If you do not choose to pre-agree the license, the license agreement is displayed for you to accept. Run the following commands to pre-agree the license terms and conditions:

   a) For the client:

   ```
   CALL PGM (QSYS/QLPACAGR) PARM ('5725A49' 'V9R2M0' '0000' 0)
   ```

   The parameters of **PARM** are:

   5725A49
   The product identifier for IBM MQ client for IBM i

   V10R0M0
   The version, release, and modification level

0000
The option number for the base IBM MQ client for IBM i product

0
Unused error structure

b) For the client samples:

```
CALL PGM (QSYS/QLPACAGR) PARM ('5725A49' 'V9R2M0' '0001' 0)
```

The parameters of **PARM** are:

5725A49
The product identifier for IBM MQ client for IBM i

V10R0M0
The version, release, and modification level

0001
The option number for the samples

0
Unused error structure

3. Issue the installation command to run the installation without requiring any interactive input:
   a) Install the client by issuing the following command:

```
RSTLICPGM LICPGM (5725A49) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
```

The parameters of RSTLICPGM are:

LICPGM (5725A49)
The product identifier for IBM MQ client for IBM i

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01

OPTION (*BASE)
The level of IBM MQ client for IBM i product installed

OUTPUT (*PRINT)
Whether the spooled output of the job is printed

   b) Install the samples by issuing the following command:

```
RSTLICPGM LICPGM (5725A49) DEV (installation device) OPTION (1) OUTPUT (*PRINT)
```

The parameters of RSTLICPGM are:

LICPGM (5725A49)
The product identifier for IBM MQ client for IBM i

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01

OPTION (1)
The samples option

OUTPUT (*PRINT)
Whether the spooled output of the job is printed

4. To ensure that the product has loaded correctly, issue the Display Software Resources (**DSPSFWRSC**) command and check that the licensed program 5725A49 is listed. If you have installed the base and the optional samples, you see:

```
Resource
ID    Option Feature Description
5725A49  *BASE  5050   IBM MQ client for IBM i
5725A49  1    5050   IBM MQ client for IBM i -Samples
```

5. To see the library and version number of the products installed, press **F11**, while viewing the Display Software Resources screen. The following screen is displayed:

```
Resource          Feature
ID    Option Feature  Type  Library  Release
5725A49  *BASE  5050   *CODE  QMQM    V10R0M0
5725A49  1    5050   *CODE  QMQMSAMP  V10R0M0
```

6. To check exactly what version you have installed, use the **DSPMQMVER** program.
   For example, `/QSYS.LIB/QMQM.LIB/DSPMQVER.PGM -a` in a qshell.

What to do next

If you want to see how the installation went in more detail, perform one or more of the following tasks:

- View the log file using the DSPJOBLOG command.
- View the spoolfile generated from the RSTLICPGM command.

If the installation of IBM MQ client for IBM i failed, see “Handling installation failures for IBM i” on page 79

Related concepts

“Uninstalling IBM MQ for IBM i” on page 89
There are two ways of uninstalling IBM MQ for IBM i.

IBM i *Installation of IBM MQ client and IBM MQ server for IBM i*

When you install an IBM MQ server on an IBM i system, the client is also automatically installed.

The installed version of the IBM MQ client for IBM i can be refreshed by using a "slip installation" which replaces an existing installation with a fresh image.

Installing a client over an existing client results in a successful installation.

Installing a client over an existing server results in a failure with a CPDB6A4 error.

Installing a server over an existing client results in a successful upgrade of the client to both server and client capabilities.

IBM i Installing IBM MQ Java messaging and web services for IBM i

Install IBM MQ Java messaging and web services for IBM i, using the **RSTLICPGM** command.

Before you begin

JM 3.0 From IBM MQ 9.3.0, Jakarta Messaging 3.0 is supported for developing new applications. IBM MQ 9.3.0 and later continue to support JMS 2.0 for existing applications. It is not supported to use both the Jakarta Messaging 3.0 API and the JMS 2.0 API in the same application. For more information, see Using IBM MQ classes for JMS/Jakarta Messaging.

You can install only one instance of IBM MQ Client for IBM i in each partition of your server.

If you have an older version of Java messaging and web services (5724L26) installed and want to install a newer version, you can install the new version without uninstalling the older one.

If you have MA88 installed (5648C60), and try to install anyway, the installation fails with a warning requesting you to uninstall the old client. To uninstall MA88, issue the following command:

```
DLTLICPGM LICPGM(5648C60) OPTION(*ALL)
```

If this command fails to delete the IFS directory `/QIBM/ProdData/mqm/java` and its subdirectories, use the EDTF command and select option 9 against the Java directory. For example:

```
EDTF STMF('/QIBM/ProdData/mqm')
```

About this task

This procedure covers the installation of both the Java messaging and web services, and the Java messaging and web services samples. If you do not want to install the samples, then do not complete the steps specific to the samples.

After following the optional step to pre-agree the license, and then issuing the **RSTLICPGM** command, the installation runs without requiring any interactive input.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Optional: Pre-agree the license terms and conditions. If you do not choose to pre-agree the license, the license agreement is displayed for you to accept. Run the following commands to pre-agree the license terms and conditions:
   a) For Java messaging and web services:

   ```
   CALL PGM (QSYS/QLPACAGR) PARM ('5724L26' 'V9R2M0' '0000' 0)
   ```

   The parameters of **PARM** are:

   5724L26
   The product identifier for IBM MQ Java messaging and web services for IBM i

   V10R0M0
   The version, release, and modification level

   0000
   The option number for the base IBM MQ Java messaging and web services product.

   0
   Unused error structure

   b) For the samples:

   ```
   CALL PGM (QSYS/QLPACAGR) PARM ('5724L26' 'V9R2M0' '0001' 0)
   ```

   The parameters of **PARM** are:

   5724L26
   The product identifier for IBM MQ Java messaging and web services for IBM i

   V10R0M0
   The version, release, and modification level

   0001
   The option number for the samples.

   0
   Unused error structure
3. Issue the installation command to run the installation without requiring any interactive input:
   a) Install the IBM MQ Java messaging and web services by issuing the following command:

   ```
   RSTLICPGM LICPGM (5724L26) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
   ```

   The parameters of RSTLICPGM are:

LICPGM (5724L26)
The product identifier for IBM MQ Java messaging and web services for IBM i

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01

OPTION (*BASE)
Install the base IBM MQ Java messaging and web services for IBM i

OUTPUT (*PRINT)
Whether the spooled output of the job is printed

b) Install the samples by issuing the following command:

```
RSTLICPGM LICPGM (5724L26) DEV (installation device) OPTION (1) OUTPUT (*PRINT)
```

The parameters of RSTLICPGM are:

LICPGM (5724L26)
The product identifier for IBM MQ Java messaging and web services for IBM i

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01

OPTION (1)
Install the samples

OUTPUT (*PRINT)
Whether the spooled output of the job is printed

4. To ensure that the product has loaded correctly, issue the Display Software Resources (DSPSFWRSC) command and check that the licensed program 5724L26 is listed. If you have installed the base and the optional samples, you see:

```
Resource
ID    Option Feature Description
5724L26  *BASE  5050  IBM MQ Java Messaging and Web Services
5724L26  1    5050  IBM MQ Java Messaging and Web Services - Samp
```

5. Press **F11** while viewing the Display Software Resources screen, and you see the library and version number of the products installed:

```
Resource          Feature
ID       Option Feature  Type   Library  Release
5724L26  *BASE  5050     *CODE  QMQMJAVA V10R0M0
5724L26  1      5050     *CODE  QMQMJAVA V10R0M0
```

6. Check what versions you have installed by using the following commands:

IBM MQ Classes for Java:

```
java com.ibm.mq.MQJavaLevel
```

Note: For this command to work, you might have to set your environment classpath to:

- `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.jar`

IBM MQ Classes for Java Message Service:

```
java com.ibm.mq.jms.MQJMSLevel
```

Note: For this command to work, you might need to set your environment classpath to:

- `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.jakarta.client.jar` (Jakarta Messaging 3.0) or `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.allclient.jar` (JMS 2.0)

See Environment variables relevant to IBM MQ classes for Java and Environment variables used by IBM MQ classes for JMS.

For IBM MQ for IBM i 9.2, both report:

```
Version: 9.2.0.0
```

Note: The command uses the Java classes, and so it reports the version and also performs some verification that the classes are installed and working.

7. See the following topics for full details of verification of both:
   - Using IBM MQ classes for Java
   - Using IBM MQ classes for JMS

IBM i Verifying an IBM MQ installation on IBM i

The topics in this section provide instructions on how to verify a client installation of IBM MQ on IBM i systems.

IBM i *Verifying a client installation using the command line on IBM i*

You can verify a client installation using the command line. On the server you create a queue manager, a local queue, a listener, and a server-connection channel. You must also apply security rules to allow the client to connect and make use of the queue defined. On the client you create a client-connection channel, and then use the sample PUT and GET programs to complete the verification procedure.

The verification procedure shows how to create a queue manager called `queue.manager.1`, a local queue called `QUEUE1`, and a server-connection channel called `CHANNEL1` on the server.

It shows how to create the client-connection channel on the IBM MQ MQI client workstation. It then shows how to use the sample programs to put a message onto a queue, and get the message from the queue.

The example does not address any client security issues. See Setting up IBM MQ MQI client security for details if you are concerned with IBM MQ MQI client security issues.

The verification procedure assumes that:

- The full IBM MQ server product has been installed on a server.
- The server installation is accessible on your network.
- The IBM MQ MQI client software has been installed on a client system.
- The IBM MQ sample programs have been installed.
- TCP/IP has been configured on the server and client systems. For more information, see Configuring connections between the server and client.

First, set up the server using the command line, using the instructions in “Setting up the server using the command line IBM i” on page 85.

Once you have set up the server, you must set up the client, using the instructions in “Connecting to a queue manager, using the MQSERVER environment variable on IBM i” on page 87.

Finally, you can test the communications between client and server, using the instructions in “Testing communication between a client and a server on IBM i” on page 88.

IBM i *Setting up the server using the command line IBM i*

Follow these instructions to create a queue manager, queue, and channel on the server. You can then use these objects to verify the installation.

About this task

These instructions assume that no queue manager or other IBM MQ objects have been defined.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Create a user ID on the server that is not in the `mqm` group.

   This user ID must exist on the server and client. This is the user ID that the sample applications must be run as, otherwise a 2035 error is returned.
2. Log in as a user in the MQM group.
3. Create a queue manager called `QUEUE.MANAGER.1` by entering the following command:

   ```
   crtmqm QUEUE.MANAGER.1
   ```

   You see messages telling you that the queue manager has been created.
4. Start the queue manager by entering the following command:

   ```
   strmqm QUEUE.MANAGER.1
   ```

   A message tells you when the queue manager has started.
5. Define a local queue called `QUEUE1` by entering the following command:

   ```
   CRTMQMQ QNAME(QUEUE1) QTYPE(*LCL)
   ```

   A message tells you when the queue has been created.
6. Allow the user ID that you created in step 1 to use `QUEUE1` by entering the following command:

   ```
   SET AUTHREC PROFILE(QUEUE1) OBJTYPE(QUEUE) PRINCIPAL(' non_mqm_user ') AUTHADD(PUT,GET)
   ```

   where *non_mqm_user* is the user ID created in step 1. A message tells you when the authorization has been set. You must also run the following command to give the user ID authority to connect:

   ```
   SET AUTHREC OBJTYPE(QMGR) PRINCIPAL(' non_mqm_user ') AUTHADD(CONNECT)
   ```

   If this command is not run, a 2305 stop error is returned.
7. Define a server-connection channel by entering the following command:

   ```
   CRTMQMCHL CHLNAME(CHANNEL1) CHLTYPE(*SVRCN) TRPTYPE(*TCP)
   MCAUSRID('QMQM')
   ```

   A message tells you when the channel has been created.
8. Allow your client channel to connect to the queue manager and run under the user ID that you created in step 1, by entering the following MQSC command:

   ```
   SET CHLAUTH(CHANNEL1) TYPE(ADDRESSMAP) ADDRESS(' client_ipaddr ') MCAUSER(' non_mqm_user ')
   ```

   where *client_ipaddr* is the IP address of the client system, and *non_mqm_user* is the user ID created in step 1. A message tells you when the rule has been set.
9. Define a listener by entering the following command:

   ```
   DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT (port_number)
   ```

   where *port_number* is the number of the port the listener is to run on. This number must be the same as the number used when defining your client-connection channel in "Installing an IBM MQ client on IBM i" on page 80.

   Note: If you omit the port parameter from the command, a default value of 1414 is used for the listener port. If you want to specify a port other than 1414, you must include the port parameter in the command, as shown.
10. Start the listener by entering the following command:

```
STRMQMLSR MQMNAME('QUEUE.MANAGER.1') PORT(1414)
```

11. Stop MQSC by entering:

```
end
```

You see some messages, followed by the command prompt.

What to do next

Follow the instructions to set up the client. See "Connecting to a queue manager, using the MQSERVER environment variable on IBM i" on page 87.

IBM i *Connecting to a queue manager, using the MQSERVER environment variable on IBM i*

When an IBM MQ application is run on the IBM MQ MQI client, it requires the name of the MQI channel, the communication type, and the address of the server to be used. Provide these parameters by defining the MQSERVER environment variable.

Before you begin

Before you start this task, you must complete the task, "Setting up the server using the command line IBM i" on page 85, and save the following information:

- The host name or IP address of the server and port number that you specified when creating the listener.
- The channel name of the server-connection channel.

About this task

This task describes how to connect an IBM MQ MQI client, by defining the MQSERVER environment variable on the client.

Procedure

1. Log in as the userid that you created in Step 1 of "Setting up the server using the command line IBM i" on page 85.
2. Check the TCP/IP connection. From the client, enter one of the following commands:
   - `ping server-hostname`
   - `ping n.n.n.n`

     `n.n.n.n` represents the network address. You can set the network address in IPv4 dotted decimal form, for example, `192.0.2.0`. Alternatively, set the address in IPv6 hexadecimal form, for example `2001:0DB8:0204:acff:fe97:2c34:fde0:3485`.

   If the **ping** command fails, correct your TCP/IP configuration.
3. Set the MQSERVER environment variable. From the client, enter one the following command:

```
ADDENVVAR ENVVAR(MQSERVER) VALUE('CHANNEL1/TCP/server-address (port)')
```

   Where:

   - *CHANNEL1* is the server-connection channel name.
   - *server-address* is the TCP/IP host name of the server.
   - *port* is the TCP/IP port number the server is listening on.

   If you do not give a port number, IBM MQ uses the one specified in the `qm.ini` file, or the client configuration file. If no value is specified in these files, IBM MQ uses the port number identified in the TCP/IP services file for the service name `MQSeries`. If an `MQSeries` entry in the services file does not exist, a default value of 1414 is used. It is important that the port number used by the client and the port number used by the server listener program are the same.

What to do next

Use the sample programs to test communication between the client and server; see "Testing communication between a client and a server on IBM i" on page 88.

IBM i *Testing communication between a client and a server on IBM i*

On the IBM MQ MQI client workstation, use the `amqsputc` sample program to put a message on the queue at the server workstation. Use the `amqsgetc` sample program to get the message from the queue back to the client.

Before you begin

Complete the previous topics in this section:

- Set up a queue manager, channels, and queue.
- Open a command window.
- Set system environment variables.

About this task

Note that IBM MQ object definitions are case-sensitive. Text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Start the PUT program for `QUEUE1` on `QUEUE.MANAGER.1` by entering the following command:

   ```
   CALL PGM(QMQM/AMQSPUTC) PARM(QUEUE1 QUEUE.MANAGER.1)
   ```

   If the command is successful, the following messages are displayed:

   ```
   Sample AMQSPUT0 start target queue is QUEUE1
   ```

   Tip: You might get the error, `MQRC_NOT_AUTHORIZED ( 2035 )`. By default, channel authentication is enabled when a queue manager is created. Channel authentication prevents privileged users accessing a queue manager as an IBM MQ MQI client. For verifying the installation, you can either change the MCA user ID to a non-privileged user, or disable channel authentication. To disable channel authentication run the following MQSC command:

   ```
   ALTER QMGR CHLAUTH(DISABLED)
   ```

   When you finish the test, if you do not delete the queue manager, re-enable channel authentication:

   ```
   ALTER QMGR CHLAUTH(ENABLED)
   ```

2. Type some message text, then press **Enter** twice.
   The following message is displayed:

   ```
   Sample AMQSPUT0 end
   ```

   Your message is now on the queue that is on the server queue manager.
3. Start the GET program for `QUEUE1` on `QUEUE.MANAGER.1` by entering the following command:

   ```
   CALL PGM(QMQM/AMQSGETC) PARM(QUEUE1 QUEUE.MANAGER.1)
   ```

   The sample program starts, and your message is displayed. After a short pause (approximately 30 seconds), the sample ends and the command prompt is displayed again.

Results

You have now successfully verified the client installation.

What to do next

1. On the server, stop the queue manager by entering the following command:

```
ENDMQM MQMNAME(QUEUE.MANAGER.1)
```

2. On the server, delete the queue manager by entering the following command:

```
DLTMQM MQMNAME(QUEUE.MANAGER.1)
```

IBM i Uninstalling IBM MQ for IBM i

There are two ways of uninstalling IBM MQ for IBM i.

To uninstall IBM MQ for IBM i, perform one of the following tasks:

- A *standard* deletion removes IBM MQ product code but preserves user data.
- An *entire* deletion removes both IBM MQ product code and user data.

Both types of deletion require you to be signed on to the system with a user profile that has *ALLOBJ special authority, for example, QSECOFR. Security administrator (*SECADM) special authority is also required to delete the QMQM and QMQMADM user profiles.

Related concepts

"Reinstalling IBM MQ for IBM i" on page 93
You can reinstall IBM MQ for IBM i without losing any of your data.

Related tasks

"Uninstalling IBM MQ but retaining data on IBM i" on page 89
If you want to retain your user data, for example, because you intend to reinstall IBM MQ for IBM i at a later date, you must perform a standard deletion of the product.

"Uninstalling IBM MQ and data on IBM i" on page 91
You can delete IBM MQ entirely, including all user data.

"Uninstalling IBM MQ Java Messaging and Web Services on IBM i" on page 92
Follow these instructions to uninstall IBM MQ Java.

"Uninstalling IBM MQ MQI client for IBM i" on page 92
If the IBM MQ MQI client for IBM i must be uninstalled, follow the correct procedure to ensure that all the relevant directories and files are removed.

IBM i *Uninstalling IBM MQ but retaining data on IBM i*

If you want to retain your user data, for example, because you intend to reinstall IBM MQ for IBM i at a later date, you must perform a standard deletion of the product.

About this task

To perform a standard deletion of IBM MQ for IBM i, so that your user data is retained, complete the following steps:

Procedure

1. Quiesce IBM MQ for IBM i.
   For more information, see Quiescing IBM MQ for IBM i .
2. End the IBM MQ subsystem, by issuing the command:

```
ENDSBS SBS(QMQM)
```

3. Ensure that no locks are held on the library QMQM, by issuing the command:

```
WRKOBJLCK OBJ(QMQM) OBJTYPE(*LIB)
```

4. Use the Delete Licensed Program (DLTLICPGM) command to delete the base product (and also the samples, AMS, and WEB components if you chose to install them).

   To delete only the samples, issue the command:

```
DLTLICPGM LICPGM( 5724H72 ) OPTION(1)
```

   To delete only the AMS component, issue the command:

```
DLTLICPGM LICPGM( 5724H72 ) OPTION(2)
```

   To delete only the WEB component, issue the command:

```
DLTLICPGM LICPGM( 5724H72 ) OPTION(3)
```

   To delete only extra language versions installed, issue the command:

```
DLTLICPGM LICPGM(5724H72) LNG(nnnn)
```

   where *nnnn* is the language number, as in the list here:

Table 11. Globalizations of IBM MQ for IBM i.

Language ID	Language
2909	Belgian English
2966	Belgian French MNCS (Multi-National Character Set)
2981	Canadian French MNCS
2975	Czech
2950	English uppercase
2924	English uppercase and lowercase
2984	English US DBCS
2938	English US uppercase DBCS
2928	French
2940	French MNCS
2929	German
2939	German MNCS
2976	Hungarian
2932	Italian
2942	Italian MNCS
2962	Japanese
2986	Korean
2978	Polish
2989	Simplified Chinese
2931	Spanish

To delete the base product and all other installed components, issue the command:

```
DLTLICPGM LICPGM( 5724H72 ) OPTION(*ALL)
```

Results

Deleting IBM MQ for IBM i in this way deletes only the objects that belong to IBM MQ: the QMQM library, the QMQM samp library, and the subdirectories that belong to IBM MQ server within the `/QIBM/ProdData/mqm` directory.

If that leaves no other subdirectories (for example, if IBM MQ Java is installed it uses subdirectories there) then the `/QIBM/ProdData/mqm` directory itself is deleted.

None of the queue manager journal libraries, or IFS directories based upon `/QIBM/UserData` are removed.

IBM i *Uninstalling IBM MQ and data on IBM i*

You can delete IBM MQ entirely, including all user data.

About this task

Important: If you are going to delete IBM MQ entirely, including all user data, save your user data first. It cannot be recovered.

To delete IBM MQ for IBM i entirely, complete the following steps:

Procedure

1. Quiesce IBM MQ for IBM i.
   For more information, see Quiescing IBM MQ for IBM i .
2. Delete each queue manager in turn by using the command `WRKMQM` and selecting option 4.
3. End the IBM MQ subsystem, by issuing the command:

   ```
   ENDSBS SBS(QMQM)
   ```

4. Ensure that no locks are held on the library QMQM, by issuing the command:

   ```
   WRKOBJLCK OBJ(QMQM) OBJTYPE(*LIB)
   ```

5. Optional: If you want to also uninstall IBM MQ Java, you can do it now, using the command:

   ```
   DLTLICPGM LICPGM( 5724L26 ) OPTION(*ALL)
   ```

   This will also uninstall the Java Samples, if they were installed.
6. Use the Delete Licensed Program (DLTLICPGM) command to delete the base product (and also the samples if you chose to install them). To delete the base product and the samples issue the command:

   ```
   DLTLICPGM LICPGM( 5724H72 ) OPTION(*ALL)
   ```

7. Delete the directory /QIBM/UserData/mqm and its subdirectories. Do this using the EDTF command and selecting option 9 (recursive delete) for the mqm directory, as follows,

   Note: If you do this, you no longer have any information regarding your installation. Use this command with extreme caution.

   The format of the command is:

   ```
   EDTF STMF('/QIBM/UserData')
   ```

Alternatively, you can delete the /QIBM/UserData/mqm directory and its subdirectories by repeated use of the RMVLNK and RMVDIR commands.

8. Identify all the users who belong to the QMQMADM group. Use the DSPUSRPRF command to display a list of them. You must remove the QMQMADM group profile from their user profiles before you can delete the QMQMADM user profile. The format of the command is:

```
DSPUSRPRF USRPRF(QMQMADM) TYPE(*GRPMBR)
```

9. You must alter the ownership or delete the objects. For each of the user profiles QMQM and QMQMADM, use the WRKOBJOWN command to list all the objects owned by the profile. The format of the command is:

```
WRKOBJOWN USRPRF( PROFILE )
```

10. Delete the two user profiles. The format of the command is:

```
DLTUSRPRF USRPRF(QMQM) OWNOBJOPT(*DLT)
DLTUSRPRF USRPRF(QMQMADM) OWNOBJOPT(*DLT)
```

IBM i *Uninstalling IBM MQ Java Messaging and Web Services on IBM i*

Follow these instructions to uninstall IBM MQ Java.

About this task

To uninstall the IBM MQ Java product.

Procedure

1. Make sure you are signed on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Issue the command:

```
DLTLICPGM LICPGM(5724L26) OPTION(*ALL)
```

Results

Deleting IBM MQ Java for IBM i deletes the objects that belong to it: the QMQMJAVA library, and the subdirectories that belong to IBM MQ Java within the `/QIBM/ProdData/mqm` directory.

If that leaves no other subdirectories (for example if the IBM MQ Server is installed it uses subdirectories there) then the `/QIBM/ProdData/mqm` directory itself is deleted.

IBM i *Uninstalling IBM MQ MQI client for IBM i*

If the IBM MQ MQI client for IBM i must be uninstalled, follow the correct procedure to ensure that all the relevant directories and files are removed.

Procedure

1. Make sure you are signed on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Use the Delete Licensed Program (**DLTLICPGM**) command to delete the IBM MQ MQI client for IBM i product (and also the samples if you chose to install them):

   To delete only the samples, issue the command

```
DLTLICPGM LICPGM(5725A49) OPTION(1)
```

To delete IBM MQ MQI client and the samples, issue the command:

```
DLTLICPGM LICPGM(5725A49) OPTION(*ALL)
```

Results

Deleting IBM MQ MQI client for IBM i deletes the objects that belong to it - the QMQM library, and the subdirectories that belong to IBM MQ MQI client for IBM i within the `/QIBM/ProdData/mqm` directory. If that leaves no other subdirectories (for example if the IBM MQ Java Client for IBM i is installed it uses subdirectories there) then the `/QIBM/ProdData/mqm` directory itself is deleted.

IBM i *Uninstalling Managed File Transfer on IBM i*

Follow these instructions to uninstall Managed File Transfer on IBM i.

Before you begin

To uninstall IBM MQ Managed File Transfer for IBM i, perform one of the following tasks:

- A *standard* deletion removes Managed File Transfer product code but preserves user data.
- An *entire* deletion removes both Managed File Transfer product code and user data.

  Note that an entire deletion requires that you manually remove the configuration data in the `/QIBM/UserData/mqm/mqft` directory.

Both types of deletion require you to be signed on to the system with a user profile that has *ALLOBJ special authority, for example, QSECOFR.

About this task

To uninstall the Managed File Transfer product.

Procedure

1. Make sure you are signed on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Issue the command:

```
DLTLICPGM LICPGM(5725M50) OPTION(*ALL)
```

Results

Deleting Managed File Transfer for IBM i deletes the objects that belong to it: the QMQMMFT library, and the subdirectories that belong to Managed File Transfer within the `/QIBM/ProdData/mqm` directory.

Note that licence files are copied to `/QIBM/ProdData/mqm/properties/version`, and an uninstallation will delete files in this directory. However, files are left in `/QIBM/ProdData/mqm/properties/5725M50` as trash. For a clean uninstallation, you must delete the files in this directory.

IBM i *Reinstalling IBM MQ for IBM i*

You can reinstall IBM MQ for IBM i without losing any of your data.

When you reinstall IBM MQ for IBM i, the system checks whether the IBM MQ configuration file (mqs.ini) exists. If the file exists, it is kept and used with the newly installed system. If the file does not exist, an empty mqs.ini file is placed in the directory `/QIBM/UserData/mqm`.

All data that you have in the UserData directory is referenced by the newly installed system. In addition, all the queue manager-associated libraries containing journal and receiver information are referenced by the new system.

Related tasks

“Installing IBM MQ server on IBM i” on page 68
You install IBM MQ for IBM i by installing the IBM MQ server in its primary language, installing samples and installing additional languages.

Linux Installing and uninstalling IBM MQ on Linux

Installation tasks that are associated with installing IBM MQ on Linux are grouped in this section.

About this task

To prepare for installation and to install IBM MQ, complete the following tasks.

If product fixes or updates are made available, see “Applying maintenance to IBM MQ” on page 291.

Procedure

- To install IBM MQ on Linux using rpm, see “Installing IBM MQ on Linux using rpm” on page 108.
- To install IBM MQ on Linux Ubuntu using a Debian installer , see “Installing IBM MQ on Linux Ubuntu using Debian” on page 125.

Linux Checking requirements on Linux

Before you install IBM MQ on Linux, you must check for the latest information and system requirements.

About this task

A summary of the tasks that you must complete to check system requirements are listed here with links to further information.

Procedure

1. Check that you have the latest information, including information on hardware and software requirements.

   See “Where to find product requirements and support information” on page 11.
2. Check that your systems meet the initial hardware and software requirements for Linux.

   See “Hardware and software requirements on Linux systems” on page 95.
3. Check that your systems have sufficient disk space for the installation.

   See Disk space requirements.
4. Check that you have the correct licenses.

   See “License requirements” on page 8 and IBM MQ license information.

What to do next

When you have completed these tasks, you are ready to start preparing your system for installation. For the next steps in installing IBM MQ, see “Preparing the system on Linux” on page 98.

Related concepts

“IBM MQ installation overview” on page 6
An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

Related tasks

“Applying maintenance to IBM MQ” on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Linux *Hardware and software requirements on Linux systems*

Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

For basic hardware and software requirements, see System Requirements for IBM MQ.

Host names

IBM MQ does not support host names that contain spaces. If you install IBM MQ on a system with a host name that contains spaces, you are unable to create any queue managers.

mqconfig control command

During the IBM MQ installation on AIX and Linux platforms, the **mqconfig** control command is run to indicate whether the system configuration meets the requirements to run IBM MQ. See Prerequisites of mqconfig for the dependencies required to run the **mqconfig** control command.

Linux support for 32-bit and 31-bit applications

64-bit Linux distributions might no longer support 32-bit applications by default. On 64-bit System x distributions, install the required 32-bit system packages in order to run 32-bit applications.

From IBM MQ 9.4.0, 64-bit Linux distributions on IBM Z (Linux s390x architecture) no longer support 31-bit applications at all. For more information, see Deprecations, stabilizations, and removals in IBM MQ.

Attention: There is no separate 32-bit client installation package. The client installation package and redistributable client contain both 32-bit and 64-bit IBM MQ client libraries. The included 32-bit libraries can be used by 32-bit applications on supported platforms where 32-bit support is offered by the operating system.

If the 32-bit Linux support libraries are not installed, 32-bit applications will not run. If you need this functionality, install the 32-bit support libraries. Here are the names of the packages that contain the required libraries.

Note: The following dependencies will satisfy both IBM MQ applications and GSKit 8.

For Red Hat Enterprise Linux for x86-64:

- glibc.i686
- libgcc.i686
- libstdc++.i686

For Ubuntu Linux for x86-64:

- libc6:i386
- libgcc-s1:i386
- libstdc++6:i386

For SUSE Linux Enterprise Server for x86-64:

- glibc-32bit
- libgcc_s1-32bit
- libstdc++6-32bit

In some cases, a 32-bit IBM MQ application might fail with an FFST showing details like this example (the uid value, which is shown in the example as 12345, might vary):

```
Probe Id          :- XY051170
 Component         :- InitPrivateServices
 Major Errorcode   :- xecI_S_NOT_AUTHORIZED
```

```
  Comment1          :- xcsGetpwuid failed to get password entry for process with real uid 12345.
  Comment2          :- Details: getuid() returned 12345; getpwuid_r(12345) failed with errno=0.
  Comment3          :- A user name of "UNKNOWN" will be used, which will likely cause later
authorisation failures.
                       Note this FFST can be turned off by exporting env var
AMQ_NOFFST_PROCESS_UID.
```

If you encounter this issue, you must install an additional 32-bit operating system component.

For SUSE Linux Enterprise Server for x86-64:

- sssd-client.i686

For Ubuntu Linux for x86-64:

- libnss3:i386

For SUSE Linux Enterprise Server for x86-64:

- sssd-32bit

Check the System Requirements for IBM MQ to see which Linux distributions are supported on IBM MQ. For example there is no 32-bit support for SUSE Linux Enterprise Server 15 (all architectures), or for Red Hat Enterprise Linux Server for IBM Z 8.

Java Message Service

JM 3.0 From IBM MQ 9.3.0, Jakarta Messaging 3.0 is supported for developing new applications. IBM MQ 9.3.0 and later continue to support JMS 2.0 for existing applications. It is not supported to use both the Jakarta Messaging 3.0 API and the JMS 2.0 API in the same application. For more information, see Using IBM MQ classes for JMS/Jakarta Messaging.

Java 8 is bundled with IBM MQ 9.0 but client components are built with Java 7 compatibility flags on.

For development, a JDK is required, and a JRE is required for running. The JRE does not need to be the JRE installed with IBM MQ, but has to be one from the supported list.

For a list of supported JDKs, see System Requirements for IBM MQ.

On Linux: On the Power® platform, the 32 bit and 64 bit JDKs are typically installed to different locations, for example, the 32 bit JDK is located in `/opt/IBMJava2-ppc-50` and the 64 bit JDK is located in `/opt/IBMJava2-ppc64-50`. Ensure that the PATH variable is correctly set for your applications that use Java.

You can check the version installed using the following command:

```
java -version
```

IBM MQ Explorer requirements

On Linux, IBM MQ Explorer can be installed by downloading and installing the stand-alone IBM MQ Explorer from Fix Central. See IBM MQ Explorer Requirements for the minimum requirements that your system needs if you want to use IBM MQ Explorer.

Note: IBM MQ Explorer for Linux is available for use only with IBM MQ on x86-64 platforms.

RDQM (replicated data queue manager)

Pacemaker is one of the prerequisites for RDQM. Pacemaker requires that certain Linux packages are installed on the system. The list for RHEL 8.2 assumes that a minimal set of system packages has been installed that includes the mandatory and default packages from the mandatory groups of the Server environment group.

The prerequisites for supported levels of RHEL 8 (Pacemaker 2) are:

- cifs-utils
- libtool-ltdl

- libxslt
- net-snmp-libs
- nfs-utils
- perl-TimeDate
- psmisc
- python36
- python3-lxml

The prerequisites for supported levels of RHEL 9 (Pacemaker 2) are:

- libxslt
- net-snmp-libs
- nfs-utils
- nfs-utils-coreos
- perl-TimeDate
- python3-lxml
- python-unversioned-command

Additional prerequisites for installing the drbd-selinux package on SELinux are as follows:

- selinux-policy
- selinux-policy-base
- rpm-plugin-selinux
- selinux-policy-targeted

These packages in turn have their own requirements (which are not listed here). When Pacemaker is installed, it reports any missing packages that also need to be installed before installation can complete successfully.

Requirements for IBM MQ classes for .NET

See Prerequisites for .NET Core on Linux for the dependencies required to run .NET on Linux.

Linux Planning to install IBM MQ on Linux

Before you install IBM MQ on Linux, you must choose which components to install and where to install them. You must also make some platform-specific choices.

About this task

The following steps provide links to additional information to help you with planning your installation of IBM MQ on Linux.

As part of your planning activities, make sure that you review the information on hardware and software requirements for the platform on which you are planning to install IBM MQ. For more information, see “Checking requirements on Linux” on page 94.

Procedure

1. Decide which IBM MQ components and features to install.

   See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.

   Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. For more information, see “License requirements” on page 8 and IBM MQ license information.

2. Review the options for naming your installation.

   In some cases, you can choose an installation name to use instead of the default name. See “Installation name on AIX, Linux, and Windows” on page 16.
3. Review the options and restrictions for choosing an installation location for IBM MQ.

   For more information, see “Installation location on Multiplatforms” on page 17.
4. If you plan to install multiple copies of IBM MQ, see “Multiple installations on AIX, Linux, and Windows” on page 19.
5. If you already have a primary installation, or plan to have one, see “Primary installation on AIX, Linux, and Windows” on page 20.
6. Make sure that the communications protocol needed for server-to-server verification is installed and configured on both systems that you plan to use.

   For more information, see “Server-to-server links on AIX, Linux, and Windows” on page 28.
7. Determine whether you need to install the Java runtime environment (JRE).

   From IBM MQ 9.1.0, if you are not using Java in your messaging applications, and you are not using portions of IBM MQ that are written in Java, you have the option to not install the JRE (or to remove the JRE if it was already installed).

   Attention: If you choose not to install the JRE, or to remove the JRE if it was already installed:

   - You must use the **runmqakm** command to manage key repositories. The **runmqktool** command is not available.
   - Use of the **runmqras** command fails unless a JRE at version 7, or later, is available on the system path.

   On Linux, you can install IBM MQ without installing the `MQSeriesJRE` RPM, unless you are installing the portions of the product that require the presence of the JRE, in which case the RPM prerequisites test fails. You can also install the `MQSeriesGSKit` RPM without the JRE.

   Upgrading from an earlier version of IBM MQ to IBM MQ 9.1.0 or later adds the separately installed JRE feature to the installed product.

   For more information, see **runmqakm** and **runmqktool** commands on AIX, Linux, and Windows.

Linux Preparing the system on Linux

On Linux systems, you might have to complete several tasks before you install IBM MQ. You might also want to complete other tasks, depending on your installation intentions.

About this task

The tasks that you perform to prepare your systems for installation are listed here. Complete the appropriate tasks for your platform before installing.

Procedure

1. Set up a user ID of the name `mqm`, with a primary group of `mqm`.

   See “Setting up the user and group on Linux” on page 99.

   Note: If the group `mqm` and/or user `mqm` do not exist, during the installation of the product, the installer creates group `mqm` and user `mqm` with a home directory of `/var/mqm`.
2. Create file systems for both the product code and working data to be stored. See “Creating file systems on Linux” on page 100.
3. Configure any additional settings needed for your Linux system.

   See “Configuring and tuning the operating system on Linux” on page 102.

What to do next

When you have completed the tasks to prepare the system, you are ready to start installing IBM MQ. To install a server using rpm , see “Installing the first IBM MQ installation on Linux using the rpm command” on page 112. To install a client using rpm, see “Installing an IBM MQ client on Linux using rpm” on page 120.

To install a server using a Debian installer, see “Installing an IBM MQ server on Linux Ubuntu using Debian packages” on page 130. To install a client using a Debian installer, see “Installing an IBM MQ client on Linux Ubuntu using Debian packages ” on page 135

Important: Having both Debian and rpm installed versions of IBM MQ on the same system is not supported.

Related tasks

Planning

“Maintaining and migrating IBM MQ” on page 287

Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

“Applying maintenance to IBM MQ” on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Linux *Setting up the user and group on Linux*

On Linux systems, IBM MQ requires a user ID of the name `mqm`, with a primary group of `mqm`. The `mqm` user ID owns the directories and files that contain the resources associated with the product.

Using Active Directory

If you are using Active Directory to provide centralized user and group definitions to your Linux system, it is not possible to have both an `mqm` user and `mqm` group definition in Active Directory because that service does not permit users and groups to have the same name.

You should:

- Put an `mqm` group definition in the Active Directory before installing IBM MQ, so that other users in the directory can later be made part of the shared group definition.
- Create the `mqm` user locally, or allow it to be created during the installation process.

Creating the user ID and group

Set the primary group of the `mqm` user to the group `mqm`.

If you are installing IBM MQ on multiple systems you might want to ensure each UID and GID of `mqm` has the same value on all systems. If you are planning to configure multi-instance queue managers, it is essential the UID and GID are the same from system to system. It is also important to have the same UID and GID values in virtualization scenarios.

RPM creates the `mqm` user ID and group `mqm`, with a home directory of `/var/mqm`, as part of the installation procedure if they do not exist.

If you have special requirements for these IDs (for example they need to have the same values as other machines you are using, or your users and group ID are centrally managed) you should create the IDs before running the installation procedure, using the **groupadd** and **useradd** commands to set the UID and GID the same on each machine.

Note: The only IBM MQ requirement, is that the `mqm` user should have the `mqm` group as its primary group.

Adding existing user IDs to the group on Linux systems

If you want to run administration commands, for example **crtmqm** (create queue manager) or **strmqm** (start queue manager), your user ID must be a member of the mqm group. This user ID must not be longer than 12 characters.

Users do not need mqm group authority to run applications that use the queue manager; it is needed only for the administration commands.

Log files created by IBM MQ Telemetry service

The **umask** setting of the user ID that creates a queue manager will determine the permissions of the Telemetry log files generated for that queue manager. Even though the ownership of the log files will be set to mqm.

Related concepts

"Creating file systems on AIX" on page 42
Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation directory for the product code can be changed at installation time, but the working data location cannot be changed.

"Configuring and tuning the operating system on Linux" on page 102
Use this topic when you are configuring IBM MQ on Linux systems.

Related tasks

"Configuring and tuning the operating system on AIX" on page 44
When installing IBM MQ on AIX systems, there are some additional settings that must be configured.

Linux *Creating file systems on Linux*

Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation directory for the product code can be changed at installation time, but the working data location cannot be changed.

Determining the size of a server installations file system

To determine the size of the /var/mqm file system for a server installation, consider:

- The maximum number of messages in the system at one time.
- Contingency for message buildups, if there is a system problem.
- The average size of the message data, plus 500 bytes for the message header.
- The number of queues.
- The size of log files and error messages.
- The amount of trace that is written to the /var/mqm/trace directory.

Storage requirements for IBM MQ also depend on which components you install, and how much working space you need. For more details, see Disk space requirements.

Creating a file system for the working data

Before you install IBM MQ, create and mount a file system called /var/mqm which is owned by the user mqm in the group mqm ; see "Setting up the user and group on Linux" on page 99. This file system is used by all installations of IBM MQ on a system. If possible, use a partition strategy with a separate volume for the IBM MQ data. This means that other system activity is not affected if a large amount of IBM MQ work builds up. Configure the directory permissions to permit the mqm user to have full control, for example, file mode 755. These permissions will then be updated during the IBM MQ installation to match the permissions required by the queue manager.

Creating separate file systems for errors and logs

You can also create separate file systems for your log data (`/var/mqm/log`) and error files (`/var/mqm/errors`). If possible, place these directories on different physical disks from the queue manager data (`/var/mqm/qmgrs`) and from each other.

If you create separate file systems the `/var/mqm/errors` directory can be NFS mounted. However, if you choose to NFS-mount `/var/mqm/errors`, the error logs might be lost if the network fails.

You can protect the stability of your queue manager by having separate file systems for:

- `/var/mqm/errors`
- `/var/mqm/trace`
- `/var/mqm/qmgrs`
- `/var/mqm/log`

In the case of `/var/mqm/errors`, it is rare that this directory receives large quantities of data. But it is sometimes seen, particularly if there is a severe system problem leading to IBM MQ writing a lot of diagnostic information in to `.FDC` files. In the case of `/var/mqm/trace`, files are only written here when you use **strmqtrc** to start tracing IBM MQ.

You can obtain better performance of normal IBM MQ operations (for example, syncpoints, MQPUT, MQGET of persistent messages) by placing the following on separate disks:

- `/var/mqm/qmgrs`
- `/var/mqm/log`

In the rare event that you need to trace an IBM MQ system for problem determination, you can reduce performance impact by placing the `/var/mqm/trace` file system on a separate disk.

If you are creating separate file systems, allow a minimum of 30 MB of storage for `/var/mqm`, 100 MB of storage for `/var/mqm/log`, and 10 MB of storage for `/var/mqm/errors`. The 100 MB minimum allowance of storage for `/var/mqm/log` is the absolute minimum required for a single queue manager and is not a recommended value. The size of a file system must be scaled according to the number of queue managers that you intend to use, the number of pages per log file, and the number of log files per queue manager.

For more information about file systems, see File system support.

The size of the log file depends on the log settings that you use. The minimum sizes are for circular logging using the default settings. For more information about log sizes, see Calculating the size of the log.

Linux

For a client installation, the file system can be mounted on a remote network device, for example NFS.

If you are performing both a client and a server installation, the requirements of the server installation take precedence over the requirements of the client installation.

Allow 15 MB as a minimum for an IBM MQ client.

A new sample IBM MQ MQI client configuration file is created in the `var/mqm` directory, by the client package, during installation, but only if this file does not exist. This file contains the `ClientExitPath` stanza. An example `mqclient.ini` file is shown in IBM MQ MQI client configuration file, `mqclient.ini`.

If you are using a common configuration file for multiple clients, either in the IBM MQ installation directory or in another location using the MQCLNTCF environment variable, you must grant read access to all user identifiers under which the IBM MQ client applications run. If, for any reason, the file cannot be read the failure is traced, and the search logic continues as if the file had not existed.

Related concepts

“Setting up the user and group on Linux” on page 99
On Linux systems, IBM MQ requires a user ID of the name `mqm`, with a primary group of `mqm`. The `mqm` user ID owns the directories and files that contain the resources associated with the product.

“Configuring and tuning the operating system on Linux” on page 102

Use this topic when you are configuring IBM MQ on Linux systems.

Linux *Configuring and tuning the operating system on Linux*

Use this topic when you are configuring IBM MQ on Linux systems.

Note: The information in this topic is mostly about global kernel tuning parameters, applying to all Linux systems. The section "Configuring the users who start IBM MQ" on page 105 describes tuning that is specific to the user.

Shell interpreter

Ensure that `/bin/sh` is a valid shell interpreter compatible with the Bourne shell. If it is not, then the post-installation configuration of IBM MQ may not complete successfully.

If the shell was not installed using RPM, you might see a prerequisites failure of `/bin/sh` shell when you try to install IBM MQ . The failure is because the RPM tables do not recognize that a valid shell interpreter is installed. If the failure occurs, you can reinstall the `/bin/sh` shell by using RPM, or specify the RPM option `--nodeps` to disable dependency checking during installation of IBM MQ .

Note: The **`--dbpath`** option is not supported when installing IBM MQ on Linux.

CPU and virtual memory

Like any software, IBM MQ uses virtual memory in proportion to the amount of work being handled.

Ensure your system has been allocated enough CPU, memory and swap space for the highest workloads intended for production. There is no simple formula IBM can provide for this. Run a test workload that equals or exceeds the expected production workloads, and monitor resource usage.

System V IPC kernel configuration

IBM MQ uses these System V IPC resources: shared memory and semaphore sets.

The minimum kernel configuration for IBM MQ for these resources is as follows:

Table 12. Minimum tunable kernel parameters values

Name	Parameter name	Value	Increase[1]	Description
`shmmni`	`kernel.shmmni`	4096	Yes	Maximum number of shared memory segments
`shmmax`	`kernel.shmmax`	268435456	No	Maximum size of a shared-memory segment (bytes)
`shmall`	`kernel.shmall`	2097152	Yes	Maximum amount of shared memory (pages)
`semmsl`	`kernel.sem`	32[2]	No	Maximum amount of semaphores permitted per set
`semmns`	`kernel.sem`	4096[2]	Yes	Maximum number of semaphores
`semopm`	`kernel.sem`	32[2]	No	Maximum number of operations in single operations
`semmni`	`kernel.sem`	128[2]	Yes	Maximum number of semaphore sets
`thrmax`	`kernel.threads-max`	32768	Yes	Maximum number of threads
`pidmax`	`kernel.pid_max`	32768	Yes	Maximum number of process identifiers

Notes:

1. In the *Increase* column:
   - **Yes** means that the *Value* shown is sufficient to run two moderate sized queue managers on the system. If you intend to run more than two queue managers, or the queue managers are to process a significant workload, you might need to increase the *Value*.
   - **No** means that, when you run more than two queue managers, you do not need to increase the *Value* and doing so gives little or no extra benefit.
2. The **kernel.sem** values are contained within a single kernel parameter containing the four values in order.

To view the current value of each parameter, run `sysctl <parameter name>`. For example:

```
sysctl kernel.shmmax
```

To add or alter these values, log on as root and open the file `/etc/sysctl.conf` with a text editor, then add or change the following entries to your chosen values:

```
kernel.shmmni = 4096
kernel.shmall = 2097152
kernel.shmmax = 268435456
kernel.sem = 32 4096 32 128
```

Then save and close the file.

To load these **sysctl** values immediately, run `sysctl -p`.

If you do not run the `sysctl -p` command, the new values are loaded when the system is rebooted.

By default the Linux kernel has a maximum number of processes, which might also limit the allowed number of threads.

For more information on `kernel.threads-max` and `kernel.pid-max`, see Resource shortage in IBM MQ queue manager when running a large number of clients

Setting RemoveIPC on IBM MQ

Attention: RemoveIPC is a systemd setting. Leaving **RemoveIPC** at its default value of Yes in the login manager configuration files (`logind.conf` and `logind.conf.d`) might cause IBM MQ owned IPC resources to be removed outside the control of IBM MQ.

You should set the value to No. For more information on **RemoveIPC** see the *login.conf* man page.

TCP/IP configuration

If you want to use **keepalive** for IBM MQ channels, you can configure the operation of the KEEPALIVE using the kernel parameters:

```
net.ipv4.tcp_keepalive_intvl
net.ipv4.tcp_keepalive_probes
net.ipv4.tcp_keepalive_time
```

See Using the TCP/IP SO_KEEPALIVE option for further information.

To view the current value of the parameters, run `sysctl <parameter name>`.

To add or alter these values, log in as root and open the file `/etc/sysctl.conf` with a text editor, then add or change the following entries to your chosen values.

To load these **sysctl** values immediately, enter the following command `sysctl -p`.

If you do not issue the `sysctl -p` command, the new values are loaded when the system is rebooted.

RDQM - configuring resource limits and environment variables

For replicated data queue managers (RDQMs), configure the `nproc` and `nofile` values for the `mqm` user in `/etc/security/limits.conf`. Alternatively set `LimitNOFILE` and `LimitNPROC` variables in the Pacemaker systemd service unit file for RDQM, named `rdqm.conf`. If the resource limits (`nproc` and/or `nofile`) are configured in both `limits.conf` and `rdqm.conf`, the higher value of the limits configured is used by the RDQM queue manager. You can use `rdqm.conf` to configure other resource limits (for example, stack size) and environment variables. Note that the `rdqm.conf` file is only read when the queue manager is started automatically by Pacemaker. This might be at system startup, or when the queue manager fails over to the node where the `rdqm.conf` file exists. If the queue manager is started manually with the **strmqm** command, it will inherit the environment where **strmqm** is run.

The following steps create a sample configuration in `rdqm.conf`:

1. Log in as root on the RDQM node.
2. Create the directory `/etc/systemd/system/pacemaker.service.d`.
3. Create the file `rdqm.conf` in that directory. The `rdqm.conf` file contains the required environment variables and resource limits in the following format:

   ```
   [Service]
   Environment="MQ_ENV_VAR=1"
   LimitNOFILE=65536
   LimitNPROC=32768
   LimitSTACK=16777216
   ```

   For more details on configuring the systemd unit file, consult your operating system documentation.
4. Restart the pacemaker service:

   ```
   systemctl daemon-reload
   systemctl restart pacemaker.service
   ```

   Any RDQM queue managers running on this node move to another node while pacemaker is restarted.
5. Repeat the procedure on the other two RDQM nodes so that the same configuration is used by the RDQM queue manager when it fails over or switches over to other nodes.

Note: You should use `qm.ini` attributes in preference to environment variables to control queue manager behavior because the `qm.ini` file is replicated between RDQM nodes.

RDQM - configuring the kernel console log level

The DRBD kernel module (kmod-drbd) can sometimes write many messages at the KERN_ERR (3) log level. To prevent these messages being copied to the system console, which can cause significant processing delays affecting the entire system, reduce the first number of the `kernel.printk` parameter to 3. For more information about kernel message priorities, see https://www.kernel.org/doc/html/latest/core-api/printk-basics.html.

To view the current value of the parameter, run `sysctl kernel.printk`.

To add or alter this value, log on as root and open the file `/etc/sysctl.conf` with a text editor, then add or change the following entry to your chosen value:

```
kernel.printk = 3 4 1 7
```

To load these `sysctl` values immediately, enter the command **sysctl -p**. If you do not issue the **sysctl -p** command, the new values are loaded when the system is rebooted.

32-bit support on 64-bit Linux platforms

Some 64-bit Linux distributions no longer support 32-bit applications by default. For details of affected platforms, and guidance on enabling 32-bit applications to run on these platforms, see “Hardware and software requirements on Linux systems” on page 95.

Configuring the users who start IBM MQ

You must make the configuration changes described in *Maximum open files* and *Maximum processes* for all users who start IBM MQ. This usually includes the `mqm` user ID, but the same changes must be made for any other user IDs who start queue managers.

For queue managers started with **systemd**, specify equivalent **NOFILE** and **NPROC** values in the unit file that contains the queue manager service configuration.

Maximum open files

The maximum number of open file-handles in the system is controlled by the parameter **fs.file-max**

The minimum value for this parameter for a system with two moderate sized queue managers is 524288.

Note: If the operating system default is higher, you should leave the higher setting, or consult your operating system provider.

You are likely to need a higher value if you intend to run more than two queue managers, or the queue managers are to process a significant workload.

To view the current value of a parameter, run `sysctl fs.file-max`.

To add or alter these values, log in as root and open the file `/etc/sysctl.conf` with a text editor, then add or change the following entry to your chosen value:

```
fs.file-max = 524288
```

Then save and close the file.

To load these **sysctl** values immediately, enter the following command `sysctl -p`.

If you do not issue the `sysctl -p` command, the new values are loaded when the system is rebooted.

If you are using a pluggable security module such as PAM (Pluggable Authentication Module), ensure that this module does not unduly restrict the number of open files for the `mqm` user. To report the maximum number of open file descriptors per process for the `mqm` user, login as the `mqm` user and enter the following values:

```
ulimit -n
```

For a standard IBM MQ queue manager, set the *nofile* value for the `mqm` user to 10240 or more. To set the maximum number of open file descriptors for processes running under the `mqm` user, add the following information to the `/etc/security/limits.conf` file:

```
mqm       hard  nofile     10240
mqm       soft  nofile     10240
```

The pluggable security module limits are not applied to queue managers started with **systemd**. To start an IBM MQ queue manager with **systemd** set **LimitNOFILE** to 10240 or more in the unit file that contains the queue manager service configuration.

For instructions on how to configure `nofile` for RDQM queue managers, see RDQM - configuring resource limits and environment variables.

Maximum processes

A running IBM MQ queue manager consists of a number of threaded programs. Each connected application increases the number of threads running in the queue manager processes. It is normal for an operating system to limit the maximum number of processes that a user runs. The limit prevents operating system failures due to an individual user or subsystem creating too many processes. You must ensure that the maximum number of processes that the `mqm` user is allowed to run is sufficient. The number of processes must include the number of channels and applications that connect to the queue manager.

The following calculation is useful when determining the number of processes for the mqm user:

```
nproc = 2048 + clientConnections * 4 + qmgrChannels * 4 +
    localBindingConnections
```

where:

- *clientConnections* is the maximum number of connections from clients on other machines connecting to queue managers on this machine.
- *qmgrChannels* is the maximum number of running channels (as opposed to channel definitions) to other queue managers. This includes cluster channels, sender/receiver channels, and so on.
- *localBindingConnections* does not include application threads.

The following assumptions are made in this algorithm:

- 2048 is a large enough contingency to cover the queue manager threads. This might need to be increased if a lot of other applications are running.
- When setting nproc, take into account the maximum number of applications, connections, channels and queue managers that might be run on the machine in the future.
- This algorithm takes a pessimistic view and the actual nproc needed might be slightly lower for later versions of IBM MQ and fastpath channels.
- On Linux, each thread is implemented as a light-weight process (LWP) and each LWP is counted as one process against nproc.

You can use the PAM_limits security module to control the number of processes that users run. You can configure the maximum number of processes for the mqm user as follows:

```
mqm       hard  nproc      4096
mqm       soft  nproc      4096
```

For more details on how to configure the PAM_limits security module type, enter the following command:

```
man limits.conf
```

The pluggable security module limits are not applied to queue managers started with **systemd**. To start an IBM MQ queue manager with **systemd** set **LimitNPROC** to a suitable value in the unit file that contains the queue manager service configuration.

For instructions on how to configure nproc for RDQM queue managers, see RDQM - configuring resource limits and environment variables.

You can check your system configuration using the mqconfig command.

For more information on configuring your system, see How to configure AIX and Linux systems for IBM MQ.

Related concepts

“Setting up the user and group on Linux” on page 99
On Linux systems, IBM MQ requires a user ID of the name mqm, with a primary group of mqm. The mqm user ID owns the directories and files that contain the resources associated with the product.

“Creating file systems on Linux” on page 100
Before installing IBM MQ, you might need to create file systems for both the product code and working data to be stored. There are minimum storage requirements for these file systems. The default installation directory for the product code can be changed at installation time, but the working data location cannot be changed.

Related reference

mqconfig

Linux Accepting the license on IBM MQ for Linux

You can choose to accept the license before or after installing the product on Linux platforms.

About this task

Accepting the IBM MQ license before you install the product causes the following issues for Linux users:

- It stops you adding the IBM MQ RPM to a yum repository.
- It does not fit well with working in the cloud, where the RPM is installed as part of building the image.
- It does not fit well with unzippable packages, where no code is run before installation.

Accepting the license after installation lets you set up your own repository to install from.

Notes:

- You still have to accept the license before you use the product.
- You must have the correct license, or licenses, for the components you want to install. See license requirements.
- If you have installed a trial license, follow the instructions for converting a trial license. See "Converting a trial license on Linux" on page 10.

Procedure

- Accept the license before you install IBM MQ.

  To accept the license before installing IBM MQ, run the `mqlicense.sh` script. Follow the instructions for installing the server by preparing your system, then follow the appropriate instructions for your operating system:

  rpm
  See "Installing the first IBM MQ installation on Linux using the rpm command" on page 112.

  dnf
  See "Installing IBM MQ on Linux Red Hat using dnf" on page 122.

  Ubuntu using Debian
  See "Installing an IBM MQ server on Linux Ubuntu using Debian packages" on page 130.

- Accept the license after you install IBM MQ.

  Attention: Do not use the `mqlicense.sh` script from the installation media to accept the license after installing IBM MQ. This script can only be used to accept the license before installation.

  To accept or view an IBM MQ license after you install the product, use the following commands:

  – mqlicense (accept license post installation)

  ```
  mqlicense -accept
  ```

  – dspmqlic (display IBM MQ license)

  ```
  dspmqlic
  ```

  Important: Although you can also use the **MQLICENSE** environment variable to accept or view an IBM MQ license after you install the product, bear in mind the following points:

  – Accepting the license by setting the **MQLICENSE** environment variable is only valid for the current session.

  – Running the **dspmqver** command still shows the license as not accepted if you run it after accepting the license by setting the **MQLICENSE** environment variable.

  You can set **MQLICENSE** to one of two values:

accept
To accept the license post-installation, use this command:

```
export MQLICENSE=accept
```

view
To display the license after you have accepted it, use this command:

```
export MQLICENSE=view
```

Linux Installing IBM MQ on Linux using rpm

Installation tasks that are associated with installing IBM MQ on Linux systems using rpm are grouped in this section.

About this task

To install IBM MQ using rpm, complete the following tasks.

For information about how to uninstall IBM MQ, see “Uninstalling or modifying IBM MQ on Linux using rpm” on page 149.

If product fixes or updates are made available, see “Applying maintenance to IBM MQ” on page 291.

Procedure

1. Check the system requirements.
   See “Checking requirements on Linux” on page 94.
2. Plan your installation.
   - As part of the planning process, you must choose which components to install and where to install them. See “IBM MQ rpm components for Linux systems” on page 108.
   - You must also make some platform-specific choices. See “Planning to install IBM MQ on Linux” on page 97.
3. Prepare your system for installation of IBM MQ.
   See “Preparing the system on Linux” on page 98.
4. Install IBM MQ server.
   See “Installing the first IBM MQ installation on Linux using the rpm command” on page 112, and “Installing additional IBM MQ installations on Linux using the rpm command” on page 116.
5. Optional: Install an IBM MQ client.
   See “Installing an IBM MQ client on Linux using rpm” on page 120.
6. Verify your installation. See “Verifying an IBM MQ installation on Linux” on page 138.

Linux *IBM MQ rpm components for Linux systems*

You can select the components that you require when you install IBM MQ.

Important:

1. For details of what each purchase of IBM MQ entitles you to install, see IBM MQ license information.
2. The RPM package `MQSeriesGSKit` file must be installed for server and client installation.

To display these components you can use, for example, the following command:

```
rpm -qa | grep MQ | xargs rpm -q --info
```

Table 13 on page 109 shows the components that are available when installing an IBM MQ server or client on a Linux system:

Table 13. IBM MQ components for Linux systems

Component	Description	Server media	Client media	RPM package name
Runtime	Contains files that are common to both server and client installations. **Note:** MQSeriesRuntime component must be installed.	✓	✓	MQSeriesRuntime
Server	You can use the server to run queue managers on your system and connect to other systems over a network. Provides messaging and queuing services to applications, and support for IBM MQ client connections.	✓		MQSeriesServer
Standard Client	The IBM MQ MQI client is a small subset of IBM MQ, without a queue manager, that uses the queue manager and queues on other (server) systems. It can be used only when the system it is on is connected to another system that is running a full server version of IBM MQ. The client and the server can be on the same system if required.	✓	✓	MQSeriesClient
SDK	The SDK is required for compiling applications. It includes sample source files, and the bindings (files .H, .LIB, .DLL, and others), that you need to develop applications to run on IBM MQ.	✓	✓	MQSeriesSDK
Sample programs	The sample application programs are needed if you want to check your IBM MQ installation using the verification procedures.	✓	✓	MQSeriesSamples
Java messaging	The files needed for messaging using Java (includes Java Message Service).	✓	✓	MQSeriesJava
Man pages	Linux man pages, in U.S. English, for: control commands MQI calls MQSC commands	✓	✓	MQSeriesMan
Java JRE	A Java runtime environment that is used by those parts of IBM MQ that are written in Java.	✓	✓	MQSeriesJRE
Message Catalogs	For available languages, see the table of message catalogs that follows.	✓	✓	
IBM Global Security Kit (GSKit)	IBM Global Security Kit (GSKit) V8 Certificate and TLS, Base Runtime.	✓	✓	MQSeriesGSKit

Table 13. IBM MQ components for Linux systems (continued)

Component	Description	Server media	Client media	RPM package name
IBM MQ Telemetry Service	IBM MQ Telemetry supports the connection of Internet Of Things (IOT) devices (that is, remote sensors, actuators and telemetry devices) that use the MQ Telemetry Transport (MQTT) protocol. The telemetry (MQXR) service enables a queue manager to act as an MQTT server, and communicate with MQTT client apps. **Note:** The IBM MQ Telemetry service is only available on Linux for x86-64 (64 bit) and Linux for IBM Z. A set of MQTT clients is available from the Eclipse Paho downloads page. These sample clients help you write your own MQTT client apps that IOT devices use to communicate with MQTT servers. See also "Installation considerations for IBM MQ Telemetry" on page 248.	✓		MQSeriesXRService
Managed File Transfer	MQ Managed File Transfer transfers files between systems in a managed and auditable way, regardless of file size or the operating systems used. For information about the function of each component, see "Managed File Transfer product options" on page 240.	✓		MQSeriesFTAgent MQSeriesFTBase MQSeriesFTLogger MQSeriesFTService MQSeriesFTTools
Advanced Message Security	Provides a high level of protection for sensitive data flowing through the IBM MQ network, while not impacting the end applications. You must install this component on all IBM MQ installations that host queues you want to protect. You must install the IBM Global Security Kit (GSKit) component on any IBM MQ installation that is used by a program that puts or gets messages to or from a protected queue, unless you are using only Java client connections. You must install the **Java JRE** component to install this component.	✓		MQSeriesAMS

Table 13. IBM MQ components for Linux systems (continued)				
Component	**Description**	**Server media**	**Client media**	**RPM package name**
AMQP Service	Install this component to make AMQP channels available. AMQP channels support AMQP 1.0 APIs. You can use AMQP channels to give AMQP applications access to the enterprise-level messaging facilities provided by IBM MQ.	✓		MQSeriesAMQP
REST API and IBM MQ Console	Adds HTTP based administration for IBM MQ through the REST API and IBM MQ Console.	✓		MQSeriesWeb
RDQM (replicated data queue manager)	Install this component to make the replicated data queue manager high availability configuration available. See "Installing RDQM (replicated data queue managers)" on page 253 for more information. **Note:** This component is available only on Linux for x86-64 (64 bit), on RHEL 8.8 or later. The package is located in the `MQServer/Advanced/RDQM folder`. This component is not supported for use with Docker.	✓		MQSeriesRDQM

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak® for Integration.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.
- V 10.0.0 From IBM MQ 10.0, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall

it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Table 14. IBM MQ message catalogs for Linux systems

Message catalog language	**RPM package name**
Brazilian Portuguese	MQSeriesMsg_pt
Czech	MQSeriesMsg_cs
French	MQSeriesMsg_fr
German	MQSeriesMsg_de
Hungarian	MQSeriesMsg_hu
Italian	MQSeriesMsg_it
Japanese	MQSeriesMsg_ja
Korean	MQSeriesMsg_ko
Polish	MQSeriesMsg_pl
Spanish	MQSeriesMsg_es
Simplified Chinese	MQSeriesMsg_Zh_CN
Traditional Chinese	MQSeriesMsg_Zh_TW
U.S. English	not applicable

Related concepts

"IBM MQ components and features" on page 6
You can select the components or features that you require when you install IBM MQ.

"Planning considerations for installation on Multiplatforms" on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

Linux *Installing the first IBM MQ installation on Linux using the rpm command*

You can install an IBM MQ server on a 64-bit Linux system using rpm. The instructions in this topic are for the first installation of IBM MQ on a Linux system.

Before you begin

- The instructions in this topic are for the first installation of IBM MQ on a Linux system. For instructions on how to install additional IBM MQ installations, see "Installing additional IBM MQ installations on Linux using the rpm command" on page 116.
- Before you start the installation procedure, ensure that you have completed the necessary steps outlined in "Preparing the system on Linux" on page 98.

About this task

Install the server by using the RPM Package Manager installer to select the components you want to install. The components and package names are listed in "IBM MQ rpm components for Linux systems" on page 108.

Attention: Unless you install all your required packages in the same operation, you must install the packages in the following order:

MQSeriesRuntime
MQSeriesJRE
MQSeriesJava
MQSeriesGSKit
MQSeriesServer
MQSeriesWeb
MQSeriesFTBase
MQSeriesFTAgent
MQSeriesFTService
MQSeriesFTLogger
MQSeriesFTTools
MQSeriesAMQP
MQSeriesAMS
MQSeriesXRService
MQSeriesClient
MQSeriesMan
MQSeriesMsg
MQSeriesSamples
MQSeriesSDK

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.
- V 10.0.0 From IBM MQ 10.0, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

2. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the tar file:
   a) For example, if you download part number CC7K6ML, you decompress the file by using the following command:

   ```
   gunzip CC7K6ML.tar.gz
   ```

   b) Similarly, extract the installation files from the tar file by using the following command:

   ```
   tar -xvf CC7K6ML.tar
   ```

   Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.
3. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
4. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:
   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```

   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.
5. Optional: Obtain the IBM MQ public signing gpg key and install it into rpm.

   ```
   rpm --import ibm_mq_public.pgp
   ```

   The IBM-provided RPMs are signed with a digital signature, and your system will not recognize that signature without further steps. This only needs to be done once for each system. For more information, see “IBM MQ code signatures” on page 14.

   The validity of any of the IBM MQ RPMs can then be verified, for example:

   ```
   # rpm -Kv MQSeriesRuntime-10.0.0-0.x86_64.rpm
   MQSeriesRuntime-10.0.0-0.x86_64.rpm:
       Header V3 RSA/SHA256 Signature, key ID 0209b828: OK
       Header SHA1 digest: OK
       V3 RSA/SHA256 Signature, key ID 0209b828: OK
       MD5 digest: OK
   ```

   Note: If you skip this step, then a harmless warning might be issued during RPM installation to indicate there is a signature but the system does not recognize the signing key, for example:

   ```
   warning: MQSeriesRuntime-10.0.0-0.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID 0209b828:
   NOKEY
   ```
6. Install IBM MQ.

   To support the running of a queue manager, you must install at least the MQSeriesRuntime, MQSeriesServer, and MQSeriesGSKit components.

   Important: The components that you need to install might not all be in the same folder on the installation media. Some components might be under the `/Advanced` folder. For more information about installing IBM MQ Advanced components, see “Installing IBM MQ Advanced for Multiplatforms” on page 232.

- For IBM MQ 10.0, install IBM MQ in the default location `/opt/mqm` by using the **`rpm -Uvh`** command:

  For example, to install all components that are available in your current location on the installation media to the default location, use the following command:

  ```
  rpm -Uvh MQSeries*.rpm
  ```

  To install the runtime and server components to the default location, use the following command:

  ```
  rpm -Uvh MQSeriesRuntime-*.rpm MQSeriesServer-*.rpm MQSeriesGSKit-*.rpm
  ```

- Install IBM MQ in a non-default location by using the `--prefix` option. All of the IBM MQ components that you require must be installed in the same location:

  The installation path specified must be either an empty directory, the root of an unused file system, or a path that does not exist. The length of the path is limited to 256 bytes and must not contain spaces.

  For example, enter the following installation path to install the runtime and server components to the `/opt/customLocation` directory on a 64-bit Linux system:

  ```
  rpm --prefix /opt/customLocation -Uvh MQSeriesRuntime-.rpm MQSeriesServer-.rpm
  MQSeriesGSKit-*.rpm
  ```

Results

You installed IBM MQ on your Linux system.

What to do next

- If you chose to accept the license post-installation, do so now. See Accept the license after installing the product.
- If required, you can now set this installation to be the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **`setmqenv`** or **`crtmqenv`** command to set various environment variables for a particular installation of IBM MQ . For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. See “Verifying an IBM MQ installation on Linux” on page 138, for more information.
- Only a user with a UID that is a member of the **`mqm`** group can issue administration commands. If you want to enable users to issue administration commands, they must be added to the **`mqm`** group. For more information, see “Setting up the user and group on Linux” on page 99 and Authority to administer IBM MQ on AIX, Linux, and Windows systems.

Related concepts

“Multiple installations on AIX, Linux, and Windows” on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

“Primary installation on AIX, Linux, and Windows” on page 20

On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

"Uninstalling or modifying IBM MQ on Linux using rpm" on page 149
On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Changing the primary installation

Related reference

setmqinst

Linux *Installing additional IBM MQ installations on Linux using the rpm command*

You can install additional IBM MQ servers on a 64-bit Linux system by using the **crtmqpkg** command during the installation process.

Before you begin

CAUTION: The instructions in this topic do not apply to Linux Ubuntu or Linux on Power Systems - Little Endian. For information about these platforms, see "Installing IBM MQ on Linux Ubuntu using Debian" on page 125.

- The instructions in this topic are for additional installations of IBM MQ on a Linux system. For instructions on how to install the first IBM MQ installation, see "Installing the first IBM MQ installation on Linux using the rpm command" on page 112.
- Before you start the installation procedure, ensure that you have completed the necessary steps outlined in "Preparing the system on Linux" on page 98.
- Before you can run the **crtmqpkg** command on Linux, you must have the **pax** and **rpmbuild** commands installed. These commands are not supplied as part of the product. You must get them from your Linux distribution supplier. The **rpmbuild** command is located in the **rpm-build** package.

About this task

Install the server by using the RPM Package Manager installer to select the components you want to install. The components and package names are listed in "IBM MQ rpm components for Linux systems" on page 108.

Attention: Unless you install all your required packages in the same operation, you must install the packages in the following order:

MQSeriesRuntime
MQSeriesJRE
MQSeriesJava
MQSeriesGSKit
MQSeriesServer
MQSeriesWeb
MQSeriesFTBase
MQSeriesFTAgent
MQSeriesFTService
MQSeriesFTLogger
MQSeriesFTTools
MQSeriesAMQP
MQSeriesAMS
MQSeriesXRService
MQSeriesExplorer
MQSeriesClient

MQSeriesMan
MQSeriesMsg
MQSeriesSamples
MQSeriesSDK

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.
- V 10.0.0 From IBM MQ 10.0, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Procedure

1. Optional: Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the tar file:
   a) For example, if you download part number CC7K6ML, you decompress the file by using the following command:

   ```
   gunzip CC7K6ML.tar.gz
   ```

   b) Similarly, extract the installation files from the tar file by using the following command:

   ```
   tar -xvf CC7K6ML.tar
   ```

   Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.
3. Set your current directory to the location of the installation files. The location might be a network location, or a local file system directory.
4. Required: Run the **crtmqpkg** command to create a unique set of packages to install on the system.

The **crtmqpkg** command is required only if this is not the first installation of IBM MQ on the system. If you have earlier versions of IBM MQ installed on your system, then installing the latest version works correctly if you install it in a different location.

Before you can run the **crtmqpkg** command on Linux, you must have the **pax** and **rpmbuild** commands installed. For more information, see Before you begin.

To run the **crtmqpkg** command on a Linux system:

a) Enter the following command:

```
./crtmqpkg suffix
```

where *suffix* is a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is located at `/var/tmp`. You must ensure that the system has enough free space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

```
$ TMPDIR=/test ./crtmqpkg suffix
```

b) Set your current directory to the location specified when the **crtmqpkg** command operation completes successfully.

This directory is a subdirectory of the `/var/tmp/mq_rpms` directory, in which the unique set of packages is created. The packages have the *suffix* value contained within the file name. For example, using a suffix of "1":

```
./crtmqpkg 1
```

means there is a subdirectory named `/var/tmp/mq_rpms/1/x86_64`.

The packages are renamed according to the subdirectory, for example:

```
From: MQSeriesRuntime-10.0.0-0.x86_64.rpm
To: MQSeriesRuntime_10.0.0-0.x86_64.rpm
```

5. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:

   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```

   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.

6. Install IBM MQ.

   To support the running of a queue manager, you must install at least the MQSeriesRuntime, MQSeriesServer, and MQSeriesGSKit components.

   Important: The components that you need to install might not all be in the same folder on the installation media. Some components might be under the `/Advanced` folder. For more information about installing IBM MQ Advanced components, see “Installing IBM MQ Advanced for Multiplatforms” on page 232.

- For IBM MQ 10.0, install IBM MQ in the default location `/opt/mqm`:

  For example, to install all components that are available in your current location on the installation media to the default location, use the following command:

  ```
  rpm -Uvh MQSeries*.rpm
  ```

  To install the runtime and server components to the default location, use the following command:

  ```
  rpm -Uvh MQSeriesRuntime-*.rpm MQSeriesServer-*.rpm
  ```

- Install IBM MQ in a non-default location by using the `--prefix` option. For each installation, all of the IBM MQ components that you require must be installed in the same location.

  The installation path specified must be either an empty directory, the root of an unused file system, or a path that does not exist. The length of the path is limited to 256 bytes and must not contain spaces.

  For example, enter the following installation path to install the runtime and server components to the `/opt/customLocation` directory on a 64-bit Linux system:

  ```
  rpm --prefix /opt/customLocation -Uvh MQSeriesRuntime-*.rpm MQSeriesServer-*.rpm
  ```

Results

You installed IBM MQ on your Linux system.

What to do next

- If required, you can now set this installation to be the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ . For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. See “Verifying an IBM MQ installation on Linux” on page 138, for more information.
- Only a user with a UID that is a member of the **mqm** group can issue administration commands. If you want to enable users to issue administration commands, they must be added to the **mqm** group. For more information, see “Setting up the user and group on Linux” on page 99 and Authority to administer IBM MQ on AIX, Linux, and Windows systems.

Related concepts

“Multiple installations on AIX, Linux, and Windows” on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

“Primary installation on AIX, Linux, and Windows” on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

“Uninstalling or modifying IBM MQ on Linux using rpm” on page 149

On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Changing the primary installation

Related reference

setmqinst

Linux *Installing an IBM MQ client on Linux using rpm*

Installing an IBM MQ client on a 64 bit Linux system.

Before you begin

- Before you start the installation procedure, make sure that you have completed the necessary steps outlined in "Preparing the system on Linux" on page 98.
- If this installation is not the only installation on the system, you must ensure that you have write access to `/var/tmp`.

About this task

This task describes the installation of the client, using the RPM Package Manager installer to select which components you want to install. You must install at least the Runtime and Client components. The components are listed in "IBM MQ rpm components for Linux systems" on page 108.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script:

   ```
   ./mqlicense.sh
   ```

   The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license.

   If possible, `mqlicense.sh` opens an X-window to display the license.

   If you need the license to be presented as text in the current shell, which can be read by a screen reader, type the following command:

   ```
   ./mqlicense.sh -text_only
   ```

   See "Accepting the license on IBM MQ for Linux" on page 107 for more information about license acceptance.
4. If you have multiple installations on this system, you must run **crtmqpkg** to create a unique set of packages to install on the system:

   a) Enter the following command:

   ```
   ./crtmqpkg suffix
   ```

where *suffix* is a name of your choosing, that will uniquely identify the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

b) Set your current directory to the location specified when the **crtmqpkg** command completes.

This directory is a sub-directory of `/var/tmp/mq_rpms`, in which the unique set of packages is created. The packages have the *suffix* value contained within the filename.

5. Optional: Obtain the IBM MQ public signing gpg key and install it into rpm.

```
rpm --import ibm_mq_public.pgp
```

The IBM-provided RPMs are signed with a digital signature, and your system will not recognize that signature without further steps. This only needs to be done once for each system. For more information, see "IBM MQ code signatures" on page 14.

The validity of any of the IBM MQ RPMs can then be verified, for example:

```
# rpm -Kv MQSeriesRuntime-10.0.0-0.x86_64.rpm
MQSeriesRuntime-10.0.0-0.x86_64.rpm:
    Header V3 RSA/SHA256 Signature, key ID 0209b828: OK
    Header SHA1 digest: OK
    V3 RSA/SHA256 Signature, key ID 0209b828: OK
    MD5 digest: OK
```

Note: If you skip this step, then a harmless warning might be issued during RPM installation to indicate there is a signature but the system does not recognize the signing key, for example:

```
warning: MQSeriesRuntime-10.0.0-0.x86_64.rpm: Header V3 RSA/SHA256 Signature, key ID 0209b828:
NOKEY
```

6. Install IBM MQ.

The minimum components that you must install are the MQSeriesRuntime, the MQSeriesClient, and the Miniseries components.

- To install to the default location, `/opt/mqm`, use the **rpm -ivh** command to install each component that you require.

  For example, to install all components to the default location use the following command:

  ```
  rpm -ivh MQSeries*.rpm
  ```

- To install to a non-default location use the **rpm --prefix** option. For each installation, all of the IBM MQ components that you require must be installed in the same location.

  The installation path specified must either be an empty directory, the root of an unused file system, or a path that does not exist. The length of the path is limited to 256 bytes and must not contain spaces.

  For example, to install the runtime and server components to `/opt/customLocation` on a 64-bit Linux system:

```
rpm --prefix /opt/customLocation -ivh MQSeriesRuntime-V.R.M-F.x86_64.rpm MQSeriesClient-V.R.M-
F.x86_64.rpm
```

where:

V
Represents the version of the product that you are installing

R
Represents the release of the product that you are installing

M
Represents the modification of the product that you are installing

F
Represents the fix pack level of the product that you are installing

What to do next

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

```
MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
```

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see "Testing communication between a client and a server on Linux" on page 147

Related tasks

"Uninstalling or modifying IBM MQ on Linux using rpm" on page 149
On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Installing IBM MQ on Linux Red Hat using dnf

You can install IBM MQ on Linux Red Hat by using the `dnf` installer.

About this task

- Before you start the installation procedure, ensure that you have completed the necessary steps outlined in "Preparing the system on Linux" on page 98.
- To install IBM MQ in a non default location, you must run the **crtmqpkg** command. This command requires that the system has the following commands installed:
  - **pax** or **rpmbuild**
  - **createrepo**
  - **yum-utils**

  These commands are not supplied as part of the product. You must get them from your Linux distribution supplier. The **rpmbuild** command is located in the **rpm-build** package.

Procedure

1. Optional: Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the tar file:
   a) For example, if you download part number CC7K6ML, you decompress the file by using the following command:

   ```
   gunzip CC7K6ML.tar.gz
   ```

   b) Similarly, extract the installation files from the tar file by using the following command:

   ```
   tar -xvf CC7K6ML.tar
   ```

Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.

3. Optional: If this is not the first installation on the system, or if you want to install IBM MQ to a non default location, run the **crtmqpkg** to create a unique set of packages to install on the system:

```
./crtmqpkg suffix installationPath
```

where:

- *suffix* specifies a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.
- *installationPath* specifies the path where you want to install IBM MQ.

Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is located at `/var/tmp`. You must ensure that the system has enough free space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

```
$ TMPDIR=/test ./crtmqpkg suffix installationPath
```

4. Set your current directory to the location of the installation packages. If you used the **crtmqpkg** command, this directory is the location that is specified when the **crtmqpkg** command operation completes successfully.
5. Configure the yum repository:

   A sample repository file is available in the `MQServer` directory of the installation packages. You can use this sample to assist you in configuring the yum repository.

   a) Create or update the repository:

   - If this is the first IBM MQ installation on the system, create a file with the suffix `.repo`, for example, `IBM_MQ.repo`, in the `/etc/yum.repos.d` directory.
   - If this is an additional IBM MQ installation on the system, append the details of the additional installation to the appropriate `.repo` file in the `/etc/yum.repos.d` directory.

   b) Add the following contents to the repository file:

```
[IBM-MQ-v.r.m-architecture]
name=IBM MQ v.r.m architecture
baseurl=file:///installationFilesLocation
enabled=1
gpgcheck=0
```

   c) Replace the *installationFilesLocation* variable with the location of the installation files.

   d) Replace the *v.r.m* variable with the version, release, and modification number for the version of IBM MQ that you want to install.

   e) Replace the *architecture* variable with the architecture of the system you are installing on. This value is one of the following values:

   - x86_64
   - ppc64le
   - s390x

   f) Optional: Enable gpg key verification.

   Replace `gpgcheck=0` with `gpgcheck=1` and add an additional `gpgkey=<uri>` line pointing to the certificate provided, for example:

```
gpgcheck=1
gpgkey=file:///directory/to/ibm_mq_public.pgp
```

   g) Optional: If you appended contents to the repository file, clear the repository cache by using the following command:

```
dnf clean all
```

h) Check that the IBM MQ repository is available by using the following command:

```
dnf repolist
```

6. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:
   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```

   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.
7. Install IBM MQ:
   - To install all available components in the default location, use the following command:

     ```
     dnf -y install MQSeries*
     ```

   - To install all available components in a non default location, use the following command:

     ```
     dnf -y install MQSeries*suffix*
     ```

     where *suffix* specifies the suffix that was chosen when you ran **crtmqpkg** in step “3” on page 123.
   - To install a subset of components, specify the components that you want to install. Any dependencies are automatically installed. To support the running of a queue manager, you must install at least the MQSeriesRuntime and the MQSeriesServer components. For example, to install the server component in the default location, use the following command:

     ```
     dnf -y install MQSeriesServer*
     ```

   - To install an older version of IBM MQ when multiple versions are available in the repository file, use the following command:

     ```
     dnf -y install MQSeries*-v.r.m-f
     ```

     where *v.r.m-f* specifies the version, release, modification, and fix pack level to install.

Results

You installed IBM MQ on your Linux system.

What to do next

- If you chose to accept the license post-installation, do so now. See Accept the license after installing the product.
- If required, you can now set this installation to be the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.

You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.

- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ . For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. See "Verifying an IBM MQ installation on Linux" on page 138, for more information.
- Only a user with a UID that is a member of the **mqm** group can issue administration commands. If you want to enable users to issue administration commands, they must be added to the **mqm** group. For more information, see "Setting up the user and group on Linux" on page 99 and Authority to administer IBM MQ on AIX, Linux, and Windows systems.

Related concepts

"Multiple installations on AIX, Linux, and Windows" on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

"Primary installation on AIX, Linux, and Windows" on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

"Uninstalling or modifying IBM MQ on Linux Red Hat using dnf" on page 151
On Linux Red Hat, you can uninstall the IBM MQ server or client using the `dnf` command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Changing the primary installation

Related reference

setmqinst

Linux Installing IBM MQ on Linux Ubuntu using Debian

Installation tasks that are associated with installing IBM MQ on Linux systems using a Debian installer are grouped in this section.

About this task

To install IBM MQ using a Debian installer, complete the following tasks.

If product fixes or updates are made available, see "Applying maintenance to IBM MQ" on page 291.

Procedure

1. Check the system requirements.

   See "Checking requirements on Linux" on page 94.
2. Plan your installation.

   As part of the planning process, you must choose which components to install and where to install them. See "IBM MQ Debian components for Linux Ubuntu systems" on page 126.
3. Prepare your system for installation of IBM MQ.

   See "Preparing the system on Linux" on page 98.
4. Install IBM MQ server.

   See "Installing an IBM MQ server on Linux Ubuntu using Debian packages" on page 130.
5. Optional: Install an IBM MQ client.

   See "Installing an IBM MQ client on Linux Ubuntu using Debian packages " on page 135.
6. Verify your installation. See "Verifying an IBM MQ installation on Linux" on page 138.

Linux *Overview of the Debian installer for IBM MQ on Linux Ubuntu*

An overview of the concepts and considerations for installing IBM MQ, on Linux Ubuntu, using the Debian installer.

Installation tools

Use **apt**, **dpkg**, or a higher level installation tool, to install and uninstall the product. The installed product on disk appears identical to an rpm-installed copy.

Attention: The Debian installation tools have no provision for overriding the installation directory. This means that there is no *relocatable or multi-version support*. Therefore the product will be installed to `/opt/mqm`, but this can be set as the primary installation if you require.

Package names

The package names have been changed to use an IBM MQ derived name.

For example, the Debian equivalent of the existing rpm server component, `MQSeriesServer`, is `ibmmq-server`.

On a single system, you can have a single version of IBM MQ installed by Debian, or you can achieve multi-version installation with Debian through the use of container based technologies, such as Docker.

Linux *IBM MQ Debian components for Linux Ubuntu systems*

You can select the components that you require when you install IBM MQ.

Important: For details of what each purchase of IBM MQ entitles you to install, see IBM MQ license information.

Table 15 on page 126 shows the components that are available when installing an IBM MQ server or client on a Linux Ubuntu system using the Debian installer:

Table 15. IBM MQ Debian components for Linux Ubuntu systems

Component	Description	Server media	Client media	Debian package name
Runtime	Contains files that are common to both server and client installations. **Note:** ibmmq-runtime component must be installed.	✓	✓	ibmmq-runtime
Server	You can use the server to run queue managers on your system and connect to other systems over a network. Provides messaging and queuing services to applications, and support for IBM MQ client connections.	✓		ibmmq-server
Standard Client	The IBM MQ MQI client is a small subset of IBM MQ, without a queue manager, that uses the queue manager and queues on other (server) systems. It can be used only when the system it is on is connected to another system that is running a full server version of IBM MQ. The client and the server can be on the same system if required.	✓	✓	ibmmq-client

Table 15. IBM MQ Debian components for Linux Ubuntu systems (continued)

Component	Description	Server media	Client media	Debian package name
SDK	The SDK is required for compiling applications. It includes sample source files, and the bindings (files .H, .LIB, .DLL, and others), that you need to develop applications to run on IBM MQ.	✓	✓	ibmmq-sdk
Sample programs	The sample application programs are needed if you want to check your IBM MQ installation using the verification procedures.	✓	✓	ibmmq-samples
Java messaging	The files needed for messaging using Java (includes Java Message Service).	✓	✓	ibmmq-java
Man pages	AIX man pages, in U.S. English, for: control commands MQI calls MQSC commands	✓	✓	ibmmq-man
Java JRE	A Java runtime environment that is used by those parts of IBM MQ that are written in Java.	✓	✓	ibmmq-jre
Message Catalogs	For available languages, see the table of message catalogs that follows.	✓	✓	
IBM Global Security Kit (GSKit)	IBM Global Security Kit (GSKit) V8 Certificate and TLS, Base Runtime.	✓	✓	ibmmq-gskit

Table 15. IBM MQ Debian components for Linux Ubuntu systems (continued)

Component	Description	Server media	Client media	Debian package name
Telemetry Service	IBM MQ Telemetry supports the connection of Internet Of Things (IOT) devices (that is, remote sensors, actuators and telemetry devices) that use the MQ Telemetry Transport (MQTT) protocol. The IBM MQ Telemetry service, which is also know as the MQXR service, enables a queue manager to act as an MQTT server, and communicate with MQTT client apps. **Note:** The IBM MQ Telemetry service is only available on Linux for x86-64 (64 bit) and Linux for IBM Z. The Eclipse Paho project, and MQTT.org, have free downloads of the latest telemetry clients and samples for a range of programming languages. Use these resources to help you write the MQTT client apps that IOT devices use to communicate with MQTT servers. See also “Installation considerations for IBM MQ Telemetry” on page 248.	✓		ibmmq-xrservice
Managed File Transfer	MQ Managed File Transfer transfers files between systems in a managed and auditable way, regardless of file size or the operating systems used. For information about the function of each component, see “Managed File Transfer product options” on page 240.	✓		ibmmq-ftagent ibmmq-ftbase ibmmq-ftlogger ibmmq-ftservice ibmmq-fttools
Advanced Message Security	Provides a high level of protection for sensitive data flowing through the IBM MQ network, while not impacting the end applications. You must install this component on all IBM MQ installations that host queues you want to protect. You must install the IBM Global Security Kit (GSKit) component on any IBM MQ installation that is used by a program that puts or gets messages to or from a protected queue, unless you are using only Java client connections. You must install the **Java JRE** component to install this component.	✓		ibmmq-ams

Table 15. IBM MQ Debian components for Linux Ubuntu systems (continued)				
Component	**Description**	**Server media**	**Client media**	**Debian package name**
AMQP Service	Install this component to make AMQP channels available. AMQP channels support AMQP 1.0 APIs. You can use AMQP channels to give AMQP applications access to the enterprise-level messaging facilities provided by IBM MQ.	✓		ibmmq-amqp
REST API and IBM MQ Console	Adds HTTP based administration for IBM MQ through the REST API and IBM MQ Console.	✓		ibmmq-web

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Table 16. IBM MQ message catalogs for Linux systems	
Message catalog language	**Component name**
Brazilian Portuguese	ibmmq-msg-pt
Czech	ibmmq-msg-cs
French	ibmmq-msg-fr
German	ibmmq-msg-de
Hungarian	ibmmq-msg-hu

Table 16. IBM MQ message catalogs for Linux systems (continued)	
Message catalog language	**Component name**
Italian	ibmmq-msg-it
Japanese	ibmmq-msg-ja
Korean	ibmmq-msg-ko
Polish	ibmmq-msg-pl
Spanish	ibmmq-msg-es
Simplified Chinese	ibmmq-msg-zh-cn
Traditional Chinese	ibmmq-msg-zh-tw
U.S. English	not applicable

Related concepts

"IBM MQ components and features" on page 6
You can select the components or features that you require when you install IBM MQ.

Linux *Installing an IBM MQ server on Linux Ubuntu using Debian packages*

You can install an IBM MQ server on a Linux Ubuntu system, using a Debian installer, in accordance with the system requirements web page.

Before you begin

See System Requirements for IBM MQ for details of the supported software levels.

Before you start the installation procedure, make sure that you first complete the necessary steps that are outlined in "Preparing the system on Linux" on page 98.

If you have installed IBM MQ 9.0.2, or earlier, on Ubuntu using rpm, you must uninstall all rpm versions of the product before installing the Debian version of the product.

You have the option to accept the license before or after product installation. See "Accepting the license on IBM MQ for Linux" on page 107 for more information.

About this task

Install the server by using a Debian installer to select the components that you want to install. The components and package names are listed in "IBM MQ Debian components for Linux Ubuntu systems" on page 126.

Attention: Ensure that you download the `Ubuntu` version of the `tar.gz` package, before you install the product, as this version contains the deb files you need for the **`apt-get`** tool.

You can use various installers. This topic describes the use of the **`apt-get`** and **dpkg** installers.

apt-get

You can use **`apt-get`** to install packages, and you do not need to install any dependent packages. **`apt-get`** installs dependency packages for the package that you require.

You must make your files accessible to **`apt-get`**, in order to use it.

To do this, issue the command, `chmod -R a+rx DIRNAME`, where `DIRNAME` is the directory into which you unpacked the `tar.gz` package.

Attention: If you do not make your files accessible to **`apt-get`**, you receive the following errors:

- N: Download is performed unsandboxed as root as file '/sw/9400deb/./InRelease' couldn't be accessed by user '_apt'. - pkgAcquire::Run (13: Permission denied)

- E: Failed to fetch file:/sw/9400deb/./Packages File not found - /sw/9400deb/./Packages (2: No such file or directory)
- E: Some index files failed to download. They have been ignored, or old ones used instead.

where `/sw/9400deb` is the directory from which you are installing IBM MQ.

dpkg

You can use **dpkg** to install individual packages, but you must ensure you install any dependencies as **dpkg** does not install any dependent packages for the package you require. Refer to the Table 17 on page 131 table for information about the dependencies of each package.

To support the running of a queue manager, you must install at least the `ibmmq-runtime` and the `ibmmq-server` components.

Table 17. Package component dependencies

Package Name	Component Function	Package Dependencies
ibmmq-runtime	Common function for all other components	None
ibmmq-server	Queue Manager	ibmmq-runtime ibmmq-gskit
ibmmq-client	C IBM MQ client libraries	ibmmq-runtime ibmmq-gskit
ibmmq-java	Java and JMS IBM MQ APIs	ibmmq-runtime
ibmmq-jre	Java Runtime Environment	ibmmq-runtime
ibmmq-sdk	Header files and libraries for non-Java APIs	ibmmq-runtime
ibmmq-man	UNIX man pages for IBM MQ	ibmmq-runtime
ibmmq-samples	IBM MQ application samples	ibmmq-runtime
ibmmq-msg-cs ibmmq-msg-de ibmmq-msg-es ibmmq-msg-fr ibmmq-msg-hu ibmmq-msg-it ibmmq-msg-ja ibmmq-msg-ko ibmmq-msg-pl ibmmq-msg-pt ibmmq-msg-ru [1] ibmmq-msg-zh-cn ibmmq-msg-zh-tw	Additional language message catalog files. English message catalog files are installed by default. For more information about these message catalogs, see “Selecting a national language for displaying messages on Linux” on page 148	ibmmq-runtime
ibmmq-gskit	IBM Global Security Kit (GSKit)	ibmmq-runtime

Table 17. Package component dependencies (continued)

Package Name	Component Function	Package Dependencies
ibmmq-web	REST API and IBM MQ Console.	ibmmq-runtime ibmmq-server ibmmq-java ibmmq-jre
ibmmq-ftbase	Managed File Transfer component	ibmmq-runtime ibmmq-java ibmmq-jre
ibmmq-ftlogger	Managed File Transfer component	ibmmq-runtime ibmmq-server ibmmq-ftbase ibmmq-java ibmmq-jre
ibmmq-fttools ibmmq-ftagent	Managed File Transfer components	ibmmq-runtime ibmmq-ftbase ibmmq-java ibmmq-jre
ibmmq-ftservice	Managed File Transfer component	ibmmq-runtime ibmmq-server ibmmq-ftagent ibmmq-ftbase ibmmq-java ibmmq-jre
ibmmq-amqp	Advanced Message Queuing Protocol component	ibmmq-runtime ibmmq-java ibmmq-server
ibmmq-xrservice	Telemetry Service component **Note:** The IBM MQ Telemetry service is only available on Linux for x86-64 (64 bit) and Linux for IBM Z.	ibmmq-runtime ibmmq-java ibmmq-jre ibmmq-server
ibmmq-ams	Advanced Message Security component	ibmmq-runtime ibmmq-server

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Procedure

1. Open a shell terminal. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script:

   ```
   ./mqlicense.sh
   ```

   The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license.

   If possible, `mqlicense.sh` opens an X-window to display the license.

   If you need the license to be presented as text in the current shell, which can be read by a screen reader, type the following command:

   ```
   ./mqlicense.sh -text_only
   ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.
4. Choose how to install the IBM MQ packages:

Either use the **apt** management tool to install the IBM MQ packages that you want, or use the **dpkg** command to install the IBM MQ packages that you want along with their dependency packages.

- To use the **apt-get** management tool to install the IBM MQ packages that you want along with their dependency packages:

  a. Create a file with the suffix `.list`, for example, `IBM_MQ.list`, in the `/etc/apt/sources.list.d` directory.

  This file should contain a deb entry for the location of the directory that contains the IBM MQ packages.

  For example:

  ```
  # Local directory containing IBM MQ packages
  deb [trusted=yes] file:/var/tmp/mq ./
  ```

  The inclusion of the `[trusted=yes]` statement (including the brackets) is optional and suppresses warnings and prompts during subsequent operations.

  b. Run the command **apt-get update** to add this directory, and the list of packages the directory contains, to the apt cache.

  Refer to the `Attention` note in "apt-get" on page 130 for possible errors you might receive.

  You can now use apt to install IBM MQ. For example, you can install the complete product by issuing the following command:

  ```
  apt-get install "ibmmq-*"
  ```

  You can install the server package and all its dependencies by issuing the following command:

  ```
  apt-get install ibmmq-server
  ```

  Attention: Do not run the `apt-get install ibmmq-*` command in the directory which holds the `.deb` files, unless you are using quotation characters in the shell.

  If you are using tools such as aptitude or synaptic, the install packages can be found in the `misc\non-free` category.

- To use the **dpkg** command to install the IBM MQ packages that you want, issue the **dpkg** command for each IBM MQ package that you want to install. For example, issue the following command to install the run time package:

  ```
  dpkg -i ibmmq-runtime_9.4.0.0_amd64.deb
  ```

  Important: Although **dpkg** permits multiple package files in the same command, this will not work as expected because of IBM MQ inter-package dependencies. You must install the packages individually in the following order. You may find that using **apt-get** is a better option.

  - ibmmq-runtime
  - ibmmq-jre
  - ibmmq-java
  - ibmmq-gskit
  - ibmmq-server
  - ibmmq-web
  - ibmmq-ftbase
  - ibmmq-ftagent
  - ibmmq-ftservice
  - ibmmq-ftlogger
  - ibmmq-fttools

- ibmmq-amqp
- ibmmq-ams
- ibmmq-xrservice
- ibmmq-client
- ibmmq-man
- ibmmq-msg_*language*
- ibmmq-samples
- ibmmq-sdk

Results

You have installed the packages you require.

What to do next

- If you chose to accept the license post-installation, do so now. See Accept the license after installing the product.
- If required, you can now set this installation to be the primary installation. Enter the following command at the command prompt:

  ```
  MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
  ```

  where *MQ_INSTALLATION_PATH* represents the directory where IBM MQ is installed.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ . For more information, see setmqenv and crtmqenv.
- If you want to confirm that the installation was successful, you can verify your installation. See “Verifying an IBM MQ installation on Linux” on page 138, for more information.

Related tasks

“Uninstalling or modifying IBM MQ on Linux Ubuntu using Debian packages” on page 153
You can uninstall an IBM MQ server or client that was installed using the Debian package manager. You can also modify an installation by removing selected packages (components) currently installed on your system.

Linux *Installing an IBM MQ client on Linux Ubuntu using Debian packages*

You can install an IBM MQ client on a Linux Ubuntu system, using a Debian package, in accordance with the system requirements web page.

Before you begin

See System Requirements for IBM MQ for details of the supported software levels.

Before you start the installation procedure, make sure that you have completed the necessary steps outlined in “Preparing the system on Linux” on page 98.

About this task

Install the client by using a Debian installer to select the components that you want to install. The components and package names are listed in “IBM MQ Debian components for Linux Ubuntu systems” on page 126.

Procedure

1. Open a shell terminal. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Set your current directory to the location of the installation packages.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
3. You have the option of accepting the license before or after installing the product. To accept the license before installing, run the `mqlicense.sh` script:

   ```
   ./mqlicense.sh
   ```

   The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license.

   If possible, `mqlicense.sh` opens an X-window to display the license.

   If you need the license to be presented as text in the current shell, which can be read by a screen reader, type the following command:

   ```
   ./mqlicense.sh -text_only
   ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.
4. Install the IBM MQ client.

   You can use any Debian installer. “Installing an IBM MQ server on Linux Ubuntu using Debian packages” on page 130 describes the use of the **apt-get** and **dpkg** packages to install a server.

   At a minimum, you must install the `ibmmq-runtime` component.

   If you are installing a subset of components, you must ensure that any dependencies are first installed, as listed in Table 18 on page 136.

   To install and use the package listed in the *Package Name* column, you must also install the components listed in the *Package Dependencies* column.

Table 18. Package component dependencies

Package Name	Component Function	Package Dependencies
ibmmq-runtime	Common function for all other components	None
ibmmq-client	C IBM MQ client libraries	ibmmq-gskit ibmmq-runtime
ibmmq-java	Java and JMS IBM MQ APIs	ibmmq-runtime
ibmmq-jre	Java Runtime Environment	ibmmq-runtime
ibmmq-sdk	Header files and libraries for non-Java APIs	ibmmq-runtime
ibmmq-man	UNIX man pages for IBM MQ	ibmmq-runtime
ibmmq-samples	IBM MQ application samples	ibmmq-runtime

Table 18. Package component dependencies (continued)		
Package Name	**Component Function**	**Package Dependencies**
ibmmq-msg-cs ibmmq-msg-de ibmmq-msg-es ibmmq-msg-fr ibmmq-msg-hu ibmmq-msg-it ibmmq-msg-ja ibmmq-msg-ko ibmmq-msg-pl ibmmq-msg-pt ibmmq-msg-ru [1] ibmmq-msg-zh-cn ibmmq-msg-zh-tw	Language specific message catalog files	ibmmq-runtime
ibmmq-gskit	IBM Global Security Kit (GSKit)	ibmmq-runtime

Notes:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Results

You have installed the packages you require.

What to do next

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

```
MQ_INSTALLATION_PATH/bin/setmqinst -i -p MQ_INSTALLATION_PATH
```

- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see "Testing communication between a client and a server on Linux" on page 147

Related concepts

"Multiple installations on AIX, Linux, and Windows" on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

"Primary installation on AIX, Linux, and Windows" on page 20
On systems that support multiple installations of IBM MQ (AIX, Linux, and Windows), the primary installation is the one to which IBM MQ system-wide locations refer. Having a primary installation is optional, but convenient.

Related tasks

"Uninstalling or modifying IBM MQ on Linux using rpm" on page 149
On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Changing the primary installation

Related reference

setmqinst

Linux Verifying an IBM MQ installation on Linux

The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on Linux systems.

About this task

You can verify a local (stand-alone) server installation or a server-to-server installation of the IBM MQ server:

- A local server installation has no communication links with other IBM MQ installations.
- A server-to-server installation does have links to other installations.

You can also verify that your IBM MQ MQI client installation completed successfully and that the communication link is working.

Procedure

- To verify a local server installation, see "Verifying a local server installation using the command line on Linux" on page 139.
- To verify a server-to-server installation, see "Verifying a server-to-server installation using the command line on Linux" on page 140.
- To verify a client installation, see "Verifying a client installation on Linux" on page 143.

Linux *Verifying a local server installation using the command line on Linux*

On Linux systems, you can verify a local installation by using the command line to create a simple configuration of one queue manager and one queue.

Before you begin

To verify the installation, you must first install the samples package.

Before beginning the verification procedure, you might want to check that you have the latest fixes for your system. For more information about where to find the latest updates, see "Checking requirements on Linux" on page 94.

About this task

Use the following steps to configure your default queue manager from the command line. After the queue manager is configured, use the `amqsput` sample program to put a message on the queue. You then use the `amqsget` sample program to get the message back from the queue.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. On a Linux system, log in as a user in the `mqm` group.
2. Set up your environment:
   a) Set up environment variables for use with a particular installation by entering the following command:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   b) Check that the environment is set up correctly by entering the following command:

      ```
      dspmqver
      ```

      If the command completes successfully, and the expected version number and installation name are returned, the environment is set up correctly.
3. Create a queue manager called `QMA` by entering the following command:

   ```
   crtmqm QMA
   ```

   Messages indicate when the queue manager is created, and when the default IBM MQ objects are created.
4. Start the queue manager by entering the following command:

   ```
   strmqm QMA
   ```

   A message indicates when the queue manager starts.
5. Start MQSC by entering the following command:

   ```
   runmqsc QMA
   ```

   A message indicates when MQSC starts. MQSC has no command prompt.
6. Define a local queue called `QUEUE1` by entering the following command:

   ```
   DEFINE QLOCAL (QUEUE1)
   ```

   A message indicates when the queue is created.

7. Stop MQSC by entering the following command:

```
end
```

   Messages are shown, followed by the command prompt.

Note: Subsequent steps require that the samples package is installed.

8. Change into the *MQ_INSTALLATION_PATH*/samp/bin directory, which contains the sample programs.

   MQ_INSTALLATION_PATH represents the high-level directory in which IBM MQ is installed.

9. Put a message on the queue by entering the following commands

```
./amqsput QUEUE1 QMA
```

   The following messages are shown:

```
Sample AMQSPUT0 start
target queue is QUEUE1
```

10. Type some message text on one or more lines, where each line is a different message. Enter a blank line to end the message input.

    The following message is shown:

```
Sample AMQSPUT0 end
```

    Your messages are now on the queue and the command prompt is shown.

11. Get the messages from the queue, by entering the following command:

```
./amqsget QUEUE1 QMA
```

    The sample program starts, and your messages are displayed.

Results

You have successfully verified your local installation.

Linux *Verifying a server-to-server installation using the command line on Linux*

You can verify a server-to-server installation using two servers, one as a sender and one as a receiver.

Before you begin

- On Linux, IBM MQ supports TCP on all Linux platforms. On x86 platforms and Power platforms, SNA is also supported. If you want to use the SNA LU6.2 support on these platforms, you need the IBM Communications Server for Linux 6.2. The Communications Server is available as a PRPQ product from IBM. For more details, see Communications Server.

  If you are using TCP/IP, make sure that TCP/IP and IBM MQ are installed on both servers.
- The examples in this task use TCP/IP. If you do not use TCP, see Setting up communication on AIX and Linux.
- Make sure that you are a member of the IBM MQ administrators group (**mqm**) on each server.
- Decide which installation is the sender server and which installation is the receiver server. The installations might be on the same system, or on different systems.

About this task

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. On the **receiver** server:
   a) On Linux, log in as a user in the mqm group.
   b) Check which ports are free, for example by running **netstat**. For more information about this command, see the documentation of your operating system.

      If port 1414 is not in use, make a note of 1414 to use as the port number in step 2 h. Use the same number for the port for your listener later in the verification. If it is in use, note a port that is not in use; for example 1415.
   c) Set up the environment for the installation you are using by entering the following command at the command prompt:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   d) Create a queue manager called QMB by entering the following command at the command prompt:

      ```
      crtmqm QMB
      ```

      Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.
   e) Start the queue manager by entering the following command:

      ```
      strmqm QMB
      ```

      A message tells you when the queue manager has started.
   f) Start MQSC by entering the following command:

      ```
      runmqsc QMB
      ```

      A message tells you that MQSC has started. MQSC has no command prompt.
   g) Define a local queue called RECEIVER.Q by entering the following command:

      ```
      DEFINE QLOCAL (RECEIVER.Q)
      ```

      A message tells you the queue has been created.
   h) Define a listener by entering the following command:

```
DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT ( PORT_NUMBER )
```

      Where *port_number* is the name of the port the listener runs on. This number must be the same as the number used when defining your sender channel.
   i) Start the listener by entering the following command:

      ```
      START LISTENER (LISTENER1)
      ```

      Note: Do not start the listener in the background from any shell that automatically lowers the priority of background processes.
   j) Define a receiver channel by entering the following command:

      ```
      DEFINE CHANNEL (QMA.QMB) CHLTYPE (RCVR) TRPTYPE (TCP)
      ```

      A message tells you when the channel has been created.
   k) End MQSC by typing:

      ```
      end
      ```

      Some messages are displayed, followed by the command prompt.

2. On the **sender** server:
   a) As the sender server is an AIX system, log in as a user in the `mqm` group.
   b) Set up the environment for the installation you are using by entering the following command at the command prompt:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   c) Create a queue manager called QMA by entering the following command at the command prompt:

      ```
      crtmqm QMA
      ```

      Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.
   d) Start the queue manager, by entering the following command:

      ```
      strmqm QMA
      ```

      A message tells you when the queue manager has started.
   e) Start MQSC by entering the following command:

      ```
      runmqsc QMA
      ```

      A message tells you that an MQSC session has started. MQSC had no command prompt.
   f) Define a local queue called QMB (to be used as a transmission queue) by entering the following command:

      ```
      DEFINE QLOCAL (QMB) USAGE (XMITQ)
      ```

      A message tells you when the queue has been created.
   g) Define a local definition of the remote queue with by entering the following command:

```
DEFINE QREMOTE (LOCAL.DEF.OF.REMOTE.QUEUE) RNAME (RECEIVER.Q) RQMNAME ('QMB') XMITQ (QMB)
```

   h) Define a sender channel by entering one of the following commands:

      con-name is the TCP/IP address of the receiver system. If both installations are on the same system, the *con-name* is `localhost`. *port* is the port you noted in 1 b. If you do not specify a port, the default value of 1414 is used.

```
DEFINE CHANNEL (QMA.QMB) CHLTYPE (SDR) CONNAME ('CON-NAME(PORT)') XMITQ (QMB) TRPTYPE (TCP)
```

   i) Start the sender channel by entering the following command:

      ```
      START CHANNEL(QMA.QMB)
      ```

      The receiver channel on the receiver server starts automatically when the sender channel starts.
   j) Stop MQSC by entering the following command:

      ```
      end
      ```

      Some messages are displayed, followed by the command prompt.
   k) Change into the *MQ_INSTALLATION_PATH*`/samp/bin` directory.

      This directory contains the sample programs. *MQ_INSTALLATION_PATH* represents the high-level directory in which IBM MQ is installed.
   l) If both the sender server and receiver server are installations on the same system, check that the queue managers have been created on different installations by entering the following command:

```
dspmq -o installation
```

If the queue managers are on the same installation, move either QMA to the sender installation or QMB to the receiver installation by using the **setmqm** command. For more information, see setmqm.

m) Put a message on the local definition of the remote queue, which in turn specifies the name of the remote queue. Enter the following command:

```
./amqsput LOCAL.DEF.OF.REMOTE.QUEUE QMA
```

A message tells you that `amqsput` has started.

n) Type some message text on one or more lines, followed by a blank line.

A message tells you that `amqsput` has ended. Your message is now on the queue and the command prompt is displayed again.

3. On the **receiver** server:

a) As your receiver server is an AIX system, change into the *MQ_INSTALLATION_PATH*`/samp/bin` directory.

This directory contains the sample programs. *MQ_INSTALLATION_PATH* represents the high-level directory in which IBM MQ is installed.

b) Get the message from the queue on the receiver by entering the following command:

```
./amqsget RECEIVER.Q QMB
```

The sample program starts, and your message is displayed. After a pause, the sample ends. Then the command prompt is displayed.

Results

You have now successfully verified the server-to-server installation.

Linux *Verifying a client installation on Linux*

You can verify that your IBM MQ MQI client installation completed successfully and that the communication link is working.

About this task

The verification procedure shows how to create a queue manager called `queue.manager.1`, a local queue called `QUEUE1`, and a server-connection channel called `CHANNEL1` on the server.

It shows how to create the client-connection channel on the IBM MQ MQI client workstation. It then shows how to use the sample programs to put a message onto a queue, and get the message from the queue.

The example does not address any client security issues. See Setting up IBM MQ MQI client security for details if you are concerned with IBM MQ MQI client security issues.

The verification procedure assumes that:

- The full IBM MQ server product has been installed on a server.
- The server installation is accessible on your network.
- The IBM MQ MQI client software has been installed on a client system.
- The IBM MQ sample programs have been installed.
- TCP/IP has been configured on the server and client systems. For more information, see Configuring connections between the server and client.

Procedure

1. Set up the server and client by using the command line.
   See “Setting up the server and client using the command line on Linux” on page 144.
2. Test the communications between client and server.
   See “Testing communication between a client and a server on Linux” on page 147.

Related tasks

“Installing an IBM MQ client on Linux using rpm” on page 120
Installing an IBM MQ client on a 64 bit Linux system.

Linux *Setting up the server and client using the command line on Linux*

You can use the command line to create the objects that you need to use to verify a client installation on Linux. On the server you create a queue manager, a local queue, a listener, and a server-connection channel. You must also apply security rules to allow the client to connect and make use of the queue defined. On the client you create a client-connection channel. After setting up the server and client, you can then use the sample programs to complete the verification procedure.

Before you begin

Before starting this task, review the information in “Verifying a client installation on Linux” on page 143.

About this task

This task explains how to use the command line to set up the server and client so that you can verify your client installation.

Procedure

1. Set up the server by following the instructions in “Setting up the server using the command line on Linux” on page 144.
2. Set up the client by following instructions in “Connecting to a queue manager, using the MQSERVER environment variable on Linux” on page 146.

What to do next

Test the communications between client and server by following the instructions in “Testing communication between a client and a server on Linux” on page 147.

Linux *Setting up the server using the command line on Linux*

Follow these instructions to create a queue manager, queue, and channel on the server. You can then use these objects to verify the installation.

About this task

These instructions assume that no queue manager or other IBM MQ objects have been defined.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Create a user ID on the server that is not in the `mqm` group.
   This user ID must exist on the server and client. This is the user ID that the sample applications must be run as, otherwise a 2035 error is returned.
2. Log in as a user in the mqm group.

3. You must set various environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

```
. MQ_INSTALLATION_PATH/bin/setmqenv -s
```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
4. Create a queue manager called QUEUE.MANAGER.1 by entering the following command:

   ```
   crtmqm QUEUE.MANAGER.1
   ```

   You see messages telling you that the queue manager has been created.
5. Start the queue manager by entering the following command:

   ```
   strmqm QUEUE.MANAGER.1
   ```

   A message tells you when the queue manager has started.
6. Start MQSC by entering the following command:

   ```
   runmqsc QUEUE.MANAGER.1
   ```

   A message tells you that an MQSC session has started. MQSC has no command prompt.
7. Define a local queue called QUEUE1 by entering the following command:

   ```
   DEFINE QLOCAL(QUEUE1)
   ```

   A message tells you when the queue has been created.
8. Allow the user ID that you created in step 1 to use QUEUE1 by entering the following command:

   ```
   SET AUTHREC PROFILE(QUEUE1) OBJTYPE(QUEUE) PRINCIPAL(' non_mqm_user ') AUTHADD(PUT,GET)
   ```

   where *non_mqm_user* is the user ID created in step 1. A message tells you when the authorization has been set. You must also run the following command to give the user ID authority to connect:

   ```
   SET AUTHREC OBJTYPE(QMGR) PRINCIPAL(' non_mqm_user ') AUTHADD(CONNECT)
   ```

   If this command is not run, a 2305 stop error is returned.
9. Define a server-connection channel by entering the following command:

   ```
   DEFINE CHANNEL (CHANNEL1) CHLTYPE (SVRCONN) TRPTYPE (TCP)
   ```

   A message tells you when the channel has been created.
10. Allow your client channel to connect to the queue manager and run under the user ID that you created in step 1, by entering the following MQSC command:

    ```
    SET CHLAUTH(CHANNEL1) TYPE(ADDRESSMAP) ADDRESS(' client_ipaddr ') MCAUSER(' non_mqm_user ')
    ```

    where *client_ipaddr* is the IP address of the client system, and *non_mqm_user* is the user ID created in step 1. A message tells you when the rule has been set.
11. Define a listener by entering the following command:

    ```
    DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT (port_number)
    ```

    where *port_number* is the number of the port the listener is to run on. This number must be the same as the number used when defining your client-connection channel in “Installing an IBM MQ client on Linux using rpm” on page 120.

    Note: If you omit the port parameter from the command, a default value of 1414 is used for the listener port. If you want to specify a port other than 1414, you must include the port parameter in the command, as shown.
12. Start the listener by entering the following command:

```
START LISTENER (LISTENER1)
```

13. Stop MQSC by entering:

```
end
```

You see some messages, followed by the command prompt.

What to do next

Follow the instructions to set up the client. See “Connecting to a queue manager, using the MQSERVER environment variable on Linux” on page 146.

Linux *Connecting to a queue manager, using the MQSERVER environment variable on Linux*

When an IBM MQ application is run on the IBM MQ MQI client, it requires the name of the MQI channel, the communication type, and the address of the server to be used. Provide these parameters by defining the MQSERVER environment variable.

Before you begin

Before you start this task, you must complete the task, “Setting up the server using the command line on Linux” on page 144, and save the following information:

- The host name or IP address of the server and port number that you specified when creating the listener.
- The channel name of the server-connection channel.

About this task

This task describes how to connect an IBM MQ MQI client, by defining the MQSERVER environment variable on the client.

You can give the client access to the generated client channel definition table, `amqclchl.tab` instead; see Accessing client-connection channel definitions.

Procedure

1. Log in as the userid that you created in Step 1 of “Setting up the server using the command line on Linux” on page 144.
2. Check the TCP/IP connection. From the client, enter one of the following commands:
   - `ping server-hostname`
   - `ping n.n.n.n`

     `n.n.n.n` represents the network address. You can set the network address in IPv4 dotted decimal form, for example, `192.0.2.0`. Alternatively, set the address in IPv6 hexadecimal form, for example `2001:0DB8:0204:acff:fe97:2c34:fde0:3485`.

   If the **ping** command fails, correct your TCP/IP configuration.
3. Set the MQSERVER environment variable. From the client, enter the following command:

```
export MQSERVER=CHANNEL1/TCP/'server-address (port)'
```

Where:

- *CHANNEL1* is the server-connection channel name.
- *server-address* is the TCP/IP host name of the server.
- *port* is the TCP/IP port number the server is listening on.

If you do not give a port number, IBM MQ uses the one specified in the `qm.ini` file, or the client configuration file. If no value is specified in these files, IBM MQ uses the port number identified in the

TCP/IP services file for the service name `MQSeries`. If an `MQSeries` entry in the services file does not exist, a default value of 1414 is used. It is important that the port number used by the client and the port number used by the server listener program are the same.

What to do next

Use the sample programs to test communication between the client and server; see "Testing communication between a client and a server on Linux" on page 147.

Linux *Testing communication between a client and a server on Linux*

On the IBM MQ MQI client workstation, use the `amqsputc` sample program to put a message on the queue at the server workstation. Use the `amqsgetc` sample program to get the message from the queue back to the client.

Before you begin

Complete the previous topics in this section:

- Set up a queue manager, channels, and queue.
- Open a command window.
- Set system environment variables.

About this task

Note that IBM MQ object definitions are case-sensitive. Text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

You must be logged in with the appropriate authority. For example, user `ivtid` in the `mqm` group.

Procedure

1. Change to the *MQ_INSTALLATION_PATH*`/samp/bin directory`, which contains the sample programs.

   MQ_INSTALLATION_PATH represents the high-level directory in which IBM MQ is installed.
2. You must set certain environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   . MQ_INSTALLATION_PATH/bin/setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
3. Start the PUT program for `QUEUE1` on `QUEUE.MANAGER.1` by entering the following command:

   ```
   ./amqsputc QUEUE1 QUEUE.MANAGER.1
   ```

   If the command is successful, the following messages are displayed:

   ```
   Sample AMQSPUT0 start
   target queue is QUEUE1
   ```

   Tip: You might get the error, `MQRC_NOT_AUTHORIZED` (2035). By default, channel authentication is enabled when a queue manager is created. Channel authentication prevents privileged users accessing a queue manager as an IBM MQ MQI client. For verifying the installation, you can either change the MCA user ID to a non-privileged user, or disable channel authentication. To disable channel authentication run the following MQSC command:

   ```
   ALTER QMGR CHLAUTH(DISABLED)
   ```

   When you finish the test, if you do not delete the queue manager, re-enable channel authentication:

   ```
   ALTER QMGR CHLAUTH(ENABLED)
   ```

4. Type some message text, then press **Enter** twice.
   The following message is displayed:

   ```
   Sample AMQSPUT0 end
   ```

   Your message is now on the queue that is on the server queue manager.
5. Start the GET program for QUEUE1 on QUEUE.MANAGER.1 by entering the following command:

   ```
   ./amqsgetc QUEUE1 QUEUE.MANAGER.1
   ```

   The sample program starts, and your message is displayed. After a short pause (approximately 30 seconds), the sample ends and the command prompt is displayed again.

Results

You have now successfully verified the client installation.

What to do next

1. You must set various environment variables on the server so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   .  MQ_INSTALLATION_PATH/bin/setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
2. On the server, stop the queue manager by entering the following command:

   ```
   endmqm QUEUE.MANAGER.1
   ```

3. On the server, delete the queue manager by entering the following command:

   ```
   dltmqm QUEUE.MANAGER.1
   ```

Linux *Selecting a national language for displaying messages on Linux*

To display messages from a different national language message catalog, you must install the appropriate catalog and set the **LANG** environment variable.

About this task

Messages in U.S. English are automatically installed with IBM MQ

Message catalogs for all languages are installed in *MQ_INSTALLATION_PATH*/msg/*language identifier*, where *language identifier* is one of the identifiers in Table 19 on page 148.

If you require messages in a different language, perform the following steps:

Procedure

1. Install the appropriate message catalog (see “IBM MQ components and features” on page 6).
2. To select messages in a different language, ensure the **LANG** environment variable is set to the identifier for the language you want to install:

Table 19. Language identifiers

Identifier	**Language**
cs_CZ	Czech
de_DE	German
es_ES	Spanish
fr_FR	French

Table 19. Language identifiers (continued)	
Identifier	**Language**
hu_HU	Hungarian
it_IT	Italian
ja_JP	Japanese
ko_KR	Korean
pl_PL	Polish
pt_BR	Brazilian Portuguese
zh_CN	Simplified Chinese
zh_TW	Traditional Chinese

Linux Uninstalling or modifying IBM MQ on Linux

You can uninstall an IBM MQ server or client. You can also modify an installation by removing selected packages (components) currently installed on your system.

Procedure

- For information on how to uninstall or modify IBM MQ on Linux, see the following subtopics:
  - "Uninstalling or modifying IBM MQ on Linux using rpm" on page 149
  - "Uninstalling or modifying IBM MQ on Linux Ubuntu using Debian packages" on page 153

Linux *Uninstalling or modifying IBM MQ on Linux using rpm*

On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Before you begin

Depending on which version of IBM MQ is installed, you might need to remove maintenance before you uninstall the base packages:

- If you are uninstalling a version of IBM MQ at IBM MQ 9.4.0 or later, you do not need to remove maintenance before you uninstall IBM MQ.
- If you are uninstalling a version of IBM MQ before IBM MQ 9.4.0, you must remove any maintenance that is applied to IBM MQ before you can uninstall. The procedure for removing maintenance changed at IBM MQ 9.4.0. Therefore, you must use the procedure that is detailed in earlier versions of the product documentation to remove the maintenance.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling or modifying, if you have not already done so.
2. For a server installation, end any IBM MQ activity that is associated with the installation you are uninstalling or modifying:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall or modify. Enter the following command:

```
. MQ_INSTALLATION_PATH/bin/setmqenv -s
```

where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.

c) Display the state of all queue managers on the system. Enter the following command:

```
dspmq -o installation
```

d) Stop all running queue managers that are associated with the installation that you want to uninstall or modify. Enter the following command for each queue manager:

```
endmqm QMgrName
```

e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

```
endmqlsr -m QMgrName
```

3. Log in as root.
4. Uninstall or modify IBM MQ by using the **rpm** command:

a) On a system with a single installation:

- Find out the names of the packages (components) currently installed on your system, by entering the following command:

```
rpm -qa | grep MQSeries
```

- Remove all components by appending all the package names to the **rpm** command arguments. For example:

```
rpm -qa | grep MQSeries | xargs rpm -ev
```

- Modify your installation by appending individual package names to the rpm command arguments. For example, to remove the runtime, Server and SDK components enter the following command:

```
rpm -ev MQSeriesRuntime MQSeriesServer MQSeriesSDK
```

b) On a system with multiple installations:

- Find out the names of the packages (components) currently installed on your system, by entering the following command:

```
rpm -qa | grep suffix
```

where *suffix* is the unique name that is given to the packages when **crtmqpkg** was run at installation time. *suffix* is included in each of the package names that belong to a particular installation.

- Remove all components by appending all the package names to the **rpm** command arguments. For example, to remove all components from an installation with the suffix MQ94 enter the following command:

```
rpm -qa | grep '\<MQSeries.*MQ94\>' | xargs rpm -ev
```

- Modify your installation by appending individual package names to the **rpm** command arguments. For example, to remove the runtime, Server and SDK components from an installation with the suffix MQ94 enter the following command:

```
rpm -ev MQSeriesRuntime-MQ94 MQSeriesServer-MQ94 MQSeriesSDK-MQ94
```

Results

After uninstallation, certain files under the directory trees `/var/mqm` and `/etc/opt/mqm` are not removed. These files contain user data and remain so subsequent installations can reuse the data. Most of the remaining files contain text, such as INI files, error logs, and FDC files. The directory tree `/var/mqm/shared` contains files that are shared across installations, including the executable shared libraries `libmqzsd.so` and `libmqzsd_r.so`.

What to do next

- If the product successfully uninstalled, you can delete any files and directories that are contained in the installation directory.
- If no other IBM MQ installations exist on the system, and you are not planning to reinstall or migrate, you can delete the `/var/mqm` and `/etc/opt/mqm` directory trees, including the files `libmqzsd.so` and `libmqzsd_r.so`. Deleting these directories destroys all queue managers and their associated data.

Uninstalling or modifying IBM MQ on Linux Red Hat using dnf

On Linux Red Hat, you can uninstall the IBM MQ server or client using the `dnf` command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Before you begin

Depending on which version of IBM MQ is installed, you might need to remove maintenance before you uninstall the base packages:

- If you are uninstalling a version of IBM MQ at IBM MQ 9.4.0 or later, you do not need to remove maintenance before you uninstall IBM MQ.
- If you are uninstalling a version of IBM MQ before IBM MQ 9.4.0, you must remove any maintenance that is applied to IBM MQ before you can uninstall. The procedure for removing maintenance changed at IBM MQ 9.4.0. Therefore, you must use the procedure that is detailed in earlier versions of the product documentation to remove the maintenance.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling or modifying, if you have not already done so.
2. For a server installation, end any IBM MQ activity associated with the installation you are uninstalling or modifying:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall or modify. Enter the following command:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   c) Display the state of all queue managers on the system. Enter the following command:

      ```
      dspmq -o installation
      ```

   d) Stop all running queue managers associated with the installation you want to uninstall or modify. Enter the following command for each queue manager:

      ```
      endmqm QMgrName
      ```

e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

```
endmqlsr -m QMgrName
```

3. Log in as root.
4. Uninstall or modify IBM MQ using the `dnf remove` command:
   - On a system with a single installation:
     - Remove the installation by using the following command:

       ```
       dnf remove MQSeries*
       ```

     - Modify the installation to add a component by using the following command:

       ```
       dnf install packageName
       ```

       where *packageName* specifies the component you want to add.
     - Modify the installation to remove a component by using the following command:

       ```
       dnf remove packageName
       ```

       where *packageName* specifies the component you want to remove.
   - On a system with a multiple installations:
     - Remove an installation by using the following command:

       ```
       dnf remove MQSeries*suffix*
       ```

       where *suffix* specifies the suffix that uniquely identifies the installation.
     - Modify the installation to add a component by using the following command:

       ```
       dnf install packageName*suffix*
       ```

       where *packageName* specifies the component you want to add, and *suffix* specifies the suffix that uniquely identifies the installation.
     - Modify the installation to remove a component by using the following command:

       ```
       dnf remove packageName*suffix*
       ```

       where *packageName* specifies the component you want to remove, and *suffix* specifies the suffix that uniquely identifies the installation.

Results

After uninstallation, certain files under the directory trees `/var/mqm` and `/etc/opt/mqm` are not removed. These files contain user data and remain so subsequent installations can reuse the data. Most of the remaining files contain text, such as INI files, error logs, and FDC files. The directory tree `/var/mqm/shared` contains files that are shared across installations, including the executable shared libraries `libmqzsd.so` and `libmqzsd_r.so`.

What to do next

- If the product successfully uninstalled, you can delete any files and directories contained in the installation directory.
- If there are no other IBM MQ installations on the system, and you are not planning to reinstall or migrate, you can delete the `/var/mqm` and `/etc/opt/mqm` directory trees, including the files `libmqzsd.so` and `libmqzsd_r.so`. Deleting these directories destroys all queue managers and their associated data.

Related tasks

"Installing IBM MQ on Linux Red Hat using dnf" on page 122
You can install IBM MQ on Linux Red Hat by using the `dnf` installer.

"Upgrading an IBM MQ installation on Linux" on page 335
You can upgrade an IBM MQ installation on Linux systems without uninstalling the earlier version.

"Uninstalling or modifying IBM MQ on Linux using rpm" on page 149
On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Linux *Uninstalling or modifying IBM MQ on Linux Ubuntu using Debian packages*

You can uninstall an IBM MQ server or client that was installed using the Debian package manager. You can also modify an installation by removing selected packages (components) currently installed on your system.

Before you begin

Depending on which version of IBM MQ is installed, you might need to remove maintenance before you uninstall the base packages:

- If you are uninstalling a version of IBM MQ at IBM MQ 9.4.0 or later, you do not need to remove maintenance before you uninstall IBM MQ.
- If you are uninstalling a version of IBM MQ before IBM MQ 9.4.0, you must remove any maintenance that is applied to IBM MQ before you can uninstall. The procedure for removing maintenance changed at IBM MQ 9.4.0. Therefore, you must use the procedure that is detailed in earlier versions of the product documentation to remove the maintenance.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling or modifying, if you have not already done so.
2. For a server installation, end any IBM MQ activity associated with the installation you are uninstalling or modifying:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall or modify. Enter the following command:

      ```
      . MQ_INSTALLATION_PATH/bin/setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   c) Display the state of all queue managers on the system. Enter the following command:

      ```
      dspmq -o installation
      ```

   d) Stop all running queue managers associated with the installation you want to uninstall or modify. Enter the following command for each queue manager:

      ```
      endmqm QMgrName
      ```

   e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

      ```
      endmqlsr -m QMgrName
      ```

3. Log in as root.
4. Uninstall or modify IBM MQ using a Debian installation command:

- Using **apt**.

  Issuing the command:

  ```
  apt-get remove "ibmmq-*"
  ```

  removes the product but leaves the package definition cached.

  Issuing the command:

  ```
  apt-get purge "ibmmq-*"
  ```

  purges the cached definition of the product.
- Using **dpkg**.

  Issuing the command:

  ```
  dpkg -r packagename
  ```

  removes the product but leaves the package definition cached.

  Issuing the command:

  ```
  dpkg -P packagename
  ```

  purges the cached definition of the product.

Results

After uninstallation, certain files under the directory trees `/var/mqm` and `/etc/opt/mqm` are not removed. These files contain user data and remain so subsequent installations can reuse the data. Most of the remaining files contain text, such as INI files, error logs, and FDC files. The directory tree `/var/mqm/shared` contains files that are shared across installations, including the executable shared libraries `libmqzsd.so` and `libmqzsd_r.so`.

What to do next

- If the product successfully uninstalled, you can delete any files and directories contained in the installation directory.
- If there are no other IBM MQ installations on the system, and you are not planning to reinstall or migrate, you can delete the `/var/mqm` and `/etc/opt/mqm` directory trees, including the files `libmqzsd.so` and `libmqzsd_r.so`. Deleting these directories destroys all queue managers and their associated data.

Linux Redistributable clients on Linux

The Linux x86-64 image is shipped in a `LinuxX64.tar.gz` file.

File names

The archive or .zip file names describe the file contents and equivalent maintenance levels.

For IBM MQ 10.0 the client images are available under the following file names:

Long Term Support: 10.0.0 IBM MQ C redistributable client for Linux x86-64
`10.0.0.0-IBM-MQC-Redist-LinuxX64.tar.gz`

Long Term Support: 9.4.0 IBM MQ JMS and Java redistributable client
`10.0.0.0-IBM-MQC-Redist-Java.zip`

Choosing the runtime files to distribute with an application

A script file named **genmqpkg** is provided by the redistributable client under the `bin` directory.

You can use the **genmqpkg** script to generate a smaller subset of files that are tailored to the needs of the application, for which the files are intended to be distributed.

You are asked a series of interactive Yes or No questions to determine the runtime requirements for an IBM MQ application.

Finally, **genmqpkg** asks you to supply a new target directory, where the script duplicates the required directories and files.

Important: A fully qualified path should be supplied to **genmqpkg**, as **genmqpkg** will not expand or evaluate shell variables.

Important: IBM Support is only able to provide assistance with the full, unmodified set of files contained within the redistributable client packages.

Other considerations

On Linux, the default data path of a non-installed client is:

Linux x86-64
$HOME/IBM/MQ/data

You can change the default directory of the data path, by using the MQ_OVERRIDE_DATA_PATH environment variable.

Note: You must create the directory first, as the directory is not created automatically.

A redistributable client runtime co-exists with a full IBM MQ client or server installation, provided that they are installed in different locations.

Important: Unpacking a redistributable image into the same location as a full IBM MQ installation is not supported.

On Linux the `ccsid.tbl` used to define the supported CCSID conversions is traditionally expected to be found in the `UserData` directory structure, along with error logs, trace files, and so on.

The `UserData` directory structure is populated by unpacking the redistributable client, and so, if the file is not found in its usual location, the redistributable client falls back to locate the file in the `/lib` subdirectory of the installation.

Classpath changes

The classpath used by **dspmqver**, **setmqenv**, and **crtmqenv** commands adds the `com.ibm.mq.allclient.jar` and `com.ibm.mq.jakarta.client.jar` to the environment, immediately following the `com.ibm.mq.jar`, and `com.ibm.mqjms.jar`.

An example of **dspmqver** output from the redistributable client on Linux:

```
Name:        IBM MQ
Version:     10.0.0.0
Level:       p940-940-L220415
BuildType:   IKAP - (Production)
Platform:    IBM MQ for Linux (x86-64 platform)
Mode:        64-bit
O/S:         Linux 2.6.32.59-0.7-default
InstName:    MQNI09200004
InstDesc:    IBM MQ V10.0.0.0 (Redistributable)
Primary:     No
InstPath:    /Development/johndoe/unzip/unpack
DataPath:    /u/johndoe/IBM/MQ/data
MaxCmdLevel: 10
```

Related concepts
“Redistributable IBM MQ clients” on page 29

An IBM MQ redistributable client is a collection of runtime files that are provided in a `.zip` or `.tar` file that can be redistributed to third parties under redistributable license terms. This provides a simple way of distributing applications and the runtime files that they require in a single package.

Windows Installing and uninstalling IBM MQ on Windows

Installation tasks that are associated with installing IBM MQ on Windows systems are grouped in this section.

About this task

To prepare for installation and to install the IBM MQ components, complete the following tasks.

For information about how to uninstall IBM MQ, see "Uninstalling IBM MQ on Windows" on page 224.

If product fixes or updates are made available, see "Applying maintenance to IBM MQ" on page 291.

Procedure

1. Check the system requirements.
   See "Checking requirements on Windows" on page 166.
2. Plan your installation.
   - As part of the planning process, you must choose which components to install and where to install them. See "IBM MQ features for Windows systems" on page 156.
   - You must also make some platform-specific choices. See "Planning to install IBM MQ on Windows" on page 168.
3. Install IBM MQ server.
   See "Installing IBM MQ server on Windows" on page 174.
4. Optional: Install an IBM MQ client.
   See "Installing an IBM MQ client on Windows" on page 200.
5. Verify your installation. See "Verifying an IBM MQ installation on Windows" on page 214.

Windows IBM MQ features for Windows systems

You can select the features that you require when you install IBM MQ.

Important: For details of what each purchase of IBM MQ entitles you to install, see IBM MQ license information.

If you choose an interactive installation, before you install, you must decide what type of installation you require. For more information about the available types of installation and the features that are installed with each option, see "Installation methods for Windows" on page 170.

The following table shows the features that are available when installing an IBM MQ server or client on a Windows system.

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Server	Server	You can use the server to run queue managers on your system and connect to other systems over a network. Provides messaging and queuing services to applications, and support for IBM MQ client connections. From IBM MQ 9.1, additional prerequisite checking is performed on this option. See Prerequisite checking for more information.	✓	
Managed File Transfer Service	MFT Service	The Managed File Transfer Service install option installs a file transfer agent that has additional capabilities beyond those provided by the file transfer agent installed using the Managed File Transfer Agent install option. These additional capabilities are:- • Create protocol bridge agents which are used to send and receive files with legacy FTP, FTPS or SFTP servers The Managed File Transfer Service install option must be installed on systems where the IBM MQ Server install option is already installed.	✓	

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Managed File Transfer Logger	MFT Logger	The Managed File Transfer Logger install option installs a file transfer logger which connects to an IBM MQ queue manager, often the queue manager designated as the coordination queue manager. It logs file transfer audit related data to either a database or a file. It must be installed on systems where the IBM MQ Server install option is already installed.	✓	
Managed File Transfer Agent	MFT Agent	The Managed File Transfer Agent install option installs a file transfer agent which connects to an IBM MQ queue manager and transfers file data, as messages, to other file transfer agents. These must be installed either as part of the Managed File Transfer Agent or Managed File Transfer Service install options.	✓	

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Managed File Transfer Tools	MFT Tools	The Managed File Transfer Tools install option installs command line tools that are used to interact with file transfer agents. You can use these tools to start file transfers, schedule file transfers and create resource monitors from the command line. The Managed File Transfer Tools can be installed and used on either a system where file transfer agents are installed, or on a system where no file transfer agents are installed.	✓	
IBM MQ MQI client	Client	The IBM MQ MQI client is a small subset of IBM MQ, without a queue manager, that uses the queue manager and queues on other (server) systems. It can be used only when the system it is on is connected to another system that is running a full server version of IBM MQ. The client and server can be on the same system if required.	✓	✓

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Extended Messaging APIs	JavaMsg	The files needed for messaging using Java. This feature includes support for JMS, XMS, .NET, and IBM MQ web services. From IBM MQ 9.1.0, this feature is named Extended Messaging APIs. In earlier versions of the product, it was named Java and .NET Messaging and Web Services.	✓	✓
Web Administration	Web	Adds HTTP based administration for IBM MQ through the REST API and IBM MQ Console. This feature also provides the messaging REST API, which you can use to perform simple point-to-point and publish messaging. You can publish messages to a topic, send messages to a queue, browse messages on a queue, and destructively get messages from a queue. If you want to install the Web Administration feature you must also install the Extended Messaging APIs (JavaMsg) feature.	✓	

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Development Toolkit	Development Toolkit	This feature includes sample source files, and the bindings (files .H, .LIB, .DLL, and others), that you need to develop applications to run on IBM MQ. Bindings and samples are provided for the following languages: C, C++, Visual Basic, Cobol, and .NET (including C#). Java and Java Message Service support is included and samples are provided for MTS (COM+), and MQSC.	✓	✓

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
IBM MQ Telemetry Service	XR Service	IBM MQ Telemetry supports the connection of Internet Of Things (IOT) devices (that is, remote sensors, actuators and telemetry devices) that use the MQ Telemetry Transport (MQTT) protocol. The telemetry (MQXR) service enables a queue manager to act as an MQTT server, and communicate with MQTT client apps. A set of MQTT clients is available from the Eclipse Paho downloads page. These sample clients help you write your own MQTT client apps that IOT devices use to communicate with MQTT servers. The XR Service install option must be installed on systems where the IBM MQ Server install option is already installed. See also “Installation considerations for IBM MQ Telemetry” on page 248.	✓	

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
Advanced Message Security	AMS	Provides a high level of protection for sensitive data flowing through the IBM MQ network, while not impacting the end applications. You must install this component on all IBM MQ installations that host queues you want to protect. You must install the IBM Global Security Kit (GSKit) component on any IBM MQ installation that is used by a program that puts or gets messages to or from a protected queue, unless you are using only Java client connections. The AMS install option must be installed on systems where the IBM MQ Server install option is already installed.	✓	

Interactive displayed name	Non-interactive displayed name	Description	Server media	Client media
AMQP Service	AMQP	Install this component to make AMQP channels available. AMQP channels support AMQP 1.0 APIs. You can use AMQP channels to give AMQP applications access to the enterprise-level messaging facilities provided by IBM MQ. The AMQP Service install option must be installed on systems where the IBM MQ Server install option is already installed.	✓	
Java runtime environment	JRE	The Java runtime environment (JRE) is a separate feature. The JRE feature installs a JRE that has been tailored for IBM MQ use, and is a required feature for all other features that use Java. That is: • IBM MQ Explorer • Web Administration • Telemetry Service • AMQP Service • Managed File Transfer Additional prerequisite checking is performed on this option. See Prerequisite checking for more information.	✓	✓

Note: From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.

Windows standard installation features

The following features are part of the Windows standard installation feature set. They are the features installed by the GUI installer for a "*typical installation*".

Interactive displayed name	Non-interactive displayed name	Notes
Server	Server	
Extended Messaging APIs	JavaMsg	Feature renamed at IBM MQ 9.1.0. It was previously named Java and .NET messaging and Web Services.
Web Administration	Web	Feature added at IBM MQ 9.1.0
Development Toolkit	Toolkit	
Java runtime environment	JRE	Feature added at IBM MQ 9.1.0. Prior to IBM MQ 9.1.0, the JRE feature was always installed.

When you install an IBM MQ server using **msiexec**, the features that are included in a *typical installation* are added to the list of features that you specify in the **ADDLOCAL** directive.

If you specify **ADDLOCAL**="" all these features will be installed.

If you do not want specific features added, you must add those specific features to the **REMOVE** directive.

For example, suppose that you specify the following settings for an **msiexec** installation:

```
ADDLOCAL="Client"
REMOVE="Web,Toolkit"
```

This results in the following features being installed:

```
Server,JavaMsg,JRE,Client
```

Related concepts

“IBM MQ components and features” on page 6
You can select the components or features that you require when you install IBM MQ.

“Planning considerations for installation on Multiplatforms” on page 16
Before you install IBM MQ, you must choose which components to install and where to install them. You must also make some platform-specific choices.

Related tasks

“Installing the server using the Launchpad” on page 175
You can install IBM MQ server on Windows systems by using the Launchpad. This procedure can be used for installing a first or a subsequent installation.

“Installing the server using msiexec” on page 177

IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

Windows Checking requirements on Windows

Before you install IBM MQ on Windows, you must check for the latest information and system requirements.

About this task

A summary of the tasks that you must complete to check system requirements are listed here with links to further information.

Procedure

1. Check that you have the latest information, including information on hardware and software requirements.

   See “Where to find product requirements and support information” on page 11.
2. Check that your systems meet the initial hardware and software requirements for Windows.

   See “Hardware and software requirements on Windows systems” on page 166.
3. Check that your systems have sufficient disk space for the installation.

   See Disk space requirements.
4. Check that you have the correct licenses.

   See “License requirements” on page 8 and IBM MQ license information.

Related concepts

“IBM MQ installation overview” on page 6
An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

Related tasks

“Applying maintenance to IBM MQ” on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Windows *Hardware and software requirements on Windows systems*

Check that the server environment meets the prerequisites for installing IBM MQ for Windows and install any prerequisite software that is missing from your system.

Before you install IBM MQ, you must check that your system meets the hardware and software requirements.

You must also review the product readme file, which includes information about last-minute changes and known problems and workarounds. For the latest version of the product readme file, see the IBM MQ, WebSphere MQ, and MQSeries product readmes web page.

Supported versions of Windows

For a list of the supported versions of the Windows operating system, see the System Requirements for IBM MQ website and follow the links to the Detailed System Requirements report for Windows. There are separate reports for Long Term Support and Continuous Delivery.

Although IBM MQ 9.1, and later, no longer supports some earlier versions of the Windows operating system referred to in the documentation, these earlier versions of Windows might still be supported for an earlier version of IBM MQ installed in the same domain as an IBM MQ 9.1 or later installation.

Changes to Windows features in Windows 10

The names of some of the Windows features have changed in Windows 10:

- *Windows Explorer* is *File Explorer*
- *My Computer* is called *This PC*
- The way in which you start the Control Panel is different
- The default browser is Microsoft Edge.

  Note: The IBM MQ Console supports only the following browsers:

  – Microsoft Edge
  – Google Chrome
  – Mozilla Firefox

Storage requirements for IBM MQ server

The storage requirements depend on which components you install, and how much working space you need. The storage requirements also depend on the number of queues that you use, the number and size of the messages on the queues, and whether the messages are persistent. You also require archiving capacity on disk, tape, or other media. For more information, see System Requirements for IBM MQ.

Disk storage is also required:

- Prerequisite software
- Optional software
- Your application programs

Requirements for IBM MQ Explorer

From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.

For more information about the requirements for the stand-alone IBM MQ Explorer, see IBM MQ Explorer installation requirements.

For further information about Windows requirements, see IBM MQ Explorer Requirements.

Requirements for IBM MQ classes for .NET

The following prerequisites apply to IBM MQ classes for .NET:

- .NET Core 2.1 is a prerequisite to use IBM MQ classes for .NET Standard, for developing .NET Core applications.
- .NET Framework V4.7.1 is a prerequisite to use IBM MQ classes for .NET Standard, for developing .NET Framework applications.
- From IBM MQ 9.4.0, for .NET 8 IBM MQ client libraries, that is libraries built using .NET 8 as the target framework, .NET 8 is a prerequisite.
- V 10.0.0 From IBM MQ 10.0.0, IBM MQ supports .NET 10 at runtime for applications using IBM MQ classes for .NET. When run against the new runtime or component, existing binaries might encounter a breaking change in behavior, such as failure to load or execute, and they might require recompilation. If you are using a .NET 6 or .NET 8 application, you can run this application without any recompilation being required by making a small edit in the `runtimeconfig` file to set the `targetframeworkversion` to `"net10.0"`.

Installation directories used for Windows operating systems

The 64-bit IBM MQ server or client, by default, installs its program directories into the 64-bit installation location: `C:\Program Files\IBM\MQ`.

Attention: There is no separate 32-bit client installation package. The client installation package and redistributable client contain both 32-bit and 64-bit IBM MQ client libraries. The included 32-bit libraries can be used by 32-bit applications on supported platforms where 32-bit support is offered by the operating system.

The default data directory that is used by IBM MQ changed in IBM MQ 8.0 to `C:\ProgramData\IBM\MQ`.

Installing prerequisite software

To install the prerequisite software that is provided in the IBM MQ server installation image, choose one of the following options:

- Navivate to the root of the server installation image, then double-click `setup.exe`. The IBM MQ Installation Launchpad window is displayed. From this window, click the **Software Prerequisites** option. Use this option to check what prerequisite software is already installed, then install any missing software.
- Navigate to the `Prereqs` folder of the server installation image. Select the folder for the software item to be installed, then start the installation program.

Related concepts

"Hardware and software requirements on Linux systems" on page 95
Before you install IBM MQ, check that your system meets the hardware and operating system software requirements for the particular components you intend to install.

"Hardware and software requirements on IBM i systems" on page 65
Check that the server environment meets the prerequisites for installing IBM MQ for IBM i.

Related tasks

"Checking requirements on Windows" on page 166
Before you install IBM MQ on Windows, you must check for the latest information and system requirements.

Related reference

IBM MQ Explorer Requirements

Windows Planning to install IBM MQ on Windows

Before you install IBM MQ on Windows, you must choose which components to install and where to install them. You must also make some platform-specific choices.

About this task

The following steps provide links to additional information to help you with planning your installation of IBM MQ on Windows.

As part of your planning activities, make sure that you review the information on hardware and software requirements for the platform on which you are planning to install IBM MQ. For more information, see "Checking requirements on Windows" on page 166.

Procedure

1. Decide which IBM MQ components and features to install.

   See "IBM MQ components and features" on page 6 and "Where to find downloadable installation images" on page 12.

Important: Ensure that your enterprise has the correct license, or licenses, for the components that you are going to install. For more information, see "License requirements" on page 8 and IBM MQ license information.

2. Review the options for naming your installation.

   In some cases, you can choose an installation name to use instead of the default name. See "Installation name on AIX, Linux, and Windows" on page 16.

3. Review the options and restrictions for choosing an installation location for IBM MQ.

   For more information, see "Installation location on Multiplatforms" on page 17.

4. If you plan to install multiple copies of IBM MQ, see "Multiple installations on AIX, Linux, and Windows" on page 19.

5. If you already have a primary installation, or plan to have one, see "Primary installation on AIX, Linux, and Windows" on page 20.

6. Make sure that the communications protocol needed for server-to-server verification is installed and configured on both systems that you plan to use.

   For more information, see "Server-to-server links on AIX, Linux, and Windows" on page 28.

7. Determine whether you need to install the Java runtime environment (JRE).

   If you are not using Java in your messaging applications, and you are not using portions of IBM MQ that are written in Java, you have the option to not install the JRE (or to remove the JRE if it was already installed).

   Attention: If you choose not to install the JRE, or to remove the JRE if it was already installed:

   - You must use the **runmqakm** command to manage key repositories. The **runmqktool** command is not available.
   - Use of the **runmqras** command fails unless a JRE at version 7, or later, is available on the system path.

   For more information, see **runmqakm** and **runmqktool** commands on AIX, Linux, and Windows.

Windows *Additional Windows features prerequisite checking*

There are two Windows installation features that have additional prerequisite checking enabled in the Windows IBM MQ installer from IBM MQ 9.1. These are the `Server` feature and the `Java Runtime Environment` (JRE) feature. These features are required by other features and installing those features, without these prerequisite checks, would cause those features to be unusable.

If you perform a Graphical User Interface installation, and select the **custom install** option, you can deselect the JRE or `Server` features.

Attention: Dialog panels prevent you from completing the installation, until you have resolved any issues.

If you perform a silent installation, and you elect to **REMOVE** the `Server` or JRE features while installing any other features that require those features, the `Server` and JRE features, as appropriate, will be added to your selected installation features.

Table 20 on page 169 describes how the selection of certain installation features requires the `Server` or JRE to be added automatically.

Table 20. Installation features requiring either the Server or JRE feature

Feature	Required by	Non-interactive name
Server	Web Administration	Web

Table 20. Installation features requiring either the Server or JRE feature (continued)		
Feature	**Required by**	**Non-interactive name**
JRE	Telemetry Service Managed File Transfer Service Managed File Transfer Agent Managed File Transfer Logger Managed File Transfer Tools AMQP Service Web Administration	XR Service MFT Service MFT Agent MFT Logger MFT Tools AMQP Service Web

To check whether the JRE or `Server` features have been installed, look in the `[INSTALLDIR]\swidtag` directory. If the:

- `ibm.com_IBM_MQ-9.0.x.swidtag` file is present, the `Server` has been installed
- `IBM_MQ_JRE-1.8.0.mqtag` file is present, the JRE has been installed.

If this is not what you require, consult the installation log.

Important: Each of the JRE and `Server` features are part of the set of Windows standard IBM MQ installation features. To remove the JRE (or the `Server`) when installing silently, add the feature to the **REMOVE** directive, do not merely omit it from the **ADDLOCAL** directive. See "Windows standard installation features" on page 165 for further details.

Windows *Installation methods for Windows*

When you install IBM MQ on Windows, there are several different installation types to choose from. This topic also describes how you can clear the installation settings of your enterprise, including the use of the **ResetMQ** command script.

If you are migrating from an earlier version of IBM MQ, see "Planning to migrate IBM MQ to a later version on Windows" on page 389. To modify an existing installation, see "Modifying a server installation using the Installation Launchpad" on page 199 and "Modifying a server installation silently using msiexec" on page 200.

Interactive or non-interactive installation

IBM MQ for Windows is installed using the Microsoft Installer (MSI). You can use the Installation Launchpad to invoke MSI, this process is called an attended or interactive installation. Alternatively, you can invoke MSI directly for a silent installation, without using the IBM MQ Installation Launchpad. This means that you can install IBM MQ on a system without interaction. This process is called unattended, silent, or non-interactive installation, and is useful for installing IBM MQ over a network on a remote system.

For a list of interactive and non-interactive features, see "IBM MQ features for Windows systems" on page 156.

Interactive installation

If you choose an interactive installation, before you install, you must decide what type of installation you require. Table 21 on page 171 shows the installation types available, and the features that are installed with each option. For the prerequisites required for each feature, see System Requirements for IBM MQ.

The installation types are:

- Typical installation
- Compact installation
- Custom Installation

You can also:

- Specify the installation location, name, and description.
- Have multiple installations on the same computer.

See "Primary installation on AIX, Linux, and Windows" on page 20 for important information about these features, including whether to designate your installation as the *primary installation*.

Table 21. Features installed with each type of interactive installation

Installation type	Server Features installed	Client Features installed	Comments
Typical	• Server • Development Toolkit • Extended Messaging APIs • Web Administration	• MQI Client • Development Toolkit • Extended Messaging APIs	The default option. Features are installed to default locations with a default installation name. Extended Messaging APIs (known as Java and .NET Messaging and Web Services before IBM MQ 9.1) includes IBM MQ classes for .NET, support for the Microsoft Windows Communication Foundation (WCF) for use with Microsoft.NET 3.
Compact	• Server only	• MQI Client only	The feature is installed to the default location with a default installation name.
Custom	By default, the following features are preselected: • Server • Development Toolkit • Extended Messaging APIs • Web Administration A custom installation can also install: • Telemetry Service • Advanced Message Security • Managed File Transfer Service • Managed File Transfer Logger • Managed File Transfer Agent • Managed File Transfer Tools • MQI Client	By default, the following features are preselected: • MQI Client • Development Toolkit • Extended Messaging APIs	A server custom installation can be used if you want to install the IBM MQ MQI client from within the server image. All the available features are listed and you can select which ones to install, and where to install them. You can also name and provide a description for the installation. Use a custom installation when you want to specify that the installation is primary. Extended Messaging APIs (known as Java and .NET Messaging and Web Services before IBM MQ 9.1) includes IBM MQ classes for .NET, support for the Microsoft Windows Communication Foundation (WCF) for use with Microsoft.NET 3 or later.

If Microsoft.NET is not installed before IBM MQ and you add it, rerun **setmqinst -i -n Installationname** if this is a primary installation.

The following table describes which level of .NET is required for which function:

Table 22. Required levels of Microsoft.NET	
IBM MQ function	**.NET version required**
IBM MQ classes for .NET. For more information, see: Installing IBM MQ classes for .NET	Microsoft .NET 6.0
The IBM MQ custom channel for WCF. For more information, see Developing WCF applications with IBM MQ. To build the sample solution files, either the Microsoft.NET 4.7.2 or later SDK, or Microsoft Visual Studio 2015 is needed. For more information, see: Software requirements for the WCF custom channel for IBM MQ	.NET framework 4.7.2 or later

For instructions on how to install IBM MQ on Windows systems, see Installing IBM MQ Server on Windows systems and "Installing an IBM MQ client on Windows" on page 200.

Non-interactive installation

If you choose a non-interactive installation the system on which you want to install must be able to access the IBM MQ image, or a copy of the files, and you must be able to access the system.

If you are running with User Account Control (UAC) enabled, you must invoke the non-interactive installation from an elevated command prompt. Elevate a command prompt by using a right-click to start the command prompt and choose **Run as administrator**. If you try to silently install from a non-elevated command prompt, the installation fails with an error of AMQ4353 in the installation log.

There are several ways to invoke MSI:

- Using the `msiexec` command with command-line parameters.
- Using the `msiexec` command with a parameter that specifies a response file. The response file contains the parameters that you normally supply during an interactive installation. See "Installing the server using msiexec" on page 177.
- Use the `MQParms` command with command-line parameters, a parameter file, or both. The parameter file can contain many more parameters than a response file. See "Installing the server using the MQParms command" on page 185.

Special domain ID

If the system belongs to a Windows domain you may need a special domain ID for the IBM MQ service, see "Considerations when installing IBM MQ server on Windows" on page 173 for more information.

Clearing IBM MQ installation settings

When you install IBM MQ on Windows, various values, such as the location of the data directory for IBM MQ, are stored in the registry.

In addition, the data directory contains configuration files that are read at installation time. To provide a trouble free re-installation experience, these values and files persist even after the last IBM MQ installation has been removed from the machine.

This is designed to assist you, and

- Allows you to easily uninstall and reinstall
- Ensures that you do not lose any previously defined queue managers in the process.

However in some cases this feature can be an annoyance. For example, if you want to:

- Move the data directory

- Install as if installing on a new machine, for example, for test purposes.
- Remove IBM MQ permanently.

To assist you in these situations, IBM MQ supplies a Windows command file, on the root directory of the installation media, called **ResetMQ.cmd**.

To run the command, enter the following:

```
ResetMQ.cmd [LOSEDATA] [NOPROMPT]
```

Attention: The parameters **LOSEDATA** and **NOPROMPT** are optional. If you supply either, or both, of these parameters, the following action results:

LOSEDATA
Existing queue managers become unusable. However, the data remains on disk.

NOPROMPT
Configuration information is permanently removed without further prompting.

You can run this command only after the last IBM MQ installation has been removed.

Important: You should use this script with caution. The command, even without specifying the optional parameter **LOSEDATA**, can irrecoverably remove queue manager configuration.

Related concepts

"Considerations when installing IBM MQ server on Windows" on page 173
There are some considerations relating to security that you should take into account when installing an IBM MQ server on Windows. There are some additional considerations relating to the object naming rules and logging.

Windows *Considerations when installing IBM MQ server on Windows*

There are some considerations relating to security that you should take into account when installing an IBM MQ server on Windows. There are some additional considerations relating to the object naming rules and logging.

Security considerations when installing IBM MQ server on a Windows system

- If you are installing IBM MQ on a Windows domain network running Active Directory Server, you probably need to obtain a special domain account from your domain administrator. For further information, and the details that the domain administrator needs to set up this special account, see "Configuring IBM MQ with the Prepare IBM MQ Wizard" on page 192 and "Creating and setting up Windows domain accounts for IBM MQ" on page 196.
- When you are installing IBM MQ server on a Windows system you must have local administrator authority. In order to administer any queue manager on that system, or to run any of the IBM MQ control commands your user ID must belong to the *local* `mqm` or `Administrators` group . If the local `mqm` group does not exist on the local system, it is created automatically when IBM MQ is installed. A user ID can either belong to the local `mqm` group directly, or belong indirectly through the inclusion of global groups in the local `mqm` group. For more information, see Authority to administer IBM MQ on UNIX, Linux, and Windows.
- Windows versions with a User Account Control (UAC) feature restricts the actions users can perform on certain operating system facilities, even if they are members of the Administrators group. If your user ID is in the Administrators group but not the `mqm` group you must use an elevated command prompt to issue IBM MQ admin commands such as **crtmqm**, otherwise the error AMQ7077 is generated. To open an elevated command prompt, right-click the start menu item, or icon, for the command prompt, and select **Run as administrator**.
- Some commands can be run without being a member of the `mqm` group (see Authority to administer IBM MQ on UNIX, Linux, and Windows).
- As with other versions of Windows, the object authority manager (OAM) gives members of the Administrators group the authority to access all IBM MQ objects even when User Account Control is enabled.

- If you intend to administer queue managers on a remote system, your user ID must be authorized on the target system. If you need to perform any of these operations on a queue manager when connected remotely to a Windows machine, you must have the `Create global objects` user access. Administrators have the `Create global objects` user access by default, so if you are an administrator you can create and start queue managers when connected remotely without altering your user rights. For more information, see Authorizing users to use IBM MQ remotely.
- If you use the highly secure template, you must apply it before installing IBM MQ. If you apply the highly secure template to a machine on which IBM MQ is already installed, all the permissions you have set on the IBM MQ files and directories are removed (see Applying security template files on Windows).

Naming considerations

Windows has some rules regarding the naming of objects created and used by IBM MQ. These naming considerations apply to IBM MQ 8.0 or later.

- Ensure that the machine name does not contain any spaces. IBM MQ does not support machine names that include spaces. If you install IBM MQ on such a machine, you cannot create any queue managers.
- For IBM MQ authorizations, names of user IDs and groups must be no longer than 64 characters (spaces are not allowed).
- An IBM MQ for Windows server does not support the connection of an IBM MQ MQI client if the client is running under a user ID that contains the @ character, for example, abc@d. Similarly, the client user ID should not be the same as local group.
- A user account that is used to run the IBM MQ Windows service is set up by default during the installation process; the default user ID is MUSR_MQADMIN. This account is reserved for use by IBM MQ. For more information, see Configuring user accounts for IBM MQ and Local and domain user accounts for the IBM MQ Windows service.
- When an IBM MQ client connects to a queue manager on the server, the username under which the client runs must not be same as the domain or machine name. If the user has the same name as the domain or machine, the connection fails with return code 2035(MQRC_NOT_AUTHORIZED).

Logging

You can set up logging during installation which assists you in troubleshooting any problems you might have with the installation.

Logging is enabled by default from the Launchpad. You can also enable complete logging, for more information, see How to enable Windows Installer logging.

Digital signatures

The IBM MQ programs and installation image are digitally signed on Windows to confirm that they are genuine and unmodified. The SHA-256 with RSA algorithm is used to sign the IBM MQ product.

Windows Installing IBM MQ server on Windows

On Windows, IBM MQ is installed by using the Microsoft Installer (MSI). You can either use the Installation Launchpad to invoke MSI or alternatively, you can invoke MSI directly.

About this task

To install IBM MQ server on Windows systems, you can choose either to install interactively with the Launchpad or to install by using MSI technology directly. MSI provides both an interactive installation and a non interactive installation.

For more information on installation options, see “Installation methods for Windows” on page 170.

Procedure

- To install IBM MQ server by using the Launchpad, see “Installing the server using the Launchpad” on page 175.
- To install IBM MQ server on by using the MSI technology directly, see “Installing the server using msiexec” on page 177.

Related tasks

“Modifying a server installation using the Installation Launchpad” on page 199
You can interactively remove or install IBM MQ features on Windows by using IBM MQ Installation Launchpad.

“Modifying a server installation silently using msiexec” on page 200
You can silently remove or install IBM MQ features on Windows by using **msiexec**.

“Configuring user accounts for IBM MQ” on page 191
After installing IBM MQ server, you must configure the IBM MQ service before you can start any queue managers.

“Uninstalling IBM MQ on Windows” on page 224
You can uninstall the IBM MQ MQI clients and servers on Windows systems by using the control panel, the command line (**msiexec**), **MQParms**, or by using the installation media, in which case you can optionally remove queue managers as well.

Windows *Installing the server using the Launchpad*

You can install IBM MQ server on Windows systems by using the Launchpad. This procedure can be used for installing a first or a subsequent installation.

About this task

You can use the Launchpad to make a compact, typical, or custom installation of IBM MQ. You can reuse the launchpad multiple times to install further installations. It automatically selects the next available installation name, instance, and location to use. To view all the installation types and the features that are installed with each option, see “Installation methods for Windows” on page 170.

Note that if you have previously uninstalled IBM MQ from your system (see “Uninstalling IBM MQ on Windows” on page 224), some configuration information might remain, and some default values might be changed.

From IBM MQ 9.3.0, a new **Confirm License Entitlement** panel in the Windows interactive installer is presented after feature selection if you have chosen to install any IBM MQ Advanced features (IBM MQ Telemetry Service, Advanced Message Security, or Managed File Transfer Service), or if you are upgrading from an installation that already has these features.

This panel simply warns you that these features are considered IBM MQ Advanced functionality and should only be installed if you have entitlement to IBM MQ Advanced. This warning reduces the risk of users installing IBM MQ Advanced features on a machine in error.

Note: The **Confirm License Entitlement** panel applies to production server builds and not to clients, beta builds, trial builds or developer (non-warranty) builds.

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
2. Locate `Setup.exe` in the base directory of the IBM MQ installation image.
   - From a network location, this location might be *m:*`\`*instmqs*`\Setup.exe`
   - From a local file system directory, this location might be *C:*`\`*instmqs*`\Setup.exe`

3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.
4. Follow the instructions on screen. Review, and if necessary, modify the software requirements and network configuration.
5. On the **IBM MQ Installation** tab of the Launchpad, select the installation language, and then click **Launch IBM MQ Installer** to start the IBM MQ installation wizard.
6. Use the IBM MQ installation wizard to install the software.

   If you select any IBM MQ Advanced features and the **Confirm License Entitlement** panel then appears:

   - If you do have an IBM MQ Advanced license, simply select **Yes (I have an MQ Advanced license)** and **Next** to continue with the installation.
   - If you do not have an IBM MQ Advanced license and do not intend to purchase one, click **Back** and change your feature selections.

   Depending on your system the installation process can take several minutes. At the end of the installation process, the IBM MQ Setup window displays the message `Installation Wizard Completed Successfully`.

   When this message appears, click **Finish**.

Results

You have successfully installed IBM MQ. The Prepare IBM MQ wizard starts automatically, displaying the **Welcome to the Prepare IBM MQ Wizard** page.

What to do next

Use the Prepare IBM MQ Wizard to configure IBM MQ with a user account for your network. You must run the wizard to configure the IBM MQ Service before you can start any queue managers. For more information, see “Configuring IBM MQ with the Prepare IBM MQ Wizard” on page 192.

- If you have chosen this installation to be the primary installation on the system, you must now set it as the primary installation. Enter the following command at the command prompt:

```
MQ_INSTALLATION_PATH\bin\setmqinst -i -p MQ_INSTALLATION_PATH
```

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see “Verifying an IBM MQ installation on Windows” on page 214.

Related tasks

“Installing the server using msiexec” on page 177
IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

“Modifying a server installation using the Installation Launchpad” on page 199

You can interactively remove or install IBM MQ features on Windows by using IBM MQ Installation Launchpad.

"Modifying a server installation silently using msiexec" on page 200
You can silently remove or install IBM MQ features on Windows by using **msiexec**.

"Configuring user accounts for IBM MQ" on page 191
After installing IBM MQ server, you must configure the IBM MQ service before you can start any queue managers.

"Uninstalling IBM MQ on Windows" on page 224
You can uninstall the IBM MQ MQI clients and servers on Windows systems by using the control panel, the command line (**msiexec**), **MQParms**, or by using the installation media, in which case you can optionally remove queue managers as well.

Windows *Installing the server using msiexec*

IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

Before you begin

If you are running IBM MQ on Windows systems with User Account Control (UAC) enabled, you must invoke the installation with elevated privileges. If you are using the Command prompt or IBM MQ Explorer, you elevate privileges by using a right-click to start the program and selecting Run as administrator. If you try to run **msiexec** without using elevated privileges, the installation fails with an error of AMQ4353 in the installation log.

About this task

IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation. An interactive installation displays panels and ask questions.

The **msiexec** command uses parameters to give MSI some or all of the information that can also be specified through panels during an interactive installation. This means that a user can create a reusable automated or semi-automated installation configuration. Parameters can be given through the command line, a transform file, a response file, or a combination of the three.

Some parameters can only be provided on the command line and not in a response file. For more information about these parameters, see Table 23 on page 179 in "Specifying command line parameters for server installation with msiexec" on page 179.

There are also a number of parameters can be used either on the command line or in a response file. For more information about these parameters, see Table 25 on page 182 in "Creating and using a response file for server installation" on page 181. If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Procedure

1. For multiple silent installations, for each version that is to be installed, find an MSI instance ID that is available to use for that installation.

   For more information, see "Choosing MSI Instance IDs for multiple client installations" on page 203.
2. To install using **msiexec**, at the command line, enter the **msiexec** command in the following format:

   ```
   msiexec parameters [USEINI="response-file"] [TRANSFORMS="transform_file"]
   ```

   where:

   parameters
   are either command-line parameters preceded by a / character, or property=value pairs. If you are using both forms of parameter, always put the command-line parameters first. For more information, see "Specifying command line parameters for server installation with msiexec" on

page 179, which contains a link to the website that lists all the command line parameters that are available.

For an unattended installation, you must include the **/q** or **/qn** parameter in the command line. Without this parameter, the installation is interactive.

Note: You must include the **/i** parameter and the file location of the IBM MQ installer package.

response-file
is the full path and file name of the file that contains the [Response] stanza and the required property=value pairs, for example `C:\MyResponseFile.ini`. An example response file, `Response.ini`, is supplied with IBM MQ. This file contains default installation parameters. For more information, see "Creating and using a response file for server installation" on page 181.

transform_file
is the full path and file name of a transform file. For more information, see "Using transforms with msiexec for server installation" on page 180 and "Choosing MSI Instance IDs for multiple server installations" on page 178.

Note: For a silent installation to succeed, the `AGREETOLICENSE="yes"` property must be defined either on the command line or in the response file.

Results

After the command has been entered, the command prompt immediately reappears. IBM MQ is installing as a background process. If you have entered parameters to produce a log, check this file to see how the installation is progressing. If the installation completes successfully, you see the message `Installation operation completed successfully` in the log file.

Windows *Choosing MSI Instance IDs for multiple server installations*

For multiple silent installations, for each version that is installed you must find an MSI instance ID that is available to use for that installation.

About this task

In order to support silent, or non-interactive, multiple installations, you need to find out whether the instance ID you want to use is already in use or not and choose the appropriate one. For each installation media (for example, each client and server), Instance ID 1 is the default ID which is used for single installations. If you want to install alongside Instance ID 1 you need to specify which instance you want to use. If you have already installed instance 1, 2, and 3 then you need to find out what the next available instance is, for instance, Instance ID 4. Similarly, if instance 2 has been removed, you need to find out that there is a gap that can be reused. You can find out which Instance ID is currently in use by using the **dspmqinst** command.

Procedure

1. Type **dspmqinst** to find a free MSI Instance in the media being installed by reviewing the MSIMedia and MSIInstanceId values for the versions already installed. For example:

```
InstName: Installation1
InstDesc:
Identifier:    1
InstPath:      C:\Program Files\IBM\MQ
Version:       9.0.0.0
Primary:       Yes
State:         Available
MSIProdCode:   {74F6B169-7CE6-4EFB-8A03-2AA7B2DBB57C}
MSIMedia:      9.0 Server
MSIInstanceId: 1
```

2. If MSI Instance ID 1 is in use and you want to use MSI Instance ID 2, the following parameters must be added to the msiexec call:

```
MSINEWINSTANCE=1 TRANSFORMS=":instanceId7.mst;1033.mst"
```

What to do next

For multiple installations, the **INSTALLATIONNAME** or **PGMFOLDER** must be supplied as an additional parameter on any non-interactive installation command. Supplying the **INSTALLATIONNAME** or **PGMFOLDER** ensures that you do not work with the wrong installation in case you omit or incorrectly specify the **TRANSFORMS** parameter.

Windows *Specifying command line parameters for server installation with msiexec*

You can specify either standard **msiexec** command line parameters preceded by a / character, or property=value pairs, or a combination of both.

About this task

The **msiexec** command can accept the following types of parameter on the command line:

Standard command line parameters, preceded by a / character

For more information about the **msiexec** command line parameters, see the MSDN Command-Line Options web page.

For an unattended installation, you must include the **/q** or **/qn** parameter in the command line. Without this parameter, the installation is interactive.

Note: You must include the **/i** parameter and the file location of the IBM MQ installer package.

Property=value pair parameters entered on the command line

All the parameters that are available for use in a response file can also be used on the command line. For more information about these parameters, see Table 25 on page 182 in "Creating and using a response file for server installation" on page 181.

There are some extra property=value pair parameters, shown in the following table, that are only for use on the command line:

Table 23. Parameters that can be used on the command line only (msiexec property=value parameters)

Property	Values	Meaning
USEINI	*path* \ *file_name*	Use the specified response file. See "Creating and using a response file for server installation" on page 181
SAVEINI	*path* \ *file_name*	Generate a response file during installation. The file contains those parameters selected for this installation that a user might make during an interactive installation.
ONLYINI	1|yes| **""**	1, yes or any value other than null. End the installation before updating the target system, but after generating a response file, if this is specified. "". Continue the installation and update the target system (the default).
TRANSFORMS	:InstanceId *x*.mst| *path* \ *file_name* | :InstanceId *x*.mst; *path* \ *file_name*	The :InstanceId *x*.mst value is only required for a subsequent installation of IBM MQ. The *path* \ *file_name* specifies what transform (.mst) files must be applied to the product. For example, `"1033.mst"` specifies the supplied U.S. English transform file.
MSINEWINSTANCE	1	This property is only required for subsequent installations of IBM MQ

When using the property=value pair parameters note that:

- Property strings must be in uppercase.
- Value strings are not case-sensitive, except for feature names. You can enclose value strings in double quotation marks. If a value string includes a blank, enclose the blank value string in double quotation marks.
- For a property that can take more than one value, use the format:

```
ADDLOCAL="Server,Client"
```

- For properties taking paths and file names, for example, **PGMFOLDER**, you must supply the paths as absolute paths and not relative paths; that is as `C:\folder\file` and not `".\folder\file"`.

When using property=value pair and command line parameters with the **msiexec** command, enter command line parameters first.

If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Procedure

- For a single installation of IBM MQ, specify the **msiexec** command as shown in the following typical example.

  All parameters, separated by one or more spaces, must be typed on the same line as the **msiexec** call.

```
msiexec
/i "path\MSI\IBM MQ.msi"
/l*v c:\install.log
/q
TRANSFORMS="1033.mst"
AGREETOLICENSE="yes"
ADDLOCAL="Server"
```

- If you are installing a second copy of IBM MQ, specify the **msiexec** command as shown in the following typical example.

  All parameters, separated by one or more spaces, must be typed on the same line as the **msiexec** call.

```
msiexec
/i "path\MSI\IBM MQ.msi"
/l*v c:\install.log
/q
TRANSFORMS=":InstanceId2.mst;1033.mst"
AGREETOLICENSE="yes"
ADDLOCAL="Server"
MSINEWINSTANCE=1
```

  where `/l*v c:\install.log` writes installation log to file `c:\install.log`.

Windows *Using transforms with msiexec for server installation*

MSI can use transforms to modify an installation. During IBM MQ installation, transforms can be used to support different national languages.

About this task

IBM MQ is supplied with transform files in the `\MSI` folder of the Server image. These files are also embedded in the IBM MQ Windows installer package, `IBM MQ.msi`.

Table 24 on page 181 shows the locale identifier, language, and the transform file name to use in the **msiexec** command line.

Table 24. Supplied transform files for various language support		
Language	**Transform File name**	**Value**
U.S. English	1033.mst	1033
German	1031.mst	1031
French	1036.mst	1036
Spanish	1034.mst	1034
Italian	1040.mst	1040
Brazilian Portuguese	1046.mst	1046
Japanese	1041.mst	1041
Korean	1042.mst	1042
Simplified Chinese	2052.mst	2052
Traditional Chinese	1028.mst	1028
Czech	1029.mst	1029
Hungarian	1038.mst	1038
Polish	1045.mst	1045

You can also specify the required language by using the **MQLANGUAGE** property with the **MQParms** command. For information about the msiexec property=value parameters, see "MQParms parameter file - server installation" on page 187.

Procedure

On the **msiexec** command line, specify the required language by using the **TRANSFORMS** property in a property=value pair as shown in the following example:

```
TRANSFORMS="1033.mst"
```

The quotation marks surrounding the value are optional.

You can also specify the full path and file name of the transform file. Again, the quotation marks surrounding the value are optional. For example:

```
TRANSFORMS="D:\Msi\1033.mst"
```

You might need to merge transforms to install multiple installations of the same version, for example:

```
TRANSFORMS=":InstanceId2.mst;D:\Msi\1033.mst"
```

Windows *Creating and using a response file for server installation*

You can use the **msiexec** command with a parameter that specifies additional properties that are defined in a response file. There are three ways of creating a response file for a server installation.

About this task

A response file is an ASCII text file with a format like a Windows `.ini` file, that contains the stanza [Response]. The [Response] stanza contains some or all the parameters that would normally be specified as part of an interactive installation. The parameters are given in a property=value pair format. Any other stanzas in the response file are ignored by **msiexec**.

An example response file, `Response.ini`, is supplied with IBM MQ. It contains the default installation parameters.

You can combine the use of a response file with `msiexec` command-line parameters described in "Specifying command line parameters for server installation with msiexec" on page 179.

Table 25 on page 182 shows the parameters that are available for use in a response file. These parameters can also be used on the command line. If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Table 25. Parameters that can be used in a response file

Property	Values	Meaning
PGMFOLDER"1" on page 184	*path*	Folder for the IBM MQ program files. For example, `c:\mqm`.
DATFOLDER	*path*	Folder for the IBM MQ data files. For example, `c:\mqm\data`. **Note:** Multiple installations of IBM MQ all use the same **DATFOLDER**.
LOGFOLDER	*path*	Folder for the IBM MQ queue manager log files. For example, `c:\mqm\log`. **Note:** Multiple installations of IBM MQ all use the same **LOGFOLDER**.
USERCHOICE	0|no	If the command line or response file specifies parameters to install features, a dialog can be displayed to prompt the user to accept the preselected options, or review and possibly change them. 0 or no. Suppresses display of the dialog. Anything else. Dialog is displayed. Not used for a silent installation.
AGREETOLICENSE "2" on page 184	yes	Accept the terms of the license. Set to `yes` before a silent installation. If the installation is not silent, this parameter is ignored.
KEEPQMDATA	**keep** |delete	If the Server feature is to be uninstalled, whether to delete any existing queue managers. delete removes any existing queue managers. keep, or any other value, keeps them. **Note:** This property is only valid on a final server uninstallation. Otherwise this property is ignored.

Table 25. Parameters that can be used in a response file (continued)

Property	Values	Meaning
LAUNCHWIZ	0|1|yes|no| **""**	0 or no. Do not launch the Prepare IBM MQ Wizard after IBM MQ is installed. 1 or yes. Launch the Prepare IBM MQ Wizard if the Server feature is installed. "". Launch the Prepare IBM MQ Wizard to install the Server (the default). If this option is to launch the Prepare IBM MQ Wizard, you can specify the WIZPARMFILE, either in this file, or on the command line. The Prepare IBM MQ Wizard must be run to make your IBM MQ installation operational. If you choose not to launch it here, you must run it before using IBM MQ.
WIZPARMFILE	*path* \ *file_name*	When specified, the file that contains the parameters to pass to the Prepare IBM MQ Wizard when it is launched. These are in the [Services].
ADDLOCAL	*feature*, *feature, All*| **""**	A comma-separated list of features to install locally. For a list of valid feature names, see "IBM MQ features for Windows systems" on page 156. All installs all features "" installs the typical features. If you do not want a feature use REMOVE="*feature*" **Note:** If this is a new installation, the typical features "3" on page 184 are installed by default irrespective of the feature list provided in the **ADDLOCAL** property. If you do not want a feature, use REMOVE="*feature*" to specify that feature.
REMOVE	*feature*, *feature*, |All| **""**	A comma-separated list of features to remove. For a list of valid feature names, see "IBM MQ features for Windows systems" on page 156. "4" on page 185 All uninstalls all features "" uninstalls no features (the default).

Table 25. Parameters that can be used in a response file (continued)		
Property	**Values**	**Meaning**
STARTSERVICE	0|no| **""**	0 or no. Do not start the IBM MQ Service at the end of installation. "" (the default). Start the IBM MQ Service at the end of installation if it was running at the start, or if this is a new installation. Anything else. Start the Service at the end of the installation. Ignored if the server feature is not installed. If you do not start the IBM MQ Service, IBM MQ will not be operational and queue managers will not start. You must run the Prepare IBM MQ Wizard for the service to be correctly configured. This parameter is only valid if LAUNCHWIZ is set to no.
STARTTASKBAR	0|no| **""**	0 or no. Do not start the IBM MQ taskbar application at the end of installation. "" (the default). Start the IBM MQ taskbar application at the end of installation if it was running at the start, or if this is a new installation. Anything else. Start the taskbar application at the end of the installation. Ignored if the server feature is not installed. This parameter is only valid if LAUNCHWIZ is set to no.
INSTALLATIONDESC	"Description of installation"	Sets the installation description from the command line. Subject to the documented installation description length limitations
INSTALLATIONNAME "1" on page 184	INSTALLATIONName	Sets the installation name from the command line. Subject to the documented installation name character and length limitations.
MAKEPRIMARY	0|1| **""**	Makes the installation primary, if possible, or removes the primary flag. 1 = Make primary, 0 = Make non-primary, - use default algorithm

Notes:

1. For multiple installations, the **INSTALLATIONNAME** or **PGMFOLDER** must be supplied as an additional parameter on any non-interactive installation command. Supplying the **INSTALLATIONNAME** or **PGMFOLDER** ensures that you do not work with the wrong installation in case you omit or incorrectly specify the **TRANSFORMS** parameter.
2. For a silent installation to succeed, the `AGREETOLICENSE="yes"` property must be defined either on the command line or in the response file.
3. For a new installation, the typical features that are installed by default, irrespective of the feature list provided in the **ADDLOCAL** property, include the following features. If they are NOT required, they must be added to the **REMOVE** list.

- Server
- MQ Explorer
- Extended Messaging APIs (was Java and .NET Messaging and Web Services before IBM MQ 9.1.0)
- Web Administration
- Development Toolkit
- Java Runtime Environment

4. When specifying which features to remove with the **REMOVE** parameter:
   - If you want to silently uninstall the Server feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying `REMOVE="Web,Server"`.
   - If you want to silently uninstall the Java runtime environment (JRE) feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying `REMOVE="Web,JRE"`.

Procedure

1. Create a response file for installation in one of the following ways:
   - Copy and edit the file `Response.ini` that is supplied in the IBM MQ Windows Server install image, using an ASCII file editor.
   - Create your own response file using an ASCII file editor.
   - Use the **msiexec** command with the **SAVEINI** (and optionally, the **ONLYINI**) command line parameters to generate a response file that contains the same installation options as shown in the following example:

     ```
     msiexec /i "path\IBM MQ.msi" /q SAVEINI="response_file"
     TRANSFORMS="1033.mst" AGREETOLICENSE="yes"
     ```

2. To run the **msiexec** command with a response file, specify the full path and file name of the response file with the **USEINI** parameter as shown in the following example:

   ```
   msiexec /i "path\MSI\IBM
   MQ.msi" /l*v c:\install.log TRANSFORMS= "1033.mst" USEINI= "C:\MQ\Responsefile"
   ```

   In the response file, all text is in English, and comments begin with a `;` character.

Example

The following example shows a typical response file:

```
[Response]
PGMFOLDER="c:\mqm"
DATFOLDER="c:\mqm\data"
LOGFOLDER="c:\mqm\log"
AGREETOLICENSE="yes"
LAUNCHWIZ=""
WIZPARMFILE="d:\MQParms.ini"
ADDLOCAL="Server,Client"
REMOVE="Toolkit"
```

Windows *Installing the server using the MQParms command*

You can use the **MQParms** command to invoke installation or uninstallation of the IBM MQ server.

Before you begin

The **MQParms** command can use parameters on a command line, or those specified in a parameter file. The parameter file is an ASCII text file that contains the parameter values that you want to set for the installation. The **MQParms** command takes the specified parameters and generates the corresponding **msiexec** command line.

This means that you can save all the parameters that you want to use with the **msiexec** command in a single file.

If you are running IBM MQ on Windows systems with User Account Control (UAC) enabled, you must invoke the installation with elevated privileges. If you are using the Command prompt or IBM MQ Explorer elevate privileges by using a right-click to start the program and selecting **Run as administrator**. If you try to run the MQParms program without using elevated privileges, the installation fails with an error of AMQ4353 in the installation log.

For silent operations, this must include the **/q** or **/qn** parameter, either on the command line, or in the [MSI] stanza of the parameter file. You must also set the AGREETOLICENSE parameter to "yes".

You can specify many more parameters in the parameter file that you use with the MQParms command than you can in the response file that you use directly with the **msiexec** command. Also, as well as parameters that the IBM MQ installation uses, you can specify parameters that can be used by the Prepare IBM MQ Wizard.

If you do not complete the Prepare IBM MQ Wizard directly after IBM MQ installations or if for any reason your machine is rebooted between completing IBM MQ installation and completing the Prepare IBM MQ Wizard, ensure that the wizard is run with Administrator privilege afterward, otherwise the installation is incomplete, and might fail. You might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the wizard to continue

An example of the file MQParms.ini is supplied with IBM MQ. This file contains default installation parameters.

There are two ways to create a parameter file for installation:

- Copy and edit the file MQParms.ini that is supplied with the product, using an ASCII file editor.
- Create your own parameter file using an ASCII file editor.

About this task

To invoke installation using the **MQParms** command:

Procedure

1. From a command line, change to the root folder of the IBM MQ Server install image (that is, the location of the file MQParms.exe).
2. Enter the following command:

```
MQParms parameter_file parameters ]
```

where:

parameter_file
is the file that contains the required parameter values. If this file is not in the same folder as MQParms.exe, specify the full path and file name. If you do not specify a parameter file, the default is MQParms.ini. For silent installation, the MQParms_silent.ini parameter file can be used. For further details, see “MQParms parameter file - server installation” on page 187.

parameters
are one or more command-line parameters, for a list of these, see the MSDN Command-Line Options web page.

Example

A typical example of an **MQParms** command is:

```
MQParms "c:\MyParamsFile.ini" /l*v c:\install.log
```

A typical example of an **MQParms** command when you are installing a second copy of IBM MQ is:

```
MQParms "c:\MyParamsFile.ini" /l*v c:\install.log TRANSFORMS=":InstanceId2.mst;1033.mst"
MSINEWINSTANCE=1
```

Alternatively, TRANSFORMS and MSINEWINSTANCE can be specified in the MSI stanza of the parameter file.

If you specify a parameter both on the command line and in the parameter file, the setting on the command line takes precedence.

If you specify a parameter file, you might want to run the encryption utility before you use the **MQParms** command (see “Encrypting a parameter file” on page 190).

If you do not specify `/i`, `/x`, `/a`, or `/j`, **MQParms** defaults to standard installation using the IBM MQ Windows Installer package, IBM MQ.msi. That is, it generates the following part of the command line:

```
/i " current_folder \MSI\IBM MQ.msi"
```

If you do not specify a WIZPARMFILE parameter, **MQParms** defaults to the current parameter file. That is, it generates the following part of the command:

```
WIZPARMFILE=" current_folder \ current_parameter_file "
```

Windows *MQParms parameter file - server installation*

A parameter file is an ASCII text file that contains sections (stanzas) with parameters that can be used by the **MQParms** command. Typically, this is an initialization file such as `MQParms.ini`.

The **MQParms** command takes parameters from the following stanzas in the file:

[MSI]
: Contains general properties related to how the **MQParms** command runs and to the installation of IBM MQ.

  The properties that you can set in this stanza are listed in “Installing the server using msiexec” on page 177, and Table 26 on page 188.

[Services]
: Contains properties related to IBM MQ account configuration, in particular, the user account required for IBM MQ Services. If you are installing IBM MQ on a network where the domain controller is on a Windows 2003 or later server, you probably need details of a special domain account. For more information, see “Configuring IBM MQ with the Prepare IBM MQ Wizard” on page 192 and “Creating and setting up Windows domain accounts for IBM MQ” on page 196.

  The properties that you can set in this stanza are listed in Table 28 on page 189.

MQParms ignores any other stanzas in the file.

The stanza parameters are in the form property=value, where property is always interpreted as uppercase, but value is case sensitive. If a value string includes a blank, it must be enclosed in double quotation marks. Most other values can be enclosed in double quotation marks. Some properties can take more than one value, for example:

```
ADDLOCAL="Server,Client"
```

To clear a property, set its value to an empty string, for example:

```
REINSTALL=""
```

The following tables show the properties that you can set. The default is shown in bold.

For the [MSI] stanza, you can enter standard MSI command line options and properties. For example:

```
- /q
- ADDLOCAL="server"
- REBOOT=Suppress
```

Refer to Table 26 on page 188, Table 27 on page 188, and Table 28 on page 189 for the properties used to install IBM MQ.

Table 26 on page 188 shows additional properties in the stanza that affect how the `MQParms` command runs, but that do not affect the installation.

Table 26. Properties used by MQParms in the MSI stanza

Property	Values	Description
MQPLOG	*path* | *file_name*	**MQParms** generates a text log file with the specified name and location.
MQPLANGUAGE	**system** |user| *transform_value* |existing	The installation language. system. Install using the language of the default system locale (the default). user. Install using the language of the default locale of the user. *transform_value*. Install using the language specified by this value. See Table 27 on page 188. existing. If IBM MQ already exists on the system, the same language will be used by default, otherwise system is used.
MQPSMS	**0** |no	0 or no. **MQParms** does not wait for the **msiexec** command to end (the default). Any other value. **MQParms** waits for the **msiexec** command to end.
MQPINUSE	**0** |1	If MQPINUSE is set to 1, **MQParms** continues installing even if IBM MQ files are in use. If this option is used a reboot will be required to complete the installation.

Table 27. Valid values for the MQPLANGUAGE property

Language	Valid values		
U.S. English	English	en_us	1033
German	German	de_de	1031
French	French	fr_fr	1036
Spanish	Spanish	es_es	1034
Italian	Italian	it_it	1040
Brazilian Portuguese	Brazilian Portuguese	pt_br	1046
Japanese	Japanese	ja_jp	1041
Korean	Korean	ko_kr	1042
Simplified Chinese	Simplified Chinese	zh_cn	2052

Table 27. Valid values for the MQPLANGUAGE property (continued)			
Language	**Valid values**		
Traditional Chinese	Traditional Chinese	zh_tw	1028
Czech	Czech	cs_cz	1029
Hungarian	Hungarian	hu_hu	1038
Polish	Polish	pl_pl	1045

For the [Services] stanza, you can enter parameters in property=value format. You might want to encrypt the values in this stanza. See “Encrypting a parameter file” on page 190.

Table 28. Properties used in the Services stanza		
Property	**Values**	**Description**
USERTYPE	**local** | domain | onlydomain	The type of user account to use: **local** Creates a local user account. **domain** Creates a local user account. If this does not have the required security authorities, it uses the domain user account specified by DOMAINNAME, USERNAME, and PASSWORD. **onlydomain** Does not create a local user account, but immediately uses the domain user account specified by DOMAINNAME, USERNAME and PASSWORD. If any of these three properties are missing, a USERTYPE of local is assumed. The properties DOMAINNAME, USERNAME, and PASSWORD are required if USERTYPE is set to onlydomain.
DOMAINNAME	*domain_name* [1]	The domain for the domain user account. Required if USERTYPE is set to domain or onlydomain.
USERNAME	*user_name* [1]	The user name for the domain user account. Required if USERTYPE is set to domain or onlydomain..
PASSWORD	*password* [1]	The password for the domain user account. Required if USERTYPE is set to domain or onlydomain.
1. Do not enclose this value in double quotation marks.		

A typical example of a parameter file is:

```
[MSI]
MQPLANGUAGE=1033
MQPLOG=%temp%\MQParms.log
```

```
MQPSMS=no
ADDLOCAL=Server
/m miffile
REMOVE=""
/l*v c:\install.log

[Services]
USERTYPE=domain
DOMAINNAME=mqm*df349edfcab12
USERNAME=mqm*a087ed4b9e9c
PASSWORD=mqm*d7eba3463bd0a3
```

Windows *Encrypting a parameter file*

If the DOMAINNAME, USERNAME, and PASSWORD values in the [Services] stanza of a parameter file are not already encrypted, you can encrypt them by running the `setmqipw` utility.

About this task

Use the `setmqipw` utility to encrypt the DOMAINNAME, USERNAME, and PASSWORD values in the [Services] stanza of a parameter file, if they are not already encrypted. (These values might be encrypted if you have run the utility before.) `setmqipw` will also encrypt the QMGRPASSWORD and CLIENTPASSWORD values in the [SSLMigration] stanza of a parameter file.

This encryption means that, if you need a special domain account to configure IBM MQ (see "Configuring IBM MQ with the Prepare IBM MQ Wizard" on page 192 and "Creating and setting up Windows domain accounts for IBM MQ" on page 196), or you need to keep key database passwords secret, details are kept secure. Otherwise, these values, including the domain account password, flow across the network as clear text. You do not have to use this utility, but it is useful if security in your network is an issue.

To run the script:

Procedure

1. From a command line, change to the folder that contains your parameter file.
2. Enter the following command:

   ```
   CD_drive:\setmqipw
   ```

   Note: You can run the command from a different folder, by entering the following command, where *parameter_file* is the full path and file name of the parameter file:

   ```
   CD_drive:\setmqipw parameter_file
   ```

Results

If you view the resulting parameter file, the encrypted values start with the string `mqm*`. Do not use this prefix for any other values; passwords or names that begin with this prefix are not supported.

The utility creates a log file, `setmqipw.log`, in the current directory. This file contains messages related to the encryption process. When encryption is successful, messages are similar to:

```
Encryption complete
Configuration file closed
Processing complete
```

What to do next

After you encrypt the parameter file, you can use it in the normal way with the `MQParms` command (see "Installing the server using the MQParms command" on page 185).

Windows *Checking for problems after installing*

There are some optional tasks that you can use to check the installation if you believe there was a problem, or to verify installation messages after an unattended (silent) installation for example.

About this task

Use these steps as a guide to check the following files for messages:

Procedure

1. Check `MSI nnnnn.LOG`. This file is in your user `Temp` folder. It is an application log that contains English messages written during installation. The log includes a message indicating whether the installation was successful and complete.

   This file is created if you have set up default logging.
2. If you used the launchpad to install IBM MQ, check `MQv9_Install_YYYY-MM-DDTHH-MM-SS.log` in your user `Temp` folder, where:

   YYYY
   This is the year that you installed IBM MQ

   MM
   This is the month that you installed IBM MQ, for example this would be 09 if you installed in September

   DD
   This is the day that you installed IBM MQ

   HH-MM-SS
   This is the time at which IBM MQ was installed

   You can get to your user Temp directory by entering the following command at the command prompt:

   ```
   cd %TEMP%
   ```
3. Check `amqmjpse.txt`. This file is in the IBM MQ data files folder (default `C:\ProgramData\IBM\MQ`). It is an application log that contains English messages written during installation by the Prepare IBM MQ Wizard.

What to do next

Verify your installation, as described in "Verifying an IBM MQ installation on Windows" on page 214.

Windows *Configuring user accounts for IBM MQ*

After installing IBM MQ server, you must configure the IBM MQ service before you can start any queue managers.

About this task

When you install IBM MQ using the graphical user interface, you are guided through several screens that help you to apply the relevant options and settings. You use the Launchpad to check software requirements, specify network information, and then start the IBM MQ installation wizard and use it to install the software.

After the installation of IBM MQ completes, you can use the Prepare IBM MQ Wizard to configure IBM MQ before starting any queue managers.

If you are setting up IBM MQ for use with the Microsoft Cluster Service (MSCS), see Supporting the Microsoft Cluster Service (MSCS).

Windows *Configuring IBM MQ with the Prepare IBM MQ Wizard*

The Prepare IBM MQ Wizard helps you to configure IBM MQ with a user account for your network. You must run the wizard to configure the IBM MQ Service before you can start any queue managers.

Before you begin

When IBM MQ is running, it must check that only authorized users can access queue managers or queues. Whenever any user attempts such access, IBM MQ uses its own local account to query information about the user.

Most networked Windows systems are members of a Windows domain where user accounts, other security principals, and security groups are maintained and managed by a directory service, Active Directory, running on a number of domain controllers. IBM MQ checks that only authorized users can access queue managers or queues.

In such networks, IBM MQ queue manager processes access the Active Directory information to find the security group membership of any users attempting to use IBM MQ resources. The accounts under which IBM MQ services run must be authorized to look up such information from the directory. In most Windows domains, local accounts defined at individual Windows servers cannot access directory information, so the IBM MQ services must run under a domain account that has the appropriate permission.

If the Windows server is not a member of a Windows domain or the domain has a reduced security or functional level, then the IBM MQ services can run under a local account that was created during installation.

If a special domain account is needed for your installation of IBM MQ, the Prepare IBM MQ Wizard asks you to enter details of this account (domain, user name, and password), so make sure that you have this information available before you start this task. Ask your domain administrator to set up an account, if one does not already exist, and provide you with the necessary details. For more information about configuring a domain account, see "Creating and setting up Windows domain accounts for IBM MQ" on page 196.

Important: If a domain account is needed and you install IBM MQ without a special account (or without entering its details), many or all parts of IBM MQ will not work, depending on the particular user accounts involved. Also, IBM MQ connections to queue managers that run under domain accounts on other systems might fail. The account can be changed by running the Prepare IBM MQ Wizard and specifying the details of the account to be used.

For information about the user rights required to take advantage of the Active Directory support, see Local and domain user accounts for the IBM MQ Windows service.

For information about the user rights required to take advantage of the Kerberos authentication support, see Securing.

About this task

The Prepare IBM MQ Wizard window is displayed when the IBM MQ installation completes. You can also start the wizard at any time by running **amqmjpse.exe** in the `..\bin64` directory of the installation.

You can use the Prepare IBM MQ Wizard (AMQMJPSE.EXE) with the following parameters:

Table 29. Startup parameters that can be used for the Prepare IBM MQ Wizard

Parameter Name	Parameter description	How parameter is used	Default action if parameter not supplied
-l *file*	Create log file	The Prepare IBM MQ Wizard appends to a log file with the program actions and results. This parameter specifies the file name to use for this log. If the path is not provided, the IBM MQ Data directory is assumed. If the file name is not provided, `amqmjpse.txt` is assumed.	Append to log file `amqmjpse.txt` in IBM MQ Data directory.
-r	Reset MQSeriesService user account	When the Prepare IBM MQ Wizard is first run it creates a local user account MUSR_MQADMIN, with specific settings and permissions. The MQSeriesService component is configured to run under this account. Depending on the LAN configuration, the wizard might reconfigure the MQSeriesService component to run under a domain user account instead. When this parameter is specified, the local user account MUSR_MQADMIN is re-created with all the default settings and permissions. The MQSeriesService component is configured to run under this account.	User account not reset.
-s	silent installation mode	Process silently. Nothing is displayed and there is no user input.	Not silent mode.
-p *file*	User parameters from file	Load and use parameters from the parameter file. If the path is not provided, the IBM MQ Data directory is assumed. If the file name is not provided, AMQMJPSE.INI is assumed. The following stanzas are loaded: [Services] [SSLMigration]	When in silent mode, the parameter file AMQMJPSE.INI is loaded from IBM MQ Data directory. When not in silent mode, a parameter file is not used.
-m *file*	Generate a Microsoft System Management Server (SMS) status .MIF file.	When the Prepare IBM MQ Wizard closes, generate a status .MIF file with the specified name. If the path is not provided, the Data directory is assumed. If the file name is not provided, AMQMJPSE.MIF is assumed. The file ISMIF32.DLL (installed as part of SMS) must be in the path. The InstallStatus field in the file will contain either Success or Failed.	.MIF file not created.

On Windows systems, you must carry out this task under a Windows administrator account, or domain administrator account in case your workstation is a member of a Windows domain.

On Windows systems with User Account Control (UAC) enabled, if you do not complete the Prepare IBM MQ Wizard directly after IBM MQ is installed, or if for any reason your machine is rebooted between completing IBM MQ installation and completing the Prepare IBM MQ Wizard, you must accept the Windows prompt when it appears to allow the wizard to run as elevated.

Procedure

1. When the IBM MQ installation completes, the Prepare IBM MQ Wizard window is displayed with a welcome message. You can start the wizard manually by running **amqmjpse.exe** in the `..\bin64` directory of the installation.

   To continue, click **Next**.
2. If you have run the Prepare IBM MQ Wizard before, this step is skipped. Otherwise, the Prepare IBM MQ Wizard window displays a progress bar with the following message:

   ```
   Status: Setting up IBM MQ Configuration
   ```

   Wait until the progress bar completes.
3. The Prepare IBM MQ Wizard window displays a progress bar with the following message:

   ```
   Status: Setting up the IBM MQ Service.
   ```

   Wait until the progress bar completes.
4. IBM MQ attempts to detect whether you must configure IBM MQ for use with Windows Active Directory Server or Windows domain users. Depending on the results of the detection, IBM MQ does one of the following things:

   - If IBM MQ detects that you need to configure IBM MQ for Windows Active Directory Server or Windows domain users, the Prepare IBM MQ Wizard window displays a message that starts:

     ```
     IBM MQ does not have the authority to query information about
     your user account
     ```

     Click **Next**, and go to step 5.
   - If you are not installing on a Windows Active Directory Server or Windows domain server and IBM MQ cannot detect whether you need to configure IBM MQ for Windows Active Directory Server or Windows domain users, the Prepare IBM MQ Wizard window displays the following message:

     ```
     Are any of the domain controllers in your network running
     Windows 2000 or later domain server?
     ```

     If you select Yes, click **Next**, then go to step 5.

     If you select No, click **Next**, then go to step 9.

     If you select **Don't know**, you cannot continue. Select one of the other options, or click **Cancel** and contact your domain administrator.
   - If IBM MQ detects that you do not need to configure IBM MQ for Windows Active Directory Server or Windows domain users, go to step 9.
5. The Prepare IBM MQ Wizard window displays the following message:

   ```
   Do you need to configure IBM MQ for users defined on Windows 2000
   or later domain controllers?
   ```

   If you select Yes, click **Next**, then go to step 6.

   If you select No, click **Next**, then go to step 9.

   If you select Don't know, you cannot continue. Select one of the other options, or click **Cancel** and contact your domain administrator. For more information about domain accounts, see “Creating and setting up Windows domain accounts for IBM MQ” on page 196.
6. Give the domain user that you obtained from your domain administrator the access to run as a service.

a) Click **Start** > **Run...**, type the command **`secpol.msc`** and click **OK**.

b) Open **Security Settings** > **Local Policies** > **User Rights Assignments**. In the list of policies, right-click **Log on as a service** > **Properties**.

c) Click **Add User or Group...** and type the name of the user you obtained from your domain administrator, then click **Check Names**

d) If prompted by a Windows Security window, type the user name and password of an account user or administrator with sufficient authority, and click **OK** > **Apply** > **OK**. Close the Local Security Policy window.

7. In the next window, enter the Domain and user ID of the domain user account that you obtained from your domain administrator. Either enter the Password for this account, or select the option **This account does not have a password**. Click **Next**.
8. The Prepare IBM MQ Wizard window displays a progress bar with the following message:

   ```
   Status: Configuring IBM MQ with the special domain user account
   ```

   Wait until the progress bar completes. If there are any problems with the domain user account, a further window is displayed. Follow the advice on this window before you continue with this procedure.
9. The Prepare IBM MQ Wizard window displays a progress bar with the following message:

   ```
   Status: Starting IBM MQ services
   ```

   Wait until the progress bar completes.
10. Next, select the options that you require.

    The Prepare IBM MQ Wizard window displays the following message:

    ```
    You have completed the Prepare IBM MQ Wizard
    ```

    Select the options that you require, then click **Finish**. Select one or more from the following list:

    - **Remove the shortcut to this wizard from the desktop**

      This option is available only if you have previously attempted installation, but you canceled the procedure from thePrepare IBM MQ Wizard and you created a desktop shortcut to this wizard. Select this option to remove the shortcut. You do not need it now that you have completed the Prepare IBM MQ Wizard.
    - **Launch IBM MQ Explorer**

      The IBM MQ Explorer allows you to view and administer your IBM MQ network. You can use the items in the Welcome to IBM MQ Explorer **Content** view page to explore the facilities in IBM MQ. This page is launched the first time that the IBM MQ Explorer is launched. The Welcome page can be viewed at any time from the IBM MQ Explorer by clicking **IBM MQ** in the **Navigator** view.
    - **Launch Notepad to view the release notes**

      The release notes contain information about installing IBM MQ and also late-breaking news that is available after the published documentation is produced.

What to do next

Optionally, follow the procedure described in Checking for problems after installing.

For information on how to verify an installation, see Verifying an IBM MQ installation on Windows.

Related concepts

User rights required for an IBM MQ Windows Service

Related tasks

Windows Creating and setting up Windows domain accounts for IBM MQ

This information is for Domain Administrators. Use this information to create and set up a special domain account for the IBM MQ service. Do this if IBM MQ is to be installed on a Windows domain where local accounts do not have the authority to query the group membership of the domain user accounts.

Windows *Creating and setting up Windows domain accounts for IBM MQ*

This information is for Domain Administrators. Use this information to create and set up a special domain account for the IBM MQ service. Do this if IBM MQ is to be installed on a Windows domain where local accounts do not have the authority to query the group membership of the domain user accounts.

About this task

After you add a local user to the `mqm` group, that user can administer IBM MQ on the system. This task describes how to do the same using Windows domain user IDs.

There is an IBM MQ component for checking Windows privileges. This component runs as a Windows service under a local user account created by IBM MQ at installation. This component checks that the account under which the IBM MQ services are run has the following privileges:

- The account has the ability to query group memberships of domain accounts.
- The account has the authority to administer IBM MQ.

If the account does not have the ability to query group memberships, the access checks made by the services fail.

Windows domain controllers running Windows Active Directory can be set up so that local accounts do not have the authority to query the group membership of the domain user accounts. This prevents IBM MQ from completing its checks, and access fails. If you are using Windows on a domain controller that has been set up in this way, you must instead use a special domain user account with the required permissions.

Each installation of IBM MQ on the network must be configured to run its service under a domain user account that has the required authority to check that users who are defined on the domains are authorized to access queue managers or queues. Typically, this special account has the IBM MQ administrator rights through membership of the domain group `DOMAIN\Domain mqm`. The domain group is automatically nested by the installation program under the local `mqm` group of the system on which IBM MQ is being installed.

Important:

1. By default, Windows 10 version 1607 or later, and Windows Server 2016 or later, are more restrictive than earlier versions of Windows. These later versions restrict clients allowed to make remote calls to the Security Accounts Manager (SAM), and could prevent IBM MQ queue managers from starting. Access to SAM is critical for the functioning of IBM MQ when IBM MQ is configured as a domain account.
2. The IBM MQ installer must be given the user ID and password details of the special domain user account. The installer can then use this information to configure the IBM MQ service after the product is installed. If an installer continues and configures IBM MQ without a special account, many or all parts of IBM MQ will not work, depending upon the particular user accounts involved, as follows:
   - IBM MQ connections to queue managers running under Windows domain accounts on other computers might fail.
   - Typical errors include `AMQ8066: Local mqm group not found` and `AMQ8079: Access was denied when attempting to retrieve group membership information for user 'abc@xyz'`.

You must repeat steps “1” on page 197 and “8” on page 197 of the following procedure for each domain that has user names that will administer IBM MQ. This creates an account for IBM MQ on each domain.

Procedure

Create a domain group with a special name that is known to IBM MQ (see "4" on page 197) and give members of this group the authority to query the group membership of any account.

1. Log on to the domain controller as an account with domain administrator authority.
2. From the Start menu, open Active Directory Users and Computers.
3. Find the domain name in the navigation pane, right-click it and select **New Group**.
4. Type a group name into the **Group name** field.

   Note: The preferred group name is `Domain mqm`. Type it exactly as shown.

   - Calling the group `Domain mqm` modifies the behavior of the Prepare IBM MQ Wizard on a domain workstation or server. It causes the Prepare IBM MQ Wizard automatically to add the group `Domain mqm` to the local `mqm` group on each new installation of IBM MQ in the domain.
   - You can install workstations or servers in a domain with no `Domain mqm` global group. If you do so, you must define a group with the same properties as `Domain mqm` group. You must make that group, or the users that are members of it, members of the local `mqm` group wherever IBM MQ is installed in a domain. You can place domain users into multiple groups. Create multiple domain groups, each group corresponding to a set of installations that you want to manage separately. Split domain users, according to the installations they manage, into different domain groups. Add each domain group or groups to the local `mqm` group of different IBM MQ installations. Only domain users in the domain groups that are members of a specific local `mqm` group can create, administer, and run queue managers for that installation.
   - The domain user that you nominate when installing IBM MQ on a workstation or server in a domain must be a member of the `Domain mqm` group, or of an alternative group you defined with same properties as the `Domain mqm` group.
5. Leave **Global** clicked as the **Group scope**, or change it to **Universal**. Leave **Security** clicked as the **Group type**. Click **OK**.
6. Follow these steps to assign permissions to the group based on the Windows version of the domain controller:

   On Windows Server 2019 and Windows Server 2022:

   a. In the Server Manager, click **Tools** then select **Active Directory Users and Computers** from the list box.

   b. Select **View** > **Advanced Features**.

   c. Expand your domain name, then click **Users**.

   d. In the **Users** window, right-click **Domain mqm** > **Properties**.

   e. On the **Security** tab, click **Advanced** > **Add...**.

   f. Click **Select principle**, then type `Domain mqm` and click **Check names** > **OK**.

   The **Name** field is prefilled with the string `Domain mqm (`*`domain name`*`\Domain mqm)`.

   g. In the **Applies to** list, select **Descendant User Objects**.

   h. In the **Permissions** list, select the **Read group membership** and **Read groupMembershipSAM** check boxes.

   i. Click **OK** > **Apply** > **OK** > **OK**.

Create one or more accounts, and add them to the group.

7. Open **Active Directory Users and Computers**.
8. Create one or more user accounts with names of your choosing.

   In the **Server Manager** navigation tree, right click **Users** to create a new user account.
9. Add each new account to the group `Domain mqm` or a group that is a member of the local `mqm` group.

   Attention: You cannot use a user domain named `mqm` on Windows.

Create an account for IBM MQ on each domain.

10. Repeat step sections “1” on page 197 and “8” on page 197 for each domain that has user names that will administer IBM MQ.

Use the accounts to configure each installation of IBM MQ.

11. Either use the same domain user account (as created in Step “1” on page 197) for each installation of IBM MQ, or create a separate account for each one, adding each to the `Domain mqm` group (or a group that is a member of the local `mqm` group).
12. When you have created the account or accounts, give one to each person configuring an installation of IBM MQ. They must enter the account details (domain name, user name, and password) into the Prepare IBM MQ Wizard. Give them the account that exists on the same domain as their installing userid.
13. When you install IBM MQ on any system on the domain, the IBM MQ installation program detects the existence of the `Domain mqm` group on the LAN, and automatically adds it to the local `mqm` group. (The local `mqm` group is created during installation; all user accounts in it have authority to manage IBM MQ). Thus all members of the " `Domain mqm` " group will have authority to manage IBM MQ on this system.
14. However, you do still need to provide a domain user account (as created in Step “1” on page 197) for each installation, and configure IBM MQ to use it when making its queries. The account details must be entered into the Prepare IBM MQ Wizard that runs automatically at the end of installation (the wizard can also be run at any time from the **start** menu).

Set the password expiry periods.

15. Choices:

    - If you use just one account for all users of IBM MQ, consider making the password of the account never expire, otherwise all instances of IBM MQ will stop working at the same time when the password expires.
    - If you give each user of IBM MQ their own user account you will have more user accounts to create and manage, but only one instance of IBM MQ will stop working at a time when the password expires.

    If you set the password to expire, warn the users that they will see a message from IBM MQ each time it expires - the message warns that the password has expired, and describes how to reset it.

Use a Windows domain account as the user ID for the IBM MQ service.

16. Click **Start** > **Run...**.

    Type the command `secpol.msc` then click **OK**.
17. Open **Security Settings** > **Local Policies** > **User Rights Assignments**.

    In the list of policies, right-click **Log on as a service** > **Properties**.
18. Click **Add User or Group...**.

    Type the name of the user you obtained from your domain administrator, and click **Check Names**.
19. If prompted by a Windows Security window, type the user name and password of an account user or administrator with sufficient authority, then click **OK** > **Apply** > **OK**.

    Close the Local Security Policy window.

    Note: User Account Control (UAC) is enabled by default. The UAC feature restricts the actions users can perform on certain operating system facilities, even if they are members of the Administrators group. You must take appropriate steps to overcome this restriction.

Related tasks

Windows Configuring IBM MQ with the Prepare IBM MQ Wizard

The Prepare IBM MQ Wizard helps you to configure IBM MQ with a user account for your network. You must run the wizard to configure the IBM MQ Service before you can start any queue managers.

Windows *Modifying a server installation using the Installation Launchpad*

You can interactively remove or install IBM MQ features on Windows by using IBM MQ Installation Launchpad.

Before you begin

To modify an installation, some features of IBM MQ must already be installed.

About this task

To use the IBM MQ Installation Launchpad to remove or install IBM MQ features, you download the installation image for your version of IBM MQ then run the `Setup.exe` program.

Procedure

1. Download the compressed file that contains the installation image, then uncompress it into a temporary directory.
2. Navigate to that directory, then double-click **Setup.exe** to start the installation process.

   The **IBM MQ Installation Launchpad** window is displayed.
3. Click the **IBM MQ Installation** option.
4. Click **Launch IBM MQ Installer**. Wait until the IBM MQ Setup window is displayed with a welcome message.
5. If you have multiple installations on your system, you must choose the installation you want to modify. Do this by selecting the **Maintain or upgrade an existing instance** option and choosing the appropriate instance.
6. Click **Next** to continue. The Program Maintenance panel is displayed.
7. Select **Modify**, then click **Next**.

   The Features panel is displayed.
8. Click the **+** symbol next to a feature to show any dependent features (subfeatures).
9. To change the installation of a feature:
   a) Click the symbol next to the feature name to display a menu.
   b) Select the required option from:
      - Install this feature
      - Install this feature and all its subfeatures (if any)
      - Do not install this feature (remove if already installed)

      The symbol next to the feature name changes to show the current installation option.
10. Stop the web server before removing the web feature.

    If you do not do this, you receive an error message.
11. When your selections are complete, click **Next**. IBM MQ installation begins.

What to do next

After modifying the installation, you might need to run **setmqenv** again as described in *What to do next* in “Installing IBM MQ server on Windows” on page 174.

Windows *Modifying a server installation silently using msiexec*

You can silently remove or install IBM MQ features on Windows by using **msiexec**.

About this task

You can silently modify an installation by using the **msiexec** command with the **ADDLOCAL** and **REMOVE** parameters.

Procedure

- To silently modify an installation using **msiexec**, set the **ADDLOCAL** parameter to include the features you want to add, and set the **REMOVE** parameter to the features you want to remove.

  For example, if you use ADDLOCAL="JavaMsg" and REMOVE="" it modifies the installation to include the Extended Messaging and APIs (JavaMsg) feature but does not remove any currently installed features.

  ```
  msiexec /i {product code} /q ADDLOCAL="JavaMsg" REMOVE="" INSTALLATIONNAME="Installation1"
  ```

  where *product_code* is the value shown for MSIProdCode in the output of the following command:

  ```
  dspmqinst -n installation_name
  ```

  An example of a product code is {0730749B-080D-4A2E-B63D-85CF09AE0EF0}.

  Important: When specifying which features to remove with the **REMOVE** parameter:

  - If you want to silently uninstall the Server feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying REMOVE="Web,Server".
  - If you want to silently uninstall the Java runtime environment (JRE) feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying REMOVE="Web,JRE".

Related concepts

“IBM MQ features for Windows systems” on page 156
You can select the features that you require when you install IBM MQ.

Related tasks

“Installing the server using msiexec” on page 177
IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

“Uninstalling IBM MQ using msiexec” on page 227
You can uninstall IBM MQ by running the **msiexec** command from the command line to remove all currently installed features, or selected features.

Windows Installing an IBM MQ client on Windows

This topic describes how to install IBM MQ client on Windows systems. This procedure can be used for installing a first or a subsequent installation.

Before you begin

To install an IBM MQ client, you must be logged on to Windows as an administrator.

About this task

Follow these instructions to perform an interactive compact, typical, or custom installation of IBM MQ. To view all the installation types and the features that are installed with each option consult Features installed with each type of interactive installation.

Attention: If you are using **msiexec** to install the client, the installation is automatically set to be the primary installation.

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
2. Locate `Setup.exe` in the `Windows` directory of the IBM MQ installation image.
   - From a network location, this location might be *m:*`\`*instmqs*`\Windows\Setup.exe`
   - From a local file system directory, this location might be *C:*`\`*instmqs*`\Windows\Setup.exe`
3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.
4. Follow the instructions on screen.

Results

A new sample IBM MQ MQI client configuration file is created in the IBM MQ installation directory (for example `C:\Program Files\IBM\MQ\`, by the IBM MQ MQI client package, during installation, but only if this file does not exist. This file contains the `ClientExitPath` stanza. An example `mqclient.ini` file is shown in IBM MQ MQI client configuration file, `mqclient.ini`.

Note:

If you are using a common configuration file for multiple clients, either in the IBM MQ installation directory or in another location using the MQCLNTCF environment variable, you must grant read access to all user identifiers under which the IBM MQ client applications run. If the file cannot be read, the failure is traced and the search logic continues as if the file had not existed.

What to do next

- If you have chosen this installation to be the primary installation on the system, when using `setup.exe`, you must now set it as the primary installation. Enter the following command at the command prompt:

```
MQ_INSTALLATION_PATH\bin\setmqinst -i -p MQ_INSTALLATION_PATH
```

  You can have only one primary installation on a system. If there is already a primary installation on the system, you must unset it before you can set another installation as the primary installation. For more information, see Changing the primary installation.
- You might want to set up the environment to work with this installation. You can use the **setmqenv** or **crtmqenv** command to set various environment variables for a particular installation of IBM MQ. For more information, see setmqenv and crtmqenv.
- For instructions on how to verify your installation, see “Testing communication between a client and a server on Windows” on page 222.

Related concepts

“Modifying a client installation using Add/Remove Programs” on page 212

On some versions of Windows, you can modify an installation by using Add/Remove Programs.

Related tasks

"Installing a client using msiexec" on page 202
IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

"Installing a client using the MQParms command" on page 209
You can use the **MQParms** command to invoke installation or uninstallation of an IBM MQ client.

"Uninstalling IBM MQ on Windows" on page 224
You can uninstall the IBM MQ MQI clients and servers on Windows systems by using the control panel, the command line (**msiexec**), **MQParms**, or by using the installation media, in which case you can optionally remove queue managers as well.

Windows *Installing a client using msiexec*

IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

About this task

IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation. An interactive installation displays panels and ask questions.

The **msiexec** command uses parameters to give MSI some or all of the information that can also be specified through panels during an interactive installation. This means that a user can create a reusable automated or semi-automated installation configuration. Parameters can be given through the command line, a transform file, a response file, or a combination of the three.

Some parameters can only be provided on the command line and not in a response file. For more information about these parameters, see Table 30 on page 204 in "Specifying command line parameters for client installation with msiexec" on page 204.

There are also a number of parameters can be used either on the command line or in a response file. For more information about these parameters, see Table 32 on page 207 in "Creating and using a response file for client installation" on page 206. If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Procedure

1. For multiple silent installations, for each version that is to be installed, find an MSI instance ID that is available to use for that installation.

   For more information, see "Choosing MSI Instance IDs for multiple server installations" on page 178.
2. To install using **msiexec**, at the command line, enter the **msiexec** command in the following format:

   ```
   msiexec parameters [USEINI="response-file"] [TRANSFORMS="transform_file"]
   ```

   where:

   parameters
   are either command line parameters preceded by a / character, or property=value pairs (if using both forms of parameter always put the command-line parameters first). For further information, see "Specifying command line parameters for client installation with msiexec" on page 204.

   For an unattended installation, you must include the **/q** or **/qn** parameter in the command line. Without this parameter, the installation is interactive.

   Note: You must include the **/i** parameter and the file location of the IBM MQ installer package.

response-file
is the full path and file name of the file that contains the [Response] stanza and the required property=value pairs, for example `C:\MyResponseFile.ini`. An example response file, `Response.ini`, is supplied with IBM MQ. This file contains default installation parameters. For further information, see "Creating and using a response file for client installation" on page 206.

transform_file
is the full path and file name of a transform file. For further information, see "Using transforms with msiexec for client installation" on page 205 and "Choosing MSI Instance IDs for multiple server installations" on page 178.

Note: For a silent installation to succeed, the `AGREETOLICENSE="yes"` property must be defined either on the command line or in the response file.

Results

After the command has been entered, the command prompt immediately reappears. IBM MQ is installing as a background process. If you have entered parameters to produce a log, check this file to see how the installation is progressing. If the installation completes successfully, you see the message `Installation operation completed successfully` in the log file.

Windows *Choosing MSI Instance IDs for multiple client installations*

For multiple silent installations, for each version that is installed you must find an MSI instance ID that is available to use for that installation.

About this task

In order to support silent, or non-interactive, multiple installations, you need to find out whether the instance ID you want to use is already in use or not and choose the appropriate one. For each installation media (for example, each client and server), Instance ID 1 is the default ID which is used for single installations. If you want to install alongside Instance ID 1 you need to specify which instance you want to use. If you have already installed instance 1, 2, and 3 then you need to find out what the next available instance is, for instance, Instance ID 4. Similarly, if instance 2 has been removed, you need to find out that there is a gap that can be reused. You can find out which Instance ID is currently in use by using the **dspmqinst** command.

Procedure

1. Type **dspmqinst** to find a free MSI Instance in the media being installed by reviewing the MSIMedia and MSIInstanceId values for the versions already installed. For example:

```
InstName: Installation1
InstDesc:
Identifier:    1
InstPath:      C:\Program Files\IBM\MQ
Version:       9.0.0.0
Primary:       Yes
State:         Available
MSIProdCode:   {74F6B169-7CE6-4EFB-8A03-2AA7B2DBB57C}
MSIMedia:      9.0 Server
MSIInstanceId: 1
```

2. If MSI Instance ID 1 is in use and you want to use MSI Instance ID 2, the following parameters must be added to the msiexec call:

```
MSINEWINSTANCE=1 TRANSFORMS=":instanceId7.mst;1033.mst"
```

What to do next

For multiple installations, the **INSTALLATIONNAME** or **PGMFOLDER** must be supplied as an additional parameter on any non-interactive installation command. Supplying the **INSTALLATIONNAME** or **PGMFOLDER** ensures that you do not work with the wrong installation in case you omit or incorrectly specify the **TRANSFORMS** parameter.

Windows *Specifying command line parameters for client installation with msiexec*

You can specify either standard **msiexec** command line parameters preceded by a / character, or property=value pairs, or a combination of both.

About this task

The **msiexec** command can accept the following types of parameters on the command line:

Standard command line parameters, preceded by a / character

For more information about the **msiexec** command line parameters, see the MSDN Command-Line Options web page.

For an unattended installation, you must include the **/q** or **/qn** parameter in the command line. Without this parameter, the installation is interactive.

Note: You must include the **/i** parameter and the file location of the IBM MQ installer package.

Property=value pair parameters on the command line

All the parameters that are available for use in a response file can be used on the command line. For more information about these parameters, see Table 32 on page 207 in "Creating and using a response file for client installation" on page 206.

There are some extra property=value pair parameters, shown in the following table that are only for use on the command line:

Table 30. Parameters that can be used on the command line only (msiexec property=value parameters)

Property	Values	Meaning
USEINI	*path* \ *file_name*	Use the specified response file. See "Creating and using a response file for client installation" on page 206
SAVEINI	*path* \ *file_name*	Generate a response file during installation. The file contains those parameters selected for this installation that a user might make during an interactive installation.
ONLYINI	1|yes| **""**	1, yes or any value other than null. End the installation before updating the target system, but after generating a response file, if this is specified. "". Continue the installation and update the target system (the default).
TRANSFORMS	:InstanceId *x*.mst| *path* \ *file_name* | :InstanceId *x*.mst; *path* \ *file_name*	The :InstanceId *x*.mst value is only required for a subsequent installation of IBM MQ. The *path* \ *file_name* specifies what transform (.mst) files must be applied to the product. For example, `"1033.mst"` specifies the supplied U.S. English transform file.
MSINEWINSTANCE	1	This property is only required for subsequent installations of IBM MQ.

Table 30. Parameters that can be used on the command line only (msiexec property=value parameters) (continued)		
Property	**Values**	**Meaning**
REMOVEFEATURES	yes	Required with value "yes" for a silent installation, otherwise ignored. Allows obsolete features, no longer part of IBM MQ, to be deleted.

When using the property=value pair parameters note that:

- Property strings must be in uppercase.
- Value strings are not case-sensitive, except for feature names. You can enclose value strings in double quotation marks. If a value string includes a blank, enclose the blank value string in double quotation marks.
- For a property that can take more than one value, use the format:

```
ADDLOCAL="Server,Client"
```

- For properties taking paths and file names, for example **PGMFOLDER**, you must supply the paths as absolute paths and not relative; that is, `C:\folder\file` and not `.\folder\file`.

When using property=value pair and command line parameters with the **msiexec** command, enter command line parameters first.

If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Procedure

- For a single installation of IBM MQ, specify the **msiexec** command as shown in the following typical example.

```
msiexec /i "path\MSI\IBM MQ.msi" /l*v c:\install.log
/q TRANSFORMS="1033.mst" AGREETOLICENSE="yes" ADDLOCAL="Client"
```

- If you are installing a second copy of IBM MQ, specify the **msiexec** command as shown in the following typical example.

```
msiexec /i "path\MSI\IBM MQ.msi" /l*v c:\install.log
/q TRANSFORMS=":InstanceId2.mst;1033.mst" AGREETOLICENSE="yes"
ADDLOCAL="Client" MSINEWINSTANCE=1
```

Windows *Using transforms with msiexec for client installation*

MSI can use transforms to modify an installation. During IBM MQ installation, transforms can be used to support different national languages.

About this task

IBM MQ is supplied with transform files in the `\MSI` folder of the client image. These files are also embedded in the IBM MQ Windows installer package, `IBM MQ.msi`.

Table 31 on page 205 shows the locale identifier, language, and the transform file name to use in the **msiexec** command line.

Table 31. Supplied transform files for various language support		
Language	**Transform File name**	**Value**
U.S. English	1033.mst	1033

Table 31. Supplied transform files for various language support (continued)		
Language	**Transform File name**	**Value**
German	1031.mst	1031
French	1036.mst	1036
Spanish	1034.mst	1034
Italian	1040.mst	1040
Brazilian Portuguese	1046.mst	1046
Japanese	1041.mst	1041
Korean	1042.mst	1042
Simplified Chinese	2052.mst	2052
Traditional Chinese	1028.mst	1028
Czech	1029.mst	1029
Hungarian	1038.mst	1038
Polish	1045.mst	1045

You can also specify the required language by using the MQLANGUAGE property with the **MQParms** command. For information about the msiexec property=value parameters, see "MQParms parameter file - client installation" on page 210.

Procedure

On the **msiexec** command line, you can specify the required language by using the **TRANSFORMS** property in a property=value pair as shown in the following example:

```
TRANSFORMS="1033.mst"
```

The quotation marks surrounding the value are optional.

You can also specify the full path and file name of the transform file. Again, the quotation marks surrounding the value are optional. For example:

```
TRANSFORMS="D:\Msi\1033.mst"
```

Table 31 on page 205 shows the locale identifier, language, and the transform file name to use in the **msiexec** command line.

You might need to merge transforms to install multiple installations of the same version, for example:

```
TRANSFORMS=":InstanceId2.mst;D:\Msi\1033.mst"
```

Windows *Creating and using a response file for client installation*

You can use the **msiexec** command with a parameter that specifies additional properties that are defined in a response file. There are three ways of creating a response file for a client installation.

About this task

A response file is an ASCII text file, with a format like a Windows `.ini` file, that contains the stanza [Response]. The [Response] stanza contains some or all the parameters that would normally be specified as part of an interactive installation. The parameters are given in a property=value pair format. Any other stanzas in the response file are ignored by **msiexec**.

An example response file, `Response.ini`, is supplied with IBM MQ. It contains the default installation parameters.

You can combine the use of a response file with the `msiexec` command line parameters described in "Specifying command line parameters for client installation with msiexec" on page 204.

Table 32 on page 207 shows the parameters that are available for use in a response file. These parameters can also be used on the command line. If a parameter is specified both on the command line and in a response file, the setting on the command line takes precedence.

Table 32. Parameters that can be used in a response file

Property	Values	Meaning
PGMFOLDER "1" on page 208	*path*	Folder for the IBM MQ program files. For example, `c:\mqm`.
DATFOLDER	*path*	Folder for the IBM MQ data files. For example, `c:\mqm\data`.
USERCHOICE	0|no	If the command line or response file specifies parameters to install features, a dialog can be displayed to prompt you to accept the preselected options, or review and possibly change them. 0 or no. Suppresses display of the dialog. Anything else. Dialog is displayed and you can amend the options. Not used for a silent installation.
AGREETOLICENSE "2" on page 208	yes	Accept the terms of the license. Set to `yes` before a silent installation. If the installation is not silent, this parameter is ignored.
ADDLOCAL	*feature*, *feature, All*| **""**	A comma-separated list of features to install locally. For a list of valid feature names, see "IBM MQ features for Windows systems" on page 156. All installs all features "" installs the typical features. If you do not want a feature use REMOVE="*feature*" **Note:** If this is a new installation the typical features (Client, Java, .NET Messaging, and Development Toolkit) are installed by default irrespective of the feature list provided in the ADDLOCAL property. If you do not want a feature use REMOVE="*feature*"
REMOVE	*feature*, *feature*, |All| **""**	A comma-separated list of features to remove. For a list of valid feature names, see "IBM MQ features for Windows systems" on page 156. All uninstalls all features "" uninstalls no features (the default).

Table 32. Parameters that can be used in a response file (continued)		
Property	**Values**	**Meaning**
INSTALLATIONDESC	"Description of installation"	Sets the installation description from the command line. Subject to the documented installation description length limitations
INSTALLATIONNAME “1” on page 208	[INSTALLATION0,]Name	Sets the installation name from the command line. Subject to the documented installation name character and length limitations.
MAKEPRIMARY	0|1| **""**	Makes the installation primary, if possible, or removes the primary flag. 1 = Make primary, 0 = Make non-primary, - use default algorithm **Note:** This option is ignored if another IBM MQ installation is present and set as the primary.

Notes:

1. For multiple installations, the **INSTALLATIONNAME** or **PGMFOLDER** must be supplied as an additional parameter on any non-interactive installation command. Supplying the **INSTALLATIONNAME** or **PGMFOLDER** ensures that you do not work with the wrong installation in case you omit or incorrectly specify the **TRANSFORMS** parameter.
2. For a silent installation to succeed, the `AGREETOLICENSE="yes"` property must be defined either on the command line or in the response file.

Procedure

1. Create a response file for installation in one of the following ways:
   - Copy and edit the file `Response.ini` that is supplied on the IBM MQ Windows Server install image, using an ASCII file editor.
   - Create your own response file using an ASCII file editor.
   - Use the **msiexec** command with the **SAVEINI** (and optionally, the **ONLYINI**) command line parameters to generate a response file that contains the same installation options as shown in the following example:

     ```
     msiexec /i "path\IBM MQ.msi" /q SAVEINI="response_file"
     TRANSFORMS="1033.mst" AGREETOLICENSE="yes"
     ```
2. To run the **msiexec** command with a response file, specify the full path and file name of the response file with the **USEINI** parameter as shown in the following example:

   ```
   msiexec /i "path\MSI\IBM MQ.msi" /l*v c:\install.log
   TRANSFORMS="1033.mst" USEINI="C:\MQ\Responsefile"
   ```

   In the response file, all text is in English, and comments begin with a `;` character.

Example

The following example shows a typical response file:

```
[Response]
PGMFOLDER="c:\mqm"
DATFOLDER="c:\mqm\data"
AGREETOLICENSE="yes"
ADDLOCAL="Client"
REMOVE="Toolkit"
```

Windows *Installing a client using the MQParms command*

You can use the **MQParms** command to invoke installation or uninstallation of an IBM MQ client.

Before you begin

The **MQParms** command can use parameters on a command line, or those specified in a parameter file. The parameter file is an ASCII text file that contains the parameter values that you want to set for the installation. The **MQParms** command takes the specified parameters and generates the corresponding **msiexec** command line.

This means that you can save all the parameters that you want to use with the **msiexec** command in a single file.

If you are running IBM MQ on Windows systems with User Account Control (UAC) enabled, you must invoke the installation with elevated privileges. If you are using the Command prompt or IBM MQ Explorer elevate privileges by using a right-click to start the program and selecting **Run as administrator**. If you try to run the MQParms program without using elevated privileges, the installation fails with an error of AMQ4353 in the installation log.

For silent operations, this must include the **/q** or **/qn** parameter, either on the command line, or in the [MSI] stanza of the parameter file. You must also set the AGREETOLICENSE parameter to "yes".

You can specify many more parameters in the parameter file that you use with the MQParms command than you can in the response file that you use directly with the **msiexec** command. Also, as well as parameters that the IBM MQ installation uses, you can specify parameters that can be used by the Prepare IBM MQ Wizard.

If you do not complete the Prepare IBM MQ Wizard directly after IBM MQ installations or if for any reason your machine is rebooted between completing IBM MQ installation and completing the Prepare IBM MQ Wizard, ensure that the wizard is run with Administrator privilege afterward, otherwise the installation is incomplete, and might fail. You might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the wizard to continue

An example of the file MQParms.ini is supplied with IBM MQ. This file contains default installation parameters.

There are two ways to create a parameter file for installation:

- Copy and edit the file MQParms.ini that is supplied with the product, using an ASCII file editor.
- Create your own parameter file using an ASCII file editor.

About this task

To invoke installation using the MQParms command:

Procedure

1. From a command line, change to the root folder of the IBM MQ installation media (that is, the location of the file MQParms.exe).
2. Enter the following command:

   ```
   MQParms [ parameter_file ] [ parameters ]
   ```

   where:

   parameter_file
   is the file that contains the required parameter values. If this file is not in the same folder as MQParms.exe, specify the full path and file name. If you do not specify a parameter file, the default is MQParms.ini. For further details, see “MQParms parameter file - client installation” on page 210.

   parameters
   are one or more command-line parameters, for a list of these, see the MSDN Command-Line Options web page.

Example

A typical example of an MQParms command is:

```
MQParms "c:\MyParamsFile.ini" /l*v c:\install.log
```

If you specify a parameter both on the command line and in the parameter file, the setting on the command line takes precedence.

If you do not specify `/i`, `/x`, `/a`, or `/j`, MQParms defaults to standard installation using the IBM MQ Windows Installer package, IBM IBM MQ.msi. That is, it generates the following part of the command line:

```
/i " current_folder \MSI\IBM MQ.msi"
```

Windows *MQParms parameter file - client installation*

A parameter file is an ASCII text file that contains sections (stanzas) with parameters that can be used by the **MQParms** command. Typically, this is an initialization file such as `MQParms.ini`.

The **MQParms** command takes parameters from the following stanzas in the file:

[MSI]
Contains general properties related to how the **MQParms** command runs and to the installation of IBM MQ.

The properties that you can set in this stanza are listed in "Installing a client using msiexec" on page 202, and Table 33 on page 210.

`MQParms` ignores any other stanzas in the file.

The stanza parameters are in the form property=value, where property is always interpreted as uppercase, but value is case sensitive. If a value string includes a blank, it must be enclosed in double quotation marks. Most other values can be enclosed in double quotation marks. Some properties can take more than one value, for example:

```
ADDLOCAL="Server,Client"
```

To clear a property, set its value to an empty string, for example:

```
REINSTALL=""
```

The following tables show the properties that you can set. The default is shown in bold.

For the [MSI] stanza, you can enter standard MSI command line options and properties. For example:

```
- /q
- ADDLOCAL="client"
- REBOOT=Suppress
```

Refer to Table 33 on page 210, and Table 34 on page 211 for the properties used to install IBM MQ.

Table 33 on page 210 shows additional properties in the stanza that affect how the `MQParms` command runs, but that do not affect the installation.

Table 33. Properties used by MQParms in the MSI stanza

Property	Values	Description
MQPLOG	*path* | *file_name*	**MQParms** generates a text log file with the specified name and location.

Table 33. Properties used by MQParms in the MSI stanza (continued)		
Property	**Values**	**Description**
MQPLANGUAGE	**system** |user| *transform_value* |existing	The installation language. system. Install using the language of the default system locale (the default). user. Install using the language of the default locale of the user. *transform_value*. Install using the language specified by this value. See Table 34 on page 211. existing. If MQ already exists on the system, the same language will be used by default, otherwise system is used.
MQPSMS	**0** |no	0 or no. **MQParms** does not wait for the `msiexec` command to end (the default). Any other value. **MQParms** waits for the `msiexec` command to end.
MQPINUSE	**0** |1	If MQPINUSE is set to 1, **MQParms** continues installing even if IBM MQ files are in use. If this option is used a reboot will be required to complete the installation.

Table 34. Valid values for the MQPLANGUAGE property			
Language	**Valid values**		
U.S. English	English	en_us	1033
German	German	de_de	1031
French	French	fr_fr	1036
Spanish	Spanish	es_es	1034
Italian	Italian	it_it	1040
Brazilian Portuguese		pt_br	1046
Japanese	Japanese	ja_jp	1041
Korean	Korean	ko_kr	1042
Simplified Chinese		zh_cn	2052
Traditional Chinese		zh_tw	1028
Czech	Czech	cs_cz	1029
Hungarian	Hungarian	hu_hu	1038
Polish	Polish	pl_pl	1045

A typical example of a parameter file is:

```
[MSI]
MQPLANGUAGE=1033
MQPLOG=%temp%\MQParms.log
```

```
MQPSMS=no
ADDLOCAL=CLIENT
/m miffile
REMOVE=""
/l*v c:\install.log
```

Windows *Modifying a client installation on Windows*

You modify the installation when an IBM MQ for Windows client is installed and you want to remove or install some IBM MQ client features.

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
2. Locate `Setup.exe` in the `Windows` directory of the IBM MQ installation image.
   - From a network location, this location might be *m:*`\`*instmqs*`\Windows\Setup.exe`
   - From a local file system directory, this location might be *C:*`\`*instmqs*`\Windows\Setup.exe`
3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.
4. Click **Next** to continue.
5. Select **Modify**, then click **Next**.

   The Features panel is displayed.
6. To change the installation of a feature, complete the following steps:
   a) Click the symbol next to the feature name to display a menu.
   b) Select the required option from:
      - Install this feature
      - Install this feature and all its subfeatures (if any)
      - Do not install this feature (remove if already installed).

      The symbol next to the feature name changes to show the current installation option.
7. When your selections are complete, click **Next**.

   The IBM MQ Setup window displays a summary of the installation you selected.
8. To continue, click **Modify** then wait until the progress bar is complete.

   When the IBM MQ client is successfully installed, the IBM MQ Setup window displays the following message: `Installation Wizard Completed Successfully`
9. Click **Finish** to close the window.

Windows *Modifying a client installation using Add/Remove Programs*

On some versions of Windows, you can modify an installation by using Add/Remove Programs.

For Windows 7 follow these steps.

1. From the Windows taskbar, select **Start** > **Control Panel**.
2. Select **Add/Remove Programs**.
3. Select **IBM MQ**.

4. Select **Change**.

   The IBM MQ Setup window with the Program Maintenance panel is displayed.
5. Select **Modify**, then click **Next**.

   The Features panel is displayed.
6. To change the installation of a feature:
   a. Click the symbol next to the feature name to display a menu.
   b. Select the required option from:
      - Install this feature
      - Install this feature and all its subfeatures (if any)
      - Do not install this feature (remove if already installed).

      The symbol next to the feature name changes to show the current installation option.
7. When your selections are complete, click **Next**.
8. The IBM MQ Setup window displays a summary of the installation you selected.

   To continue, click **Modify**.
9. Wait until the progress bar is complete.

   When the IBM MQ client is successfully installed, the IBM MQ Setup window displays the following message:

   ```
   Installation Wizard Completed Successfully
   ```

   Click **Finish** to close the window.
10. For Windows 8, the **Add/Remove Programs** option uninstalls the whole product.

    You need to run the `setup.exe` file from the original installation media to make any modifications to the installation.

Windows *Modifying a client installation silently using msiexec*

You can use msiexec to modify an IBM MQ client installation.

To silently modify an IBM MQ client installation using msiexec, follow the instructions on the installation pages, but set the ADDLOCAL parameter to include the features you want to add, and set the REMOVE parameter to the features you want to remove.

For example if you used ADDLOCAL="JavaMsg" and REMOVE="" it would modify the installation to include the Java Messaging and Web Services feature.

The instructions for msiexec begin here: “Installing a client using msiexec” on page 202

Windows *Modifying a client installation silently using MQParms*

You can use the **MQParms** command to modify an IBM MQ client installation.

To silently modify an IBM MQ client installation using **MQParms**, follow the instructions on the installation pages, but set the ADDLOCAL parameter to include the features you want to add, and set the REMOVE parameter to the features you want to remove.

For example if you used ADDLOCAL="JavaMsg" and REMOVE="" it would modify the installation to include the Java Messaging and Web Services feature.

For details of the **MQParms** command, see “Installing a client using the MQParms command” on page 209.

Windows Verifying an IBM MQ installation on Windows

The topics in this section provide instructions on how to verify a server or a client installation of IBM MQ on Windows systems.

About this task

You can verify a local (stand-alone) server installation or a server-to-server installation of the IBM MQ server:

- A local server installation has no communication links with other IBM MQ installations.
- A server-to-server installation does have links to other installations.

You can also verify that your IBM MQ MQI client installation completed successfully and that the communication link is working.

Procedure

- To verify a local server installation, see "Verifying a local server installation using the command line on Windows" on page 214.
- To verify a server-to-server installation, see "Verifying a server-to-server installation using the command line on Windows" on page 216.
- To verify a client installation, see "Verifying a client installation on Windows" on page 218.

Windows *Verifying a local server installation using the command line on Windows*

On Windows systems, you can verify a local installation by using the command line to create a simple configuration of one queue manager and one queue.

Before you begin

To verify the installation, you must first install the samples package.

Before beginning the verification procedure, you might want to check that you have the latest fixes for your system. For more information about where to find the latest updates, see "Checking requirements on Windows" on page 166.

About this task

Use the following steps to configure your default queue manager from the command line. After the queue manager is configured, use the `amqsput` sample program to put a message on the queue. You then use the `amqsget` sample program to get the message back from the queue.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Set up your environment:
   a) Set up environment variables for use with a particular installation by entering the following command:

      ```
      MQ_INSTALLATION_PATH\bin\setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
   b) Check that the environment is set up correctly by entering the following command:

      ```
      dspmqver
      ```

If the command completes successfully, and the expected version number and installation name are returned, the environment is set up correctly.

2. Create a queue manager called QMA by entering the following command:

```
crtmqm QMA
```

Messages indicate when the queue manager is created, and when the default IBM MQ objects are created.

3. Start the queue manager by entering the following command:

```
strmqm QMA
```

A message indicates when the queue manager starts.

4. Start MQSC by entering the following command:

```
runmqsc QMA
```

A message indicates when MQSC starts. MQSC has no command prompt.

5. Define a local queue called QUEUE1 by entering the following command:

```
DEFINE QLOCAL (QUEUE1)
```

A message indicates when the queue is created.

6. Stop MQSC by entering the following command:

```
end
```

Messages are shown, followed by the command prompt.

Note: Subsequent steps require that the samples package is installed.

7. Put a message on the queue by entering the following command:

```
amqsput QUEUE1 QMA
```

The following messages are shown:

```
Sample AMQSPUT0 start
target queue is QUEUE1
```

8. Type some message text on one or more lines, where each line is a different message. Enter a blank line to end the message input.

The following message is shown:

```
Sample AMQSPUT0 end
```

Your messages are now on the queue and the command prompt is shown.

9. Get the messages from the queue, by entering the following command:

```
amqsget QUEUE1 QMA
```

The sample program starts, and your messages are displayed.

Results

You have successfully verified your local installation.

Windows *Verifying a server-to-server installation using the command line on Windows*

You can verify a server-to-server installation using two servers, one as a sender and one as a receiver.

Before you begin

- On Windows, IBM MQ supports TCP, SNA, NetBios, and SPX.

  The examples in this task use TCP/IP. If you do not use TCP, see Setting up communication for Windows.
- Make sure that you are a member of the IBM MQ administrators group (**mqm**) on each server.
- Decide which installation is the sender server and which installation is the receiver server. The installations might be on the same system, or on different systems.

About this task

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. On the **receiver** server:
   a) Check which ports are free, for example by running **netstat**. For more information about this command, see the documentation of your operating system.

      If port 1414 is not in use, make a note of 1414 to use as the port number in step 2 g. Use the same number for the port for your listener later in the verification. If it is in use, note a port that is not in use; for example 1415.

   b) Set up the environment for the installation you are using by entering the following command at the command prompt:

      ```
      MQ_INSTALLATION_PATH\bin\setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.

   c) Create a queue manager called QMB by entering the following command at the command prompt:

      ```
      crtmqm QMB
      ```

      Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.

   d) Start the queue manager by entering the following command:

      ```
      strmqm QMB
      ```

      A message tells you when the queue manager has started.

   e) Start MQSC by entering the following command:

      ```
      runmqsc QMB
      ```

      A message tells you that MQSC has started. MQSC has no command prompt.

   f) Define a local queue called RECEIVER.Q by entering the following command:

      ```
      DEFINE QLOCAL (RECEIVER.Q)
      ```

      A message tells you the queue has been created.

   g) Define a listener by entering the following command:

```
DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT ( PORT_NUMBER )
```

Where *port_number* is the name of the port the listener runs on. This number must be the same as the number used when defining your sender channel.

h) Start the listener by entering the following command:

```
START LISTENER (LISTENER1)
```

Note: Do not start the listener in the background from any shell that automatically lowers the priority of background processes.

i) Define a receiver channel by entering the following command:

```
DEFINE CHANNEL (QMA.QMB) CHLTYPE (RCVR) TRPTYPE (TCP)
```

A message tells you when the channel has been created.

j) End MQSC by typing:

```
end
```

Some messages are displayed, followed by the command prompt.

2. On the **sender** server:

a) Set up the environment for the installation you are using by entering the following command at the command prompt:

```
MQ_INSTALLATION_PATH\bin\setmqenv -s
```

where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.

b) Create a queue manager called QMA by entering the following command at the command prompt:

```
crtmqm QMA
```

Messages tell you that the queue manager has been created, and that the default IBM MQ objects have been created.

c) Start the queue manager, by entering the following command:

```
strmqm QMA
```

A message tells you when the queue manager has started.

d) Start MQSC by entering the following command:

```
runmqsc QMA
```

A message tells you that an MQSC session has started. MQSC had no command prompt.

e) Define a local queue called QMB (to be used as a transmission queue) by entering the following command:

```
DEFINE QLOCAL (QMB) USAGE (XMITQ)
```

A message tells you when the queue has been created.

f) Define a local definition of the remote queue by entering the following command:

```
DEFINE QREMOTE (LOCAL.DEF.OF.REMOTE.QUEUE) RNAME (RECEIVER.Q) RQMNAME ('QMB') XMITQ (QMB)
```

g) Define a sender channel by entering the following command:

```
DEFINE CHANNEL (QMA.QMB) CHLTYPE (SDR) CONNAME ('CON-NAME(PORT)') XMITQ (QMB) TRPTYPE (TCP)
```

con-name is the TCP/IP address of the receiver system. If both installations are on the same system, the *con-name* is `localhost`. *port* is the port you noted in 1 a. If you do not specify a port, the default value of 1414 is used.

h) Start the sender channel by entering the following command:

```
START CHANNEL(QMA.QMB)
```

The receiver channel on the receiver server starts automatically when the sender channel starts.

i) Stop MQSC by entering the following command:

```
end
```

Some messages are displayed, followed by the command prompt.

j) If both the sender server and receiver server are installations on the same system, check that the queue managers have been created on different installations by entering the following command:

```
dspmq -o installation
```

If the queue managers are on the same installation, move either QMA to the sender installation or QMB to the receiver installation by using the **setmqm** command. For more information, see setmqm.

k) Put a message on the local definition of the remote queue, which in turn specifies the name of the remote queue. Enter the following command:

```
amqsput LOCAL.DEF.OF.REMOTE.QUEUE QMA
```

A message tells you that `amqsput` has started.

l) Type some message text on one or more lines, followed by a blank line.

A message tells you that `amqsput` has ended. Your message is now on the queue and the command prompt is displayed again.

3. On the **receiver** server:

a) Get the message from the queue on the receiver by entering the following command:

```
amqsget RECEIVER.Q QMB
```

The sample program starts, and your message is displayed. After a pause, the sample ends. Then the command prompt is displayed.

Results

You have now successfully verified the server-to-server installation.

Windows *Verifying a client installation on Windows*

You can verify that your IBM MQ MQI client installation completed successfully and that the communication link is working.

About this task

The verification procedure shows how to create a queue manager called `queue.manager.1`, a local queue called `QUEUE1`, and a server-connection channel called `CHANNEL1` on the server.

It shows how to create the client-connection channel on the IBM MQ MQI client workstation. It then shows how to use the sample programs to put a message onto a queue, and get the message from the queue.

The example does not address any client security issues. See Setting up IBM MQ MQI client security for details if you are concerned with IBM MQ MQI client security issues.

The verification procedure assumes that:

- The full IBM MQ server product has been installed on a server.
- The server installation is accessible on your network.
- The IBM MQ MQI client software has been installed on a client system.
- The IBM MQ sample programs have been installed.
- TCP/IP has been configured on the server and client systems. For more information, see Configuring connections between the server and client.

Procedure

1. Set up the server and client by using the command line.

   For more information, see "Setting up the server and client using the command line on Windows" on page 219.
2. Test the communications between client and server.

   For more information, see "Testing communication between a client and a server on Windows" on page 222.

Related tasks

"Installing an IBM MQ client on Windows" on page 200
This topic describes how to install IBM MQ client on Windows systems. This procedure can be used for installing a first or a subsequent installation.

Windows *Setting up the server and client using the command line on Windows*

You can use the command line to create the objects that you need to use to verify a client installation on Windows. On the server you create a queue manager, a local queue, a listener, and a server-connection channel. You must also apply security rules to allow the client to connect and make use of the queue defined. On the client you create a client-connection channel. After setting up the server and client, you can then use the sample programs to complete the verification procedure.

Before you begin

Before starting this task, review the information in "Verifying a client installation on Windows" on page 218.

About this task

This task explains how to use the command line to set up the server and client so that you can verify your client installation.

Procedure

1. Set up the server by following the instructions in "Setting up the server using the command line on Windows" on page 220.
2. Set up the client by following instructions in "Connecting to a queue manager, using the MQSERVER environment variable on Windows" on page 221.

What to do next

Test the communications between client and server by following the instructions in "Testing communication between a client and a server on Windows" on page 222.

Windows *Setting up the server using the command line on Windows*

Follow these instructions to create a queue manager, queue, and channel on the server. You can then use these objects to verify the installation.

About this task

These instructions assume that no queue manager or other IBM MQ objects have been defined.

IBM MQ object definitions are case-sensitive. Any text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Create a user ID on the server that is not in the `mqm` group.

   This user ID must exist on the server and client. This is the user ID that the sample applications must be run as, otherwise a 2035 error is returned.
2. You must set various environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

```
MQ_INSTALLATION_PATH\bin\setmqenv -s
```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed
3. Create a queue manager called `QUEUE.MANAGER.1` by entering the following command:

```
crtmqm QUEUE.MANAGER.1
```

   You see messages telling you that the queue manager has been created.
4. Start the queue manager by entering the following command:

```
strmqm QUEUE.MANAGER.1
```

   A message tells you when the queue manager has started.
5. Start MQSC by entering the following command:

```
runmqsc QUEUE.MANAGER.1
```

   A message tells you that an MQSC session has started. MQSC has no command prompt.
6. Define a local queue called `QUEUE1` by entering the following command:

```
DEFINE QLOCAL(QUEUE1)
```

   A message tells you when the queue has been created.
7. Allow the user ID that you created in step 1 to use `QUEUE1` by entering the following command:

```
SET AUTHREC PROFILE(QUEUE1) OBJTYPE(QUEUE) PRINCIPAL(' non_mqm_user ') AUTHADD(PUT,GET)
```

   where *non_mqm_user* is the user ID created in step 1. A message tells you when the authorization has been set. You must also run the following command to give the user ID authority to connect:

```
SET AUTHREC OBJTYPE(QMGR) PRINCIPAL(' non_mqm_user ') AUTHADD(CONNECT)
```

   If this command is not run, a 2305 stop error is returned.
8. Define a server-connection channel by entering the following command:

```
DEFINE CHANNEL (CHANNEL1) CHLTYPE (SVRCONN) TRPTYPE (TCP)
```

   A message tells you when the channel has been created.

9. Allow your client channel to connect to the queue manager and run under the user ID that you created in step 1, by entering the following MQSC command:

   ```
   SET CHLAUTH(CHANNEL1) TYPE(ADDRESSMAP) ADDRESS(' client_ipaddr ') MCAUSER(' non_mqm_user ')
   ```

   where *client_ipaddr* is the IP address of the client system, and *non_mqm_user* is the user ID created in step 1. A message tells you when the rule has been set.
10. Define a listener by entering the following command:

    ```
    DEFINE LISTENER (LISTENER1) TRPTYPE (TCP) CONTROL (QMGR) PORT (port_number)
    ```

    where *port_number* is the number of the port the listener is to run on. This number must be the same as the number used when defining your client-connection channel in "Installing an IBM MQ client on Windows" on page 200.

    Note: If you omit the port parameter from the command, a default value of 1414 is used for the listener port. If you want to specify a port other than 1414, you must include the port parameter in the command, as shown.
11. Start the listener by entering the following command:

    ```
    START LISTENER (LISTENER1)
    ```
12. Stop MQSC by entering:

    ```
    end
    ```

    You see some messages, followed by the command prompt.

What to do next

Follow the instructions to set up the client. See "Connecting to a queue manager, using the MQSERVER environment variable on Windows" on page 221.

Windows *Connecting to a queue manager, using the MQSERVER environment variable on Windows*

When an IBM MQ application is run on the IBM MQ MQI client, it requires the name of the MQI channel, the communication type, and the address of the server to be used. Provide these parameters by defining the MQSERVER environment variable.

Before you begin

Before you start this task, you must complete the task, "Setting up the server using the command line on Windows" on page 220, and save the following information:

- The host name or IP address of the server and port number that you specified when creating the listener.
- The channel name of the server-connection channel.

About this task

This task describes how to connect an IBM MQ MQI client, by defining the MQSERVER environment variable on the client.

You can give the client access to the generated client channel definition table, `amqclchl.tab` instead; see Accessing client-connection channel definitions.

Alternatively, on Windows, if Active Directory support is enabled, the client discovers the client-connection information dynamically from the Active Directory.

Procedure

1. Log in as the userid that you created in Step 1 of "Setting up the server using the command line on Windows" on page 220.

2. Check the TCP/IP connection. From the client, enter one of the following commands:
   - `ping server-hostname`
   - `ping n.n.n.n`

     `n.n.n.n` represents the network address. You can set the network address in IPv4 dotted decimal form, for example, `192.0.2.0`. Alternatively, set the address in IPv6 hexadecimal form, for example `2001:0DB8:0204:acff:fe97:2c34:fde0:3485`.

   If the **ping** command fails, correct your TCP/IP configuration.
3. Set the MQSERVER environment variable. From the client, enter the following command:

   ```
   SET MQSERVER=CHANNEL1/TCP/server-address(port)
   ```

   Where:
   - *CHANNEL1* is the server-connection channel name.
   - *server-address* is the TCP/IP host name of the server.
   - *port* is the TCP/IP port number the server is listening on.

   If you do not give a port number, IBM MQ uses the one specified in the `qm.ini` file, or the client configuration file. If no value is specified in these files, IBM MQ uses the port number identified in the TCP/IP services file for the service name `MQSeries`. If an `MQSeries` entry in the services file does not exist, a default value of 1414 is used. It is important that the port number used by the client and the port number used by the server listener program are the same.

What to do next

Use the sample programs to test communication between the client and server; see "Testing communication between a client and a server on Windows" on page 222.

Windows *Testing communication between a client and a server on Windows*

On the IBM MQ MQI client workstation, use the `amqsputc` sample program to put a message on the queue at the server workstation. Use the `amqsgetc` sample program to get the message from the queue back to the client.

Before you begin

Complete the previous topics in this section:

- Set up a queue manager, channels, and queue.
- Open a command window.
- Set system environment variables.

About this task

Note that IBM MQ object definitions are case-sensitive. Text entered as an MQSC command in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. Make sure that you type the examples exactly as shown.

Procedure

1. Change into the *MQ_INSTALLATION_PATH*\Tools\C\Samples\Bin directory for 32 bit systems or the *MQ_INSTALLATION_PATH*\Tools\C\Samples\Bin64 directory for 64 bit systems.

   MQ_INSTALLATION_PATH represents the high-level directory in which IBM MQ is installed.
2. You must set certain environment variables so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   MQ_INSTALLATION_PATH\bin\setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed

3. Start the PUT program for QUEUE1 on QUEUE.MANAGER.1 by entering the following command:

   ```
   amqsputc QUEUE1 QUEUE.MANAGER.1
   ```

   If the command is successful, the following messages are displayed:

   ```
   Sample AMQSPUT0 start target queue is QUEUE1
   ```

   Tip: You might get the error, MQRC_NOT_AUTHORIZED (2035). By default, channel authentication is enabled when a queue manager is created. Channel authentication prevents privileged users accessing a queue manager as an IBM MQ MQI client. For verifying the installation, you can either change the MCA user ID to a non-privileged user, or disable channel authentication. To disable channel authentication run the following MQSC command:

   ```
   ALTER QMGR CHLAUTH(DISABLED)
   ```

   When you finish the test, if you do not delete the queue manager, re-enable channel authentication:

   ```
   ALTER QMGR CHLAUTH(ENABLED)
   ```

4. Type some message text, then press **Enter** twice.
   The following message is displayed:

   ```
   Sample AMQSPUT0 end
   ```

   Your message is now on the queue that is on the server queue manager.
5. Start the GET program for QUEUE1 on QUEUE.MANAGER.1 by entering the following command:

   ```
   amqsgetc QUEUE1 QUEUE.MANAGER.1
   ```

   The sample program starts, and your message is displayed. After a short pause (approximately 30 seconds), the sample ends and the command prompt is displayed again.

Results

You have now successfully verified the client installation.

What to do next

1. You must set various environment variables on the server so that the installation can be used in the current shell. You can set the environment variables by entering the following command:

   ```
   MQ_INSTALLATION_PATH\bin\setmqenv -s
   ```

   where *MQ_INSTALLATION_PATH* refers to the location where IBM MQ is installed.
2. On the server, stop the queue manager by entering the following command:

   ```
   endmqm QUEUE.MANAGER.1
   ```

3. On the server, delete the queue manager by entering the following command:

   ```
   dltmqm QUEUE.MANAGER.1
   ```

Windows *Selecting a national language for displaying messages on Windows*

To display messages from a different national language message catalog, you must either set the **MQS_FORCE_NTLANGID** environment variable, or change a regional setting.

About this task

Messages in U.S. English are automatically installed with IBM MQ

Messages in the national languages that IBM MQ supports are automatically installed. Messages are displayed in the national language, based on the following order:

1. The value of the **MQS_FORCE_NTLANGID** environment variable, if set.
2. The regional format of the user that is displaying the message, if the language specified by the regional format is supported by IBM MQ.
3. The Administrative system locale if the language specified by the system locale is supported by IBM MQ.
4. US English, if no other supported language can be determined.

Note: The queue manager is usually launched by a service on the machine, and hence is running under its own user account (for example MUSR_MQADMIN) or a specific domain account provided during install time. See Local and domain user accounts for the IBM MQ Windows service for more information.

If you require messages in a language other than the one associated with the regional format of a user account, perform the following steps:

Procedure

1. Globally set the **MQS_FORCE_NTLANGID** environment variable, to the language identifier of the desired language, for messages displayed by the queue manager.

   You should set the **MQS_FORCE_NTLANGID** system wide. Otherwise, every user displaying messages needs to have the environment variable set individually.

   The language identifier values, represented in hexadecimal notation, are listed in the following Microsoft document: Language Identifier Constants and Strings
2. Reboot machines where queue managers are running as a service, for the environment variable to take effect.

Windows Uninstalling IBM MQ on Windows

You can uninstall the IBM MQ MQI clients and servers on Windows systems by using the control panel, the command line (**msiexec**), **MQParms**, or by using the installation media, in which case you can optionally remove queue managers as well.

Before you begin

CAUTION: Windows The Windows Registry contains critical information, including file locations, drivers, and start-up processes. IBM MQ relies on these specific registry settings to function correctly. Changing these settings without proper information can cause the IBM MQ application to become unusable or fail completely as incorrect changes can disrupt its essential functions.

By default, uninstallation logging is not enabled on Windows. To ensure that you receive an uninstallation log, carry out the following procedure:

1. In a command prompt, open the registry editor by issuing the command **regedit**.
2. Create, or edit, the appropriate registry key:
   `HKEY_LOCAL_MACHINE\Software\Policies\Microsoft\Windows\Installer`
3. Under this registry key add the following information:

   Name
   Logging

   Data type
   REG_SZ

   Value
   voicewarmup
4. Save the updated registry key.

Procedure

The first part of the procedure ensures that there are no IBM MQ programs or processes running:

1. If you are running IBM MQ with the Microsoft Cluster Service (MSCS), remove the queue managers from MSCS control before uninstalling IBM MQ. Perform the following steps for each queue manager currently under MSCS control :
   a) Take the queue manager resource offline.
   b) Destroy the resource instance.
   c) Migrate the queue manager files back from shared drives. This step is shown as optional in Removing a queue manager from MSCS control. However, it is mandatory in this case.
2. Stop all IBM MQ applications associated with the installation you are uninstalling.
3. Stop all Managed File Transfer agents.
   If any Managed File Transfer agents are running, you can use the **fteStopAgent** command to stop the agents in a controlled way. You can also stop the agents immediately, if necessary, using the **-i** parameter; see fteStopAgent (stop a Managed File Transfer Agent).
4. For a server installation, end all IBM MQ activity:
   a) Log in as a user in the group `mqm`.
   b) Stop all running queue managers and listeners by using the IBM MQ Explorer, or by entering the following commands:
      i) Set up your environment to work with the installation you want to uninstall by entering the following command:

      ```
      MQ_INSTALLATION_PATH\bin\setmqenv -s
      ```

      where *MQ_INSTALLATION_PATH* is the location where IBM MQ is installed.
      ii) For each queue manager, enter the following command to stop the queue manager:

      ```
      endmqm queue_manager_name
      ```

      iii) For each queue manager, enter the following command to stop any listeners associated with the queue manager:

      ```
      endmqlsr -m queue_manager_name
      ```

5. Stop IBM MQ.
   To do this right-click the **IBM MQ** icon in the system tray, then select **Stop IBM MQ**.
6. Close all IBM MQ windows.
7. Stop any monitoring service.

When all processes associated with IBM MQ are no longer running, you can uninstall IBM MQ:

8. Uninstall IBM MQ by using one of the following methods:
   - Use the Windows Control Panel. This process is described in: “Uninstalling IBM MQ using the control panel” on page 226. This method does not remove the queue manager data.
   - Use the command line by running the **msiexec** command as described in: “Uninstalling IBM MQ using msiexec” on page 227. This method does not remove the queue manager data.
   - Use the appropriate parameters with **MQParms**. This process is described in “Uninstalling IBM MQ using MQParms” on page 229. This method does not remove the queue manager data.
   - Use the installation media, by selecting the appropriate option as described in: “Uninstalling IBM MQ on Windows using the installation media” on page 229. The option to remove queue manager data is displayed in the **Removing Server feature** panel, if appropriate.

   If you have to cancel the uninstallation process before it is finished, you might have to reconfigure IBM MQ with the Prepare IBM MQ wizard because the rollback of the deletion of the IBM MQ service

is unable to set the service's user account password. Use the following command to reconfigure IBM MQ:

```
MQ_INSTALLATION_PATH\bin\amqmjpse.exe -r
```

For more information about the Prepare IBM MQ Wizard, see "Configuring IBM MQ with the Prepare IBM MQ Wizard" on page 192.

9. Check the Windows event log and restart the system if necessary.

   If event ID 10005 is written to the Windows event log, you must restart the system to complete the uninstallation process.

10. If you are uninstalling the last or only installation of IBM MQ, you can remove all the information about previous installations that is retained on the system, if you want to. You should use the **ResetMQ.cmd** for this purpose; see "Clearing IBM MQ installation settings" on page 172 for more information.

    The following registry values remain after uninstallation:

    - `My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\IBM\WebSphere MQ\LogDefaultPath`
    - `My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\IBM\WebSphere MQ\WorkPath`
    - `My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\IBM\WebSphere MQ\LogDefaultPath`
    - `My Computer\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\IBM\WebSphere MQ\WorkPath`

    Data folders will also remain and are located at *MQ_DATA_PATH*`\Config`, where *MQ_DATA_PATH* is the location of the IBM MQ data directory. Most of the remaining files contain text such as INI files, error logs, and FDC files. The executable shared library `mqzsd.dll` also remains.

    If a client is installed on a system where the `LogDefaultPath` registry value remains from a previous server installation, a client installation will attempt to create this directory if it does not already exist. If this behavior is not wanted, remove the LogDefaultPath registry value before installing the client.

Windows *Uninstalling IBM MQ using the control panel*

You can uninstall IBM MQ by using the control panel to remove all currently installed features.

Before you begin

Start the uninstalling process by following the steps described in "Uninstalling IBM MQ on Windows" on page 224.

If you no longer require the queue managers that are on the system, delete them by using the IBM MQ Explorer or the **dltmqm** command.

Procedure

1. From the Windows taskbar, open the control panel by clicking **Start** > **Settings** > **Control Panel**, or **Start** > **Control Panel**.
2. Open **Programs and Features**.
3. Click **IBM MQ (*installation_name*)**, where *installation_name* is the name of the installation you want to remove.
4. Click **Remove** or **Uninstall** and click **Yes** to confirm.

   If User Account Control (UAC) is enabled, accept the Windows prompt to allow the uninstallation to run as elevated. The program then begins and runs to completion.

What to do next

Complete the steps that you started in "Uninstalling IBM MQ on Windows" on page 224.

Windows *Uninstalling IBM MQ using msiexec*

You can uninstall IBM MQ by running the **msiexec** command from the command line to remove all currently installed features, or selected features.

Before you begin

This task describes one of several uninstallation options that you can choose from when uninstalling IBM MQ as described in "Uninstalling IBM MQ on Windows" on page 224. Before starting this task, refer to "Uninstalling IBM MQ on Windows" on page 224 for more information.

If you no longer require the queue managers that are on the system, delete them by using the IBM MQ Explorer or the **dltmqm** command.

About this task

You can use the **msiexec** command to uninstall IBM MQ either by running the `msiexec` command with a parameter that calls a response file, or by entering the required `msiexec` parameters on the command line.

Important: When specifying which features to remove with the **REMOVE** parameter:

- If you want to silently uninstall the Server feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying `REMOVE="Web,Server"`.
- If you want to silently uninstall the Java runtime environment (JRE) feature, and the Web Administration (Web) feature is installed, you must also silently uninstall the Web feature at the same time by specifying `REMOVE="Web,JRE"`.

If you are running IBM MQ on Windows with User Account Control (UAC) enabled, you must invoke the silent uninstallation from an elevated command prompt. Elevate a command prompt by using a right-click to start the command prompt and choose **Run as administrator**.

In all of the examples of commands shown, the variable names used are as follows:

- *installation_name* is the name of the installation you want to remove.
- *product_code* is the value shown for MSIProdCode in the output of the following command:

  ```
  dspmqinst -n installation_name
  ```

  An example of a product code is `{0730749B-080D-4A2E-B63D-85CF09AE0EF0}`.

Procedure

- To silently uninstall IBM MQ by running the `msiexec` command with a parameter that calls a response file:
  a) Set which features to uninstall, and whether to keep existing queue managers in the response file.

  A response file is an ASCII text file that contains the parameter values that you want to set for the uninstallation. The response file has a format similar to a Windows `.ini` file, and contains the stanza `[Response]`. This stanza contains parameters that the **msiexec** command can use, in the form of *property = value* pairs. The **msiexec** command ignores any other stanzas in the file. This is an example of a simple uninstallation `[Response]` stanza:

  ```
  [Response] REMOVE="ALL"
  ```

  For more information about how to create a response file, including which parameters you can specify, see "Creating and using a response file for server installation" on page 181.

  b) To silently uninstall IBM MQ using the response file, enter the following command: msiexec /x {*product_code*} /l*v "c:\removal.log" /q USEINI="*response_file*" INSTALLATIONNAME="*installation_name*"

- To uninstall IBM MQ by entering the required `msiexec` parameters on the command line, enter one of the following commands:
  - To invoke an interactive uninstallation giving you the option to remove queue manager data (providing there are no other IBM MQ installations remaining):

    ```
    msiexec /x {product_code} /l*v "c:\removal.log" REMOVE="All"
    INSTALLATIONNAME="installation_name"
    ```

    If you are running IBM MQ on a Windows system with User Account Control (UAC) enabled, you might see **Open File - Security Warning** dialog boxes during uninstallation that list International Business Machines Limited as the publisher. Click **Run** to allow the uninstallation to continue.
  - To invoke a silent uninstallation that does not remove any queue manager data:

    ```
    msiexec /x {product_code} /l*v "c:\removal.log" /q REMOVE="All"
    INSTALLATIONNAME="installation_name"
    ```
  - To invoke a silent uninstallation and remove any queue manager data (only valid when removing the final server installation):

    ```
    msiexec /x {product_code} /l*v "c:\removal.log" /q REMOVE="All" KEEPQMDATA="delete"
    INSTALLATIONNAME="installation_name"
    ```
  - To monitor the progress of the uninstalling process and not remove any queue manager data:

    ```
    msiexec /x {product_code} /l*v "c:\removal.log" INSTALLATIONNAME="installation_name"
    ```

    If you are running IBM MQ on a Windows system with User Account Control (UAC) enabled, you might see **Open File - Security Warning** dialog boxes during uninstallation that list International Business Machines Limited as the publisher. Click **Run** to allow the uninstallation to continue.
  - To invoke a silent uninstallation and not remove any queue manager data:

    ```
    msiexec /x {product_code} /l*v "c:\removal.log" /q INSTALLATIONNAME="installation_name"
    ```

Results

After the command is entered, the command prompt immediately reappears and IBM MQ is uninstalled as a background process. If you entered parameters to produce a log, check this file to see how the uninstallation is progressing. If the uninstallation finishes successfully, you see the message `Removal completed successfully` in the log file.

What to do next

Complete the steps that you started in “Uninstalling IBM MQ on Windows” on page 224.

Related concepts

“IBM MQ features for Windows systems” on page 156
You can select the features that you require when you install IBM MQ.

Related tasks

“Installing the server using msiexec” on page 177
IBM MQ on Windows uses the MSI technology to install software. MSI provides both an interactive installation and a non interactive installation.

“Modifying a server installation silently using msiexec” on page 200

You can silently remove or install IBM MQ features on Windows by using **msiexec**.

Windows *Uninstalling IBM MQ using MQParms*

You can uninstall IBM MQ by running the **MQParms** command from the command line to remove all currently installed features.

Before you begin

Start the uninstalling process by following the steps described in "Uninstalling IBM MQ on Windows" on page 224.

Procedure

1. Follow the instructions on the MQParms installation pages to uninstall IBM MQ non-interactively. See: "Installing the server using the MQParms command" on page 185.
   a) Set the ADDLOCAL parameter to empty (ADDLOCAL="").
   b) Set the REMOVE parameter to "ALL" (REMOVE="ALL").
2. If you have multiple versions of IBM MQ installed on your system, specify the product code that identifies the installation you want to remove.
   Type the following command:

   ```
   MQParms.exe parameter_file/i "{product_code}"
   ```

   where

   - *parameter_file* is the file that contains the required parameter values. If this file is not in the same folder as `MQParms.exe`, specify the full path and file name. If you do not specify a parameter file, the default is `MQParms.ini`.
   - *product_code* is the value shown for MSIProdCode in the output of the following command:

     ```
     dspmqinst -n installation_name
     ```

     where *installation_name* is the name of the installation you want to remove. An example of a product code is `{0730749B-080D-4A2E-B63D-85CF09AE0EF0}`.

What to do next

Complete the steps that you started in "Uninstalling IBM MQ on Windows" on page 224.

Windows *Uninstalling IBM MQ on Windows using the installation media*

You can uninstall IBM MQ by using the installation media to remove all currently installed features and optionally remove existing queue managers and their data.

Before you begin

Start the uninstalling process by following the steps described in "Uninstalling IBM MQ on Windows" on page 224.

Procedure

1. Download the compressed file that contains the installation image, then uncompress it into a temporary directory.
2. Navigate to that directory, then double-click `Setup.exe` to start the installation process.
   The IBM MQ Installation Launchpad window is displayed.
3. Click **IBM MQ Installation**.
4. Click **Launch IBM MQ Installer** and click **Next** until the IBM MQ Program Maintenance panel is displayed with a welcome message.

If this panel is not displayed, IBM MQ for Windows is not currently installed.

5. Click **Maintain or upgrade an existing instance** and if there is more than one installation of IBM MQ on the system, select which installation you want to remove. Click **Next** and in the Program Maintenance panel, click **Remove**, then **Next**.
6. If you are uninstalling the last or only server, and there are any queue managers on the system, the Removing Server feature panel is shown.

   Click one of the following options:

   - **Keep**: keep existing queue managers and their objects.
   - **Remove**: remove existing queue managers and their objects.

   Click **Next**.

   The Remove IBM MQ panel is displayed, with a summary of the installation to be removed.
7. Click **Remove** to continue.

   If there are any messages that state that locked files are found, ensure that there are no IBM MQ programs running; see "Uninstalling IBM MQ on Windows" on page 224.

   When IBM MQ has been uninstalled, a message indicates completion.
8. Click **Finish**.

What to do next

Complete the steps that you started in "Uninstalling IBM MQ on Windows" on page 224.

Windows Redistributable clients on Windows

The Windows 64-bit image is shipped in a `Win64.zip` file.

File names

The archive or .zip file names describe the file contents and equivalent maintenance levels.

For IBM MQ 10.0 the client images are available under the following file names:

Long Term Support: 10.0.0 IBM MQ C and .NET redistributable client for Windows x64
`10.0.0.0-IBM-MQC-Redist-Win64.zip`

Long Term Support: 10.0.0 IBM MQ JMS and Java redistributable client
`10.0.0.0-IBM-MQC-Redist-Java.zip`

Choosing the runtime files to distribute with an application

A script file named **genmqpkg** is provided by the redistributable client under the `bin` directory.

You can use the **genmqpkg** script to generate a smaller subset of files that are tailored to the needs of the application, for which the files are intended to be distributed. You are asked a series of interactive `Yes` or `No` questions to determine the runtime requirements for an IBM MQ

application.

Finally, **genmqpkg** asks you to supply a new target directory, where the script duplicates the required directories and files.

Important: IBM Support is only able to provide assistance with the full, unmodified set of files contained within the redistributable client packages.

Other considerations

On Windows, the default data path of a non-installed client is `%HOMEDRIVE%%HOMEPATH%\IBM\MQ\data`.

You can change the default directory of the data path, by using the MQ_OVERRIDE_DATA_PATH environment variable.

Note: You must create the directory first, as the directory is not created automatically.

A redistributable client runtime co-exists with a full IBM MQ client or server installation, provided that they are installed in different locations.

Important: Unpacking a redistributable image into the same location as a full IBM MQ installation is not supported.

Classpath changes

The classpath used by **dspmqver**, **setmqenv**, and **crtmqenv** commands adds the `com.ibm.mq.allclient.jar` and `com.ibm.mq.jakarta.client.jar` to the environment, immediately following the `com.ibm.mq.jar`, and `com.ibm.mqjms.jar`.

An example of **dspmqver** output from the redistributable client on Windows:

```
Name:        IBM MQ
Version:     10.0.0.0
Level:       p940-940-L220415
BuildType:   IKAP - (Production)
Platform:    IBM MQ for Windows (x64 platform)
Mode:        64-bit
O/S:         Windows 10 Professional x64 Edition, Build 7601: SP1
InstName:    MQNI09200004
InstDesc:    IBM MQ V10.0.0.0 (Redistributable)
Primary:     No
InstPath:    C:\Users\johndoe\Desktop\Redist
DataPath:    C:\Users\johndoe\IBM\MQ\data
MaxCmdLevel: 10
```

Related concepts

“Redistributable IBM MQ clients” on page 29
An IBM MQ redistributable client is a collection of runtime files that are provided in a `.zip` or `.tar` file that can be redistributed to third parties under redistributable license terms. This provides a simple way of distributing applications and the runtime files that they require in a single package.

Windows .NET application runtime - Windows only

Considerations when using the .NET application.

The runtime DLL files laid down in the *redistributable* images on Windows for .NET applications are normally registered with the global assembly cache (GAC) by a user with system administrator privileges, when installing the primary installation. However, this severely limits the benefits of redistribution.

The *redistributable* package on the Windows platform does not provide any tooling to register DLLs with the GAC, so .NET applications have to locate the appropriate assemblies by other means. There are two options that work in this situation.

Probing

After checking the GAC, the .NET runtime attempts to locate required assemblies through probing. The first location checked is the application base, which is the root location where the application is being run. See the information on *How the Runtime Locates Assemblies* on the Microsoft Web site for more information.

Note that when using this approach, the maintenance level of the assemblies used when building the .NET application must match those used at runtime - for example an application built at IBM MQ 8.0.0 Fix Pack 4 must be run with the IBM MQ 8.0.0 Fix Pack 4 redistributable client runtime.

Using this approach, a .NET application placed in the `\bin` directory alongside the IBM MQ assemblies picks up assemblies from a primary IBM MQ installation (if one exists), falling back to the redistributable copies.

1. Compile the .NET application under a full IBM MQ installation, that is `csc \t:exe \r:System.dll \r:amqmdnet.dll \lib: \out:nmqwrld.exe nmqwrld.cs`.
2. Copy the `exe` file in the redistributable client `.zip` file into the `\bin` directory.

DEVPATH environment variable

An alternative, that allows your application to be built, distributed, extracted and run as previously, is to use DEVPATH to locate the required assemblies. Unlike with the probing approach, this option overrides any matching assemblies from the GAC. However it is for this reason that Microsoft discourages its use in a production environment.

This approach can be effective where there is a possibility that a full IBM MQ installation is installed on the client. However, there is a good reason to always use the redistributable assemblies.

1. Compile the .NET application under a full IBM MQ installation, that is `csc \t:exe \r:System.dll \r:amqmdnet.dll \lib: \out:nmqwrld.exe nmqwrld.cs`)
2. Copy the `.exe` file into, or alongside, the redistributable client `.zip` file.
3. In the same directory as the `.exe` file, create an application configuration file with the name of the `.exe` file suffixed by `.config`, that is `nmqwrld.exe.config` with the following contents:

```
<configuration>
    <runtime>
      <developmentMode  developerInstallation="true" />
    </runtime>
</configuration>
```

4. Call **`setmqenv -s`** and set the *DEVPATH* environment variable to specify the `\bin` directory from the redistributable image before running the application, that is:

```
set DEVPATH=%MQ_INSTALLATION_PATH%\bin
```

Starting and stopping trace for the .NET redistributable managed client

There are several different ways to enable trace for IBM MQ .NET applications. For more information, see Tracing IBM MQ .NET applications.

You normally need to use the trace facility only at the request of IBM Support.

More information on .NET

For more information on .NET, see Writing and deploying IBM MQ .NET programs.

Related concepts

“Redistributable IBM MQ clients” on page 29
An IBM MQ redistributable client is a collection of runtime files that are provided in a `.zip` or `.tar` file that can be redistributed to third parties under redistributable license terms. This provides a simple way of distributing applications and the runtime files that they require in a single package.

Multi MQ Adv. Installing IBM MQ Advanced for Multiplatforms

Installation tasks associated with IBM MQ Advanced for Multiplatforms are grouped in this section.

About this task

IBM MQ Advanced is a single license entitlement that, in addition to IBM MQ itself, provides entitlement to:

- Advanced Message Security
- Managed File Transfer
- IBM MQ Telemetry

- Linux Replicated data queue managers (RDQM)

For more information, see IBM MQ license information.

Procedure

- “Installing and uninstalling AMS on Multiplatforms” on page 233.
- “Installing Managed File Transfer ” on page 239.
- “Installing IBM MQ Telemetry” on page 247.
- Linux “Installing RDQM (replicated data queue managers)” on page 253.

Related tasks

“Installing IBM MQ Advanced for z/OS” on page 278
Installation of IBM MQ Advanced for z/OS consists of installation of the Managed File Transfer (MFT) feature and the Connector Pack component. The Advanced Message Security (AMS) feature does not require installation. You can choose to just install the MFT feature, just the Connector Pack component, or both.

“Installing IBM MQ Advanced for z/OS Value Unit Edition” on page 279
IBM MQ Advanced for z/OS Value Unit Edition (VUE) is a bundling of the IBM MQ for z/OS VUE and IBM MQ Advanced for z/OS products.

Related reference

DISPLAYQMGR ADVCAP
MQCMD_INQUIRE_Q_MGR MQIA_ADVANCED_CAPABILITY

Multi Installing and uninstalling AMS on Multiplatforms

Installation and uninstallation, by platform, for Advanced Message Security (AMS) on Multiplatforms.

About this task

Advanced Message Security is a separately installed component of IBM MQ and is another option on the IBM MQ installer. Make sure that you purchase a license for using IBM MQ Advanced before the installation (see IBM MQ license information).

Procedure

- “Installing AMS on Multiplatforms” on page 233
- “Uninstalling AMS on Multiplatforms” on page 237

Multi *Installing AMS on Multiplatforms*

Use the information for your platform to guide you through installing the Advanced Message Security (AMS) component.

Before you begin

Make sure the following IBM MQ components are installed in your environment:

- MQSeriesRuntime
- MQSeriesServer

About this task

For information about installing Advanced Message Security follow the guidance for the appropriate platform.

Procedure

- “Installing Advanced Message Security on AIX” on page 234
- “Installing Advanced Message Security on IBM i” on page 234
- “Installing Advanced Message Security on Linux” on page 235
- “Installing AMS on Windows using the Launchpad” on page 236

Installing Advanced Message Security on AIX
You can install Advanced Message Security component on AIX platforms using either system management interface tool (SMIT) or the command line.

Installing using SMIT

Procedure

1. Log on as root.
2. Change the directory to the location of the installation packages.
3. Start the system management interface tool (SMIT).
   The system management menu is displayed.
4. Select the required SMIT window using the following sequence:

   ```
   Software Installation and Maintenance
   Install and Update Software
   Install Software
   ```

5. Enter the directory location of the installation package.
6. Press F4 to list the software in the **SOFTWARE name** option.
7. Select the `mqm.ams.rte` and press Enter.
8. Accept the default setting for the remaining options and press Enter.

Results
Advanced Message Security has been installed successfully.

Installing using command line

Procedure

1. Log on as root.
2. Set your current directory to the location of the installation file. The location might be a network location, or a local file system directory.
3. Run the following command:

   ```
   installp -a -c -Y -d. mqm.ams.rte
   ```

   Note the period, signifying the current directory, following the **-d** parameter.

Results
Advanced Message Security component has been installed successfully.

IBM i *Installing Advanced Message Security on IBM i*
You can install Advanced Message Security component on IBM i.

Procedure

Install AMS using the command:

```
RSTLICPGM LICPGM(5724H72) DEV(installation device) OPTION(2) OUTPUT(*PRINT)
```

where the parameters of **RSTLICPGM** are:

LICPGM(5724H72)
The product identifier for IBM MQ for IBM i.

DEV(installation device)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION(2)
Install Advanced Message Security for IBM i

OUTPUT(*PRINT)
The output is printed with the spooled output of the job.

Results

The AMS component has been installed successfully.

Once AMS is installed on an IBM MQ server installation, any:

- Queue managers that are subsequently started enable security policy management features.
- Applications that connect to the queue manager enable interceptors.

What to do next

See Setting up certificates and the keystore configuration file on IBM i for details on setting up your security policy.

Linux *Installing Advanced Message Security on Linux*

You can install Advanced Message Security on Linux platforms.

Procedure

1. Log on as root.
2. Set your current directory to the location of the installation file. The location might be a network share, or a local file system directory.
3. Optional: If this installation is not the first installation on the system, run the **crtmqpkg** command to create a unique set of packages to install on the system.

   Before you can run the **crtmqpkg** command on Linux, you must have the **pax** and **rpmbuild** commands installed. These commands are not supplied as part of the product. You must get them from your Linux distribution supplier. The **rpmbuild** command is located in the **rpm-build** package.

   a) Enter the following command:

   ```
   ./crtmqpkg suffix
   ```

   where *suffix* is a name of your choosing, that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

   Note: This command creates a full copy of the installation packages in a subdirectory of `/var/tmp`. You must ensure that the system has enough space before running the command.

   b) Set your current directory to the location specified when the **crtmqpkg** command completes.

   This directory is a subdirectory of `/var/tmp/mq_rpms`, in which the unique set of packages is created. The packages have the *suffix* value contained within the filename. For example, using a suffix of "1":

   ```
   ./crtmqpkg 1
   ```

there is a subdirectory named `/var/tmp/mq_rpms/1/i386` and the packages are renamed, for example:

```
From: MQSeriesAMS-V.R.M-F.i386.rpm
To: MQSeriesAMS_1-V.R.M-F.i386.rpm
```

where:

V
Represents the version of the product that you are installing

R
Represents the release of the product that you are installing

M
Represents the modification of the product that you are installing

F
Represents the fix pack level of the product that you are installing

4. In the command line, issue the following command:

   This example shows a minimum installation:

   ```
   rpm -iv package_name
   ```

   where *package_name* is one of the following:

   - MQSeriesAMS-V.R.M-F.i386.rpm
   - MQSeriesAMS-V.R.M-F.x86_64.rpm
   - MQSeriesAMS-V.R.M-F.ppc.rpm
   - MQSeriesAMS-V.R.M-F.s390.rpm

Results

Advanced Message Security has been installed successfully.

Windows *Installing AMS on Windows using the Launchpad*

Access the IBM MQ installation image. Run the Launchpad. Follow the instructions on screen to install the Advanced Message Security component (AMS) on Windows.

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.

2. Locate `Setup.exe` in the base directory of the IBM MQ installation image.

   - From a network location, this location might be *m:*`\`*instmqs*`\Setup.exe`
   - From a local file system directory, this location might be *C:*`\`*instmqs*`\Setup.exe`

3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.

4. Follow the instructions on screen.

Multi *Uninstalling AMS on Multiplatforms*

Use the information for your platform to uninstall the Advanced Message Security (AMS) component.

Procedure

- "Uninstalling AMS on AIX" on page 237
- "Uninstalling AMS on Linux" on page 238
- "Uninstalling AMS on Windows" on page 239

Related tasks

"Installing AMS on Multiplatforms" on page 233
Use the information for your platform to guide you through installing the Advanced Message Security (AMS) component.

AIX *Uninstalling AMS on AIX*

On AIX platforms, you can remove Advanced Message Security component either using SMIT or the command line.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling.
2. For a server installation, end any IBM MQ activity associated with the installation you are uninstalling:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall. Enter the following command:

   ```
   . MQ_INSTALLATION_PATH/bin/setmqenv
   ```

   where `. MQ_INSTALLATION_PATH` refers to the location where IBM MQ is installed.
   c) Display the state of all queue managers on the system. Enter the following command:

   ```
   dspmq -o installation
   ```

   d) Stop all running queue managers associated with the installation you want to uninstall. Enter the following command for each queue manager:

   ```
   endmqm QMgrName
   ```

   e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

   ```
   endmqlsr -m QMgrName
   ```

3. Log in as root.
4. Uninstall AMS component using either **installp** or **smit**. If AMS component was installed in a non-default location, you must use **installp** to uninstall.
   - Uninstall using **installp** by entering one of the following commands:
     – For an installation in the default location `/usr/mqm`

     ```
     installp -u mqm.ams.rte
     ```

     – For an installation in a non-default location:

     ```
     installp -R
     usil -u mqm.ams.rte
     ```

     where *usil* is the path of the User Specified Installation Location (USIL) specified when the product was installed.

- Uninstall using **smit**:
  a. Select the required **smit** window using the following sequence:

```
Software Installation and Maintenance
Software Maintenance and Utilities
Remove Installed Software
```

  b. List the software in the **SOFTWARE name** field:
    i) Enter .
    ii) Press **F4**
  c. Select the file sets to uninstall from the list (those beginning with mqm), and press **Enter**. There is an option at this stage to do a preview. Leave the option set to the default value of **Yes** to preview the file sets you are uninstalling, or select **No** to not preview these file sets.
  d. Press **Enter** on the **Remove Installed Software** panel, it asks whether you are sure, press **Enter**.

Results

The Advanced Message Security component has been uninstalled.

Linux *Uninstalling AMS on Linux*

Use the `rpm` command to remove Advanced Message Security component on Linux platforms.

Procedure

1. Stop all IBM MQ applications associated with the installation you are uninstalling.
2. For a server installation, end any IBM MQ activity associated with the installation you are uninstalling:
   a) Log in as a user in the group `mqm`.
   b) Set up your environment to work with the installation you want to uninstall. Enter the following command:

```
. MQ_INSTALLATION_PATH/bin/setmqenv
```

   where `. MQ_INSTALLATION_PATH` refers to the location where IBM MQ is installed.
   c) Display the state of all queue managers on the system. Enter the following command:

```
dspmq -o installation
```

   d) Stop all running queue managers associated with the installation you want to uninstall. Enter the following command for each queue manager:

```
endmqm QMgrName
```

   e) Stop any listeners associated with the queue managers. Enter the following command for each queue manager:

```
endmqlsr -m QMgrName
```

3. Log in as root.
4. Run the following command:

```
rpm -e package_name
```

   where *package_name* is MQSeriesAMS-*V.R.M-F*

   V
   Represents the version of the product that you are uninstalling

   R
   Represents the release of the product that you are uninstalling

M
Represents the modification of the product that you are uninstalling

F
Represents the fix pack level of the product that you are uninstalling

Results

The Advanced Message Security component has been uninstalled.

Windows *Uninstalling AMS on Windows*

You can uninstall Advanced Message Security component using the GUI uninstallation wizard, or a command-line interface.

Using the installation wizard

Procedure

1. Download the compressed file that contains the installation image, then uncompress it into a temporary directory.
2. Navigate to that directory, then double-click `setup.exe` to start the installation process.
   The IBM MQ Installation Launchpad window is displayed.
3. Click the **IBM MQ Installation**.
4. Click **Launch IBM MQ Installer**. Click **Next** until the IBM MQ Program Maintenance panel is displayed with a welcome message.
   If this panel is not displayed, IBM WebSphere MQ for Windows 7.5 is not installed on this machine. When presented with the option, select to remove/maintain or upgrade.
5. Select **Maintain or upgrade an existing instance**, then click **Next**.
6. If there are any existing queue managers, the Removing Server feature panel is displayed.
   Click one of the following options, then click **Next**:
   - **Keep** - keep existing queue managers and their objects.
   - **Remove** - remove existing queue managers and their objects.

   The Program Maintenance panel is displayed, with a summary of the installation to be removed.
7. Click **Modify** and click **Next**.
8. On the list of available IBM MQ features, click Advanced Message Security, select **Do not install this feature (remove if already intalled)**, and click **Next**.
   The Ready to modify IBM MQ panel appears with the summary of your changes.
9. Click **Modify** and **Next** on the following panel to continue.

Results

Selected features of Advanced Message Security component have been removed.

MQ Adv. Installing Managed File Transfer

Managed File Transfer is installed as a component of IBM MQ on AIX, Linux, and Windows, and on z/OS. Managed File Transfer remains as a separate product on IBM i.

Before you begin

Before you install Managed File Transfer, check that your system meets both the hardware and software requirements of the product. See System Requirements for IBM MQ.

For all platforms, you must have one IBM MQ queue manager available in your Managed File Transfer network to use as the coordination queue manager.

Note: If you are migrating or upgrading an existing IBM MQ installation, you must update database logger instances before other parts of the Managed File Transfer network so that these instances can correctly process the latest versions of the transfer log messages that they receive.

The following steps describe installing Managed File Transfer as a component of IBM MQ on AIX, Linux, and Windows. z/OS For IBM MQ for z/OS, see "Installing IBM MQ Advanced for z/OS" on page 278. IBM i For IBM MQ for IBM i, see "Installing Managed File Transfer on IBM i" on page 74.

Procedure

1. Decide which Managed File Transfer components to install.

   Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. These options are Managed File Transfer Agent, Managed File Transfer Service, Managed File Transfer Logger, or Managed File Transfer Tools.

   To decide which components to install, review the product options and topology information in the following topics:

   - Managed File Transfer product options
   - Managed File Transfer topology overview
2. Install IBM MQ, including Managed File Transfer components.

   For information about which specific components to install for your platform, including Managed File Transfer, see "IBM MQ components and features" on page 6.

   For more information about installing IBM MQ on AIX, Linux, and Windows, see the appropriate information for your platform:

   - AIX "Installing and uninstalling IBM MQ on AIX" on page 34
   - Linux "Installing and uninstalling IBM MQ on Linux" on page 94
   - Windows "Installing and uninstalling IBM MQ on Windows" on page 156

Related concepts

Managed File Transfer

Managed File Transfer topology overview

Related reference

"Installed MFT command sets" on page 243

The following table shows which Managed File Transfer commands are installed with each component.

ALW *Managed File Transfer product options*

Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. These options are Managed File Transfer Agent, Managed File Transfer Service, Managed File Transfer Logger, or Managed File Transfer Tools.

Managed File Transfer Agent

A file transfer agent connects to an IBM MQ queue manager, and transfers file data, as messages, to other file transfer agents.

You install an agent through either the Managed File Transfer Agent or Managed File Transfer Service installation options.

The Managed File Transfer Agent option installs an agent that has the following capabilities:

- Make client or bindings mode connections to queue managers.

  Note: When the file transfer agent and queue manager are on the same system, consider using the bindings mode connections.

- Transfer files to and from other Managed File Transfer agents.
- Transfer files to and from Connect:Direct® nodes.

The Managed File Transfer Service option, described in the next section, installs a file transfer agent that also has additional capability to transfer files to and from legacy FTP, FTPS, or SFTP protocol servers.

Managed File Transfer Service

The Managed File Transfer Service option installs an agent that has the following capabilities:

- Make client or bindings mode connections to queue managers.

  Note: When the file transfer agent and queue manager are on the same system, consider using the bindings mode connections.
- Transfer files to and from other Managed File Transfer agents.
- Transfer files to and from Connect:Direct nodes.
- Create protocol bridge agents that transfer files to and from legacy SFTP, FTP, or FTPS protocol servers.

Some capabilities are available on only a subset of supported platforms. For more information, see IBM MQ System Requirements.

A Managed File Transfer Service can only be installed on systems where the IBM MQ Server option is already installed.

Managed File Transfer Logger

A file transfer logger connects to an MQ queue manager, often the queue manager that is designated as the coordination queue manager, and logs audit-related file transfer data to either a database or a file. A logger can only be installed on systems where the IBM MQ Server installation option is already installed.

Managed File Transfer Tools

The Managed File Transfer Tools are command line tools that you use to interact with file transfer agents. The tools allow you to start file transfers, schedule file transfers and create resource monitors from the command line. The Managed File Transfer Tools need not be installed on the same system as the file transfer agents that they interact with.

Managed File Transfer Base

On AIX and Linux platforms, there is an additional Managed File Transfer Base installation component. This component contains files common to all of the installation options. You must install the Managed File Transfer Base component before installing any of the Agent, Logger, Service, or Tools components.

For more information about the IBM MQ components that are required for each product option on AIX and Linux platforms, see the following topics:

- AIX "Required MFT components on AIX" on page 241
- Linux "Required MFT components on Linux" on page 242

Related concepts

Managed File Transfer introduction

Managed File Transfer topology overview

AIX *Required MFT components on AIX*

Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. On AIX systems, these options are Managed File Transfer Agent, Managed File Transfer

Logger, Managed File Transfer Service, and Managed File Transfer Tools, and each option requires specific components.

Managed File Transfer Agent

mqm.base.runtime

mqm.java.rte

mqm.jre.rte

mqm.ft.base

mqm.ft.agent

Managed File Transfer Logger

mqm.base.runtime

mqm.server.rte

mqm.java.rte

mqm.jre.rte

mqm.ft.base

mqm.ft.logger

Managed File Transfer Service

mqm.base.runtime

mqm.server.rte

mqm.java.rte

mqm.jre.rte

mqm.ft.base

mqm.ft.agent

mqm.ft.service

Managed File Transfer Tools

mqm.base.runtime

mqm.java.rte

mqm.jre.rte

mqm.ft.base

mqm.ft.tools

Linux *Required MFT components on Linux*

Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. On Linux systems, these options are Managed File Transfer Agent, Managed File Transfer Logger, Managed File Transfer Service, and Managed File Transfer Tools, and each option requires specific components.

Managed File Transfer Agent

MQSeriesRuntime

MQSeriesJava

MQSeriesJRE

MQSeriesFTBase

MQSeriesFTAgent

Managed File Transfer Logger

MQSeriesRuntime

MQSeriesServer

MQSeriesJava

MQSeriesJRE

MQSeriesFTBase

MQSeriesFTLogger

Managed File Transfer Service

MQSeriesRuntime

MQSeriesServer

MQSeriesJava

MQSeriesJRE

MQSeriesFTBase

MQSeriesFTAgent

MQSeriesFTService

Managed File Transfer Tools

MQSeriesRuntime

MQSeriesJava

MQSeriesJRE

MQSeriesFTBase

MQSeriesFTTools

Installed MFT command sets

The following table shows which Managed File Transfer commands are installed with each component.

Table 35. Managed File Transfer commands available in each command set

Command	Agent command set	Service command set	Tools command set	Logger command set	Redistributable Managed File Transfer package set
fteAnt			✓		✓
fteBundleConfiguration			✓ (AIX, Linux, and Windows only)		✓
fteCancelTransfer			✓		✓
fteChangeDefaultConfigurationOptions	✓	✓	✓	✓	✓

Table 35. Managed File Transfer commands available in each command set (continued)

Command	Agent command set	Service command set	Tools command set	Logger command set	Redistributable Managed File Transfer package set
fteCleanAgent	✓	✓			✓
fteCreateAgent	✓	✓			✓
fteCreateBridgeAgent		✓			✓
fteCreateCDAgent	✓ (AIX, Linux, and Windows only)	✓ (AIX, Linux, and Windows only)			
fteCreateEnvironment					✓
fteCreateLogger				✓	✓ "1" on page 245
fteCreateMonitor			✓		✓
fteCreateTemplate			✓		✓
fteCreateTransfer			✓		✓
fteDefine			✓ (AIX, Linux, and Windows only)		✓
fteDelete			✓ (AIX, Linux, and Windows only)		✓
fteDeleteAgent	✓	✓			✓
fteDeleteLogger				✓	✓ "1" on page 245
fteDeleteMonitor			✓		✓
fteDeleteScheduledTransfer			✓		✓
fteDeleteTemplates			✓		✓
fteDisplayVersion	✓	✓		✓	✓
fteListAgents	✓	✓	✓	✓	✓
fteListMonitors			✓		✓
fteListScheduledTransfers			✓		✓
fteListTemplates			✓		✓
fteModifyAgent	✓ (Windows only)	✓ (Windows only)			✓
fteModifyLogger				✓ (Windows only)	✓ "1" on page 245
fteObfuscate	✓	✓		✓	✓
ftePingAgent			✓		✓
fteRAS		✓			✓

Table 35. Managed File Transfer commands available in each command set (continued)					
Command	**Agent command set**	**Service command set**	**Tools command set**	**Logger command set**	**Redistributable Managed File Transfer package set**
fteSetAgentLogLevel	✓				✓
fteSetAgentTraceLevel	✓	✓			✓
fteSetLoggerTraceLevel				✓	✓ "1" on page 245
fteSetupCommands	✓	✓	✓	✓	✓
fteSetupCoordination	✓	✓	✓	✓	✓
fteShowAgentDetails	✓	✓	✓	✓	✓
fteShowLoggerDetails				✓	✓ "1" on page 245
fteStartAgent	✓	✓			✓
fteStartLogger				✓	✓ "1" on page 245
fteStopAgent	✓	✓			✓
fteStopLogger				✓	✓ "1" on page 245

Notes:

1. From IBM MQ 9.3.0, the Redistributable Managed File Transfer package also includes the Redistributable Managed File Transfer Logger. For more information, see Downloading and configuring Redistributable Managed File Transfer components.

Verifying an MFT installation

You can verify a Managed File Transfer installation from the command line. In this case, the agent process stops when you log off from the system.

Before you begin

- Follow the steps and complete the process in Installing Managed File Transfer.
- Ensure that it is an active IBM MQ infrastructure.

About this task

Use this task to verify whether your MFT is correctly installed alongside IBM MQ.

The following steps help you to create a queue manager for testing and verifying your MFT installation with agents. The same queue manager is used as the coordination queue manager and as the command queue manager. You create two sample agents, associated with the queue managers, and ping these agents for transfers.

Procedure

1. Log in as the Managed File Transfer administrator.
2. Set up your environment-specific variables by entering the following command, where `MQ_INSTALLATION_PATH` is the location of the installed IBM MQ:

```
.MQ_INSTALLATION_PATH/bin/setmqenv -s
```

3. Check that the environment is set up correctly by entering the **dspmqver** command.

   If the command is successful, and the expected version number and installation name are returned, the environment is set up correctly.

4. Use the **fteDisplayVersion** command to display the version of the installed Managed File Transfer.

   ```
   fteDisplayVersion -v
   ```

   For more information, see **fteDisplayVersion**.

5. Create a queue manager called MFTQM by using the **crtmqm** command.

   The messages indicate when the queue manager and the default objects are created.

   ```
   crtmqm MFTQM
   ```

   For more information, see **crtmqm**.

6. Start the queue manager by using the **strmqm** command.

   ```
   strmqm MFTQM
   ```

   For more information, see **strmqm**.

7. Use the **fteSetupCoordination** command to set up the coordination queue manager and the configuration directory structure.

   ```
   fteSetupCoordination -coordinationQMgr MFTQM
   ```

   - The coordination queue manager directory command is **MQ_DATA_PATH\mqft\config\MFTQM**.
   - The coordination properties file path is `MQ_DATA_PATH\mqft\config\MFTQM\coordination.properties`.

   The command also produces an MQSC command file that you must run against your coordination queue manager, by using the file path `MQ_DATA_PATH\mqft\config\MFTQM\MFTQM.mqsc`.

8. Run the MQSC file that you created by using the **runmqsc** command.

   ```
   runmqsc MFTQM < MQ_DATA_PATH\mqft\config\MFTQM\MFTQM.mqsc
   ```

   For more information, see runmqsc (run MQSC commands).

9. Use the **fteSetupCommands** command to set the command queue manager and to set up the command directory structure.

   ```
   fteSetupCommands -connectionQMgr MFTQM
   ```

   After this setup is done, you will receive the following message:

   ```
   BFGCL0245I: The file MQ_DATA_PATH\mqft\config\MFT4\command.properties has been created
   successfully
   ```

10. Define an agent to test out the MFT configuration, by using the following set of commands.

    a) Create an agent by using the **fteCreateAgent** command.

    ```
    fteCreateAgent -p MFTQM -agentQMgr MFTQM -agentName SOURCE_AGENT
    ```

    b) After you create the agent that is called SOURCE_AGENT, an agent directory and a subdirectory for the agent are added to the MFTQM directory. For more information, see **fteCreateAgent**.

    c) Run the MQSC file that you created by using the **runmqsc** command.

    ```
    runmqsc MFTQM < MQ_DATA_PATH/mqft/config/MFTQM/agents/SOURCE_AGENT/
    SOURCE_AGENT_create.mqsc
    ```

    d) Start the agent by using the **fteStartAgent** command.

```
fteStartAgent -p MFTQM SOURCE_AGENT
```

11. After successfully creating the agent, do the ping test by using the **ftePingAgent SOURCE_AGENT** command.

    If the agent is set up correctly, the following messages are displayed:

    - `BFGCL0212I: Issuing ping request to agent SOURCE_AGENT`
    - `BFGCL0793I: Agent SOURCE_AGENT running on host responded to ping`

12. Use steps 10 and 11 to create a second agent called DEST_AGENT and verify this agent by using the following command:

    ```
    fteCreateTransfer -p MFTQM -sa SOURCE_AGENT -sm MFTQM -da DEST_AGENT -dm MFTQM -df /PATH/TO/
    DESTINATION_FILE -de overwrite  /PATH/TO/SOURCE_FILE
    ```

    Now, you can initiate transfers between the two agents. Use this second agent as a destination agent to transfer a file.

    Note: Before you initiate the transfer, verify whether the source file exists and the destination directory is writable. In addition, check that you have set the right permissions for the user.

    The test is successful and the transfer takes place on the same machine. For additional information on the creating transfer, see fteCreateTransfer (start a new file transfer).

13. After a successful test, stop and delete these agents.

    a. Stop the agent SOURCE_AGENT by using the following command:

    ```
    fteStopAgent -m MFTQM SOURCE_AGENT
    ```

    b. Stop the agent DEST_AGENT by using the following command:

    ```
    fteStopAgent -m MFTQM DEST_AGENT
    ```

    For more information, see fteStopAgent.

14. After stopping the agents, you can now delete them.

    a. To delete the agent SOURCE_AGENT, use the following command:

    ```
    fteDeleteAgent -m MFTQM SOURCE_AGENT
    ```

    b. To delete the agent DEST_AGENT, use the following command:

    ```
    fteDeleteAgent -m MFTQM DEST_AGENT
    ```

    For more information, see fteDeleteAgent.

MQ Adv. ALW Installing IBM MQ Telemetry

Installation tasks associated with IBM MQ Telemetry are grouped in this section.

About this task

IBM MQ Telemetry is installed as part of the IBM MQ server installation.

IBM MQ Telemetry is a separately installed component of IBM MQ and is another option on the IBM MQ installer. Make sure that you purchase a license for using IBM MQ Advanced before the installation (see IBM MQ license information).

Procedure

- Install IBM MQ, including IBM MQ Telemetry.

  For information about which specific components to install for your platform, including IBM MQ Telemetry, see “IBM MQ components and features” on page 6.

For more information about installing IBM MQ on AIX, Linux, or Windows, see the appropriate information for your platform:

- AIX "Installing and uninstalling IBM MQ on AIX" on page 34
- Linux "Installing and uninstalling IBM MQ on Linux" on page 94
- Windows "Installing and uninstalling IBM MQ on Windows" on page 156

Installation considerations for IBM MQ Telemetry

IBM MQ Telemetry is a component of the main IBM MQ product. You can choose to install IBM MQ Telemetry when you first install IBM MQ, or when you modify an existing IBM MQ installation.

IBM MQ Telemetry overview

See Introduction to IBM MQ Telemetry for general details about IBM MQ Telemetry.

Support for IBM MQ Explorer

You can use IBM MQ Explorer to configure and manage the IBM MQ Telemetry runtime component. For a queue manager to accept connections from a telemetry device, one or more telemetry channels are needed. To enable MQTT, there is a `define sample configuration` wizard that can be run from IBM MQ Explorer. The wizard runs through a series of steps including defining and starting the telemetry (MQXR) service, setting up the default transmission queue, and configuring a telemetry channel. For more information about using the `define sample configuration` wizard, and any implications, see "Verifying the installation of IBM MQ Telemetry by using IBM MQ Explorer" on page 249.

The IBM MQ Explorer support provides the following capabilities:

- Telemetry node and content panel - providing welcome information, define sample configuration wizard, run MQTT client utility, Help on IBM MQ Telemetry, and status information about the IBM MQ Telemetry Service.
- Define sample configuration wizard - quickly configures a queue manager to support MQTT.
- New Telemetry Channel wizard - gathers information required to create a telemetry channel object.
- Telemetry Channels node and content panel - displays telemetry channels in the IBM MQ Explorer Content view.
- Telemetry Channel Status node and content panel - displays telemetry channel status in the IBM MQ Explorer Content view.
- MQTT Client Utility - provides a simple GUI for publishing and subscribing to topics.
- Help on IBM MQ Telemetry.

You can install the IBM MQ Telemetry runtime component on one system and configure and manage it using the IBM MQ Explorer installed on another system. However, the components can be installed only on systems with the appropriate prerequisites. For information about these prerequisites, see System Requirements for IBM MQ.

IBM MQ Telemetry client libraries and SDK

To help you write messaging applications for MQTT networks, you can install and use a set of free example MQTT clients from the Eclipse Paho downloads page.

Related concepts

IBM MQ Telemetry

Telemetry use cases

Related tasks

Administering IBM MQ Telemetry

Developing applications for IBM MQ Telemetry

Troubleshooting IBM MQ Telemetry problems

Related reference

IBM MQ Telemetry reference

Verifying the installation of IBM MQ Telemetry

There are three ways to verify the installation of IBM MQ Telemetry. Any can be used, regardless of whether IBM MQ Telemetry was installed as a custom installation of IBM MQ, or added to an existing installation of IBM MQ.

About this task

Within IBM MQ you can verify the installation of IBM MQ Telemetry either by using IBM MQ Explorer, or by using the command line.

You can also verify the installation by using the MQTT messaging client for JavaScript in a browser that supports the RFC 6455 (WebSocket) standard. A version of this client is installed with IBM MQ Telemetry, and the latest version is freely available from the Eclipse Paho downloads page. To verify the IBM MQ Telemetry installation you do not need the latest version of the client.

Procedure

- Verify your installation in one of the following ways:
  - By using IBM MQ Explorer as described in "Verifying the installation of IBM MQ Telemetry by using IBM MQ Explorer" on page 249.
  - By using the command line as described in "Verifying the installation of IBM MQ Telemetry using the command line" on page 251.

Verifying the installation of IBM MQ Telemetry by using IBM MQ Explorer

Use the Define sample configuration wizard and the MQTT client utility in IBM MQ Explorer to verify that the IBM MQ Telemetry components have installed. Also check that publish/subscribe works correctly.

Before you begin

The IBM MQ Telemetry runtime and support for IBM MQ Explorer must be installed. The telemetry folder is part of a queue manager. To view the telemetry folder, you must start a queue manager.

Before running the define sample configuration wizard on an existing queue manager, review the information provided by the wizard about the configuration changes that are made. The changes might have implications for the configuration of the existing queue manager. Alternatively, run the sample configuration wizard on a newly created queue manager to avoid changing any security settings.

About this task

To configure IBM MQ Telemetry there is a define sample configuration wizard that can be run from IBM MQ Explorer. The wizard runs through a series of steps, including defining and starting the telemetry (MQXR) service, setting up the default transmission queue, and configuring a telemetry channel.

If you would prefer to do this manually, see Configuring a queue manager for telemetry on Linux and AIX . For Windows, see Configuring a queue manager for telemetry on Windows .

You can open the define sample configuration wizard from the IBM MQ Telemetry Welcome page in IBM MQ Explorer. The wizard determines which steps are required based on the current configuration.

For example, the following actions might be specified by the wizard:

- Define the telemetry (MQXR) service.
- Start the telemetry (MQXR) service.
- Define the telemetry transmit queue.

- Set the default transmit queue of the queue manager to SYSTEM.MQTT.TRANSMIT.QUEUE.

If telemetry is already configured for this queue manager, the link to open the wizard is replaced with static text. The text confirms that the sample configuration has been set up.

After the configuration has finished, you can use IBM MQ Explorer to open the MQTT client utility. Use the MQTT client utility to verify that IBM MQ Telemetry is set up correctly.

The following items summarize the main goals that can be achieved using the MQTT client utility:

- Validation of a basic or custom IBM MQ Telemetry configuration by connecting, subscribing to topics and publishing messages.
- Showcases the main features of MQTT protocol.
- Provides a simple tool to aid in debugging IBM MQ Telemetry applications.

You can find additional information within the IBM MQ Explorer by using the **Help** menu or pressing the **F1** key.

Procedure

1. Start IBM MQ Explorer.

   On Windows and Linux systems, you can start IBM MQ Explorer by using the system menu, the `MQExplorer` executable file, the **`mqexplorer`** command, or the **`strmqcfg`** command.
2. Open the **Welcome to MQ Telemetry** page.
   - To use an existing queue manager, click on `IBM MQ\Queue Managers\`*`qMgrName`*`\Telemetry` folder to open the **Welcome to MQ Telemetry** page.
   - If, for the reasons mentioned, you decide to use a new queue manager,
     a. Click **Queue Managers** > **New** > **Queue Manager**.
     b. Type `MQTTVerification` as the **Queue manager name** > **Next** > **Next** > **Next**.
     c. Change the default port in **Listen on port number**, if the port is in use > **Finish**.
     d. When the queue manager starts, click on `IBM MQ\Queue Managers\MQTTVerification\Telemetry` folder to open the **Welcome to MQ Telemetry** page.
3. From the **Welcome to MQ Telemetry** page in IBM MQ Explorer, click **Define sample configuration**.

   If this link is not present, and instead you see the text, "The sample configuration has been set up for this queue manager", then telemetry has already been configured. Proceed to step “6” on page 250.

   If you clicked **Define sample configuration**, the page opens, and lists actions that are to be performed as part of the sample configuration.
4. Leave **Launch MQTT client utility** checked, if you want to automatically start the MQTT client utility. The check box is selected by default.
5. Click **Finish**.
6. Click **Connect**.

   In the MQTT client utility panel, ensure that the host and port names are correct.

   If you did not automatically start the MQTT client utility panel in step 4, you can start it either by using a direct link from the **Welcome to MQ Telemetry** panel, or by right-clicking a NON-TLS channel, which allows you to control the channel it runs on.

   The client history records a `Connected` event.
7. Click **Subscribe**.

   The client history records a `Subscribed` event.
8. Click **Publish**.

   The client history records a `Published` and `Received` event.

Results

If the publish/subscribe finishes successfully, the IBM MQ Telemetry installation is verified.

If you encounter problems during the installation process, view the error log:

- On Windows, the default location for this log is, *IBM MQ data directory*\qmgrs*qMgrName*\mqxr
- On AIX and Linux, the default location for this log is, /var/mqm/qmgrs/*qMgrName*/mqxr/

Verifying the installation of IBM MQ Telemetry using the command line
Follow these instructions to run scripts and a sample application to verify that the IBM MQ Telemetry components have installed, and are able to publish and subscribe.

Before you begin

Note:

This task uses the mqttv3app sample Java application, and the associated Java client library. These resources were previously available in the IBM Messaging Telemetry Clients SupportPac, and the detailed instructions in this task assume that you have a copy of this SupportPac.

The IBM Messaging Telemetry Clients SupportPac is no longer available. Free downloads of the latest telemetry clients and samples, for a range of programming languages, continue to be available from the Eclipse Paho project, and from MQTT.org.

The telemetry (MQXR) service must be started to run the sample programs. The user ID must be a member of the mqm group.

The SampleMQM script creates and uses a queue manager called MQXR_SAMPLE_QM. Therefore, do not run unaltered on a system that already has a MQXR_SAMPLE_QM queue manager. Any changes made might have implications for the configuration of the existing queue manager.

There are two commands to run the mqttv3app sample Java application. The first command creates a subscription, then waits for a message. The second command publishes to that subscription. Therefore the commands must be entered into different command lines or shell windows.

About this task

To perform verification on a server or device without a GUI, scripts are provided in the samples directory. The SampleMQM script performs the required steps to configure IBM MQ Telemetry. The mqttv3app sample Java application can then be run to validate the basic or custom IBM MQ Telemetry configuration by connecting, subscribing to topics, and publishing messages. The CleanupMQM sample script can be run to delete the queue manager created by the SampleMQM script.

The following items summarize the main goals that can be achieved using this verification procedure:

- Validate a basic or custom IBM MQ Telemetry configuration by connecting, subscribing to topics and publishing messages.
- Showcase the main features of the MQTT protocol.
- Provide a simple tool to aid in debugging IBM MQ Telemetry applications.

Procedure

1. Decompress the IBM Messaging Telemetry Clients SupportPac into a directory of your own choosing.

   This task uses the mqttv3app sample Java application, and the associated mqttv3 Java client library. If you have the earlier (MA9B) version of the SupportPac, the sample applications and client libraries are in the *CLIENTPACKDIR*/SDK/clients/java directory, where *CLIENTPACKDIR* is the directory in which you decompressed the client pack.

   Note: The later (MA9C) version of the IBM Messaging Telemetry Clients SupportPac does not have the /SDK/ directory, and does not include a compiled copy of the mqttv3app sample application. If you have this version of the SupportPac, you need to compile the application manually, then create

the /SDK/ directory and contents. For the latest information about available clients and samples, see MQTT sample programs.

2. Configure IBM MQ Telemetry.

   The SampleMQM script runs through a series of steps, including creating the MQXR_SAMPLE_QM queue manager, defining and starting the telemetry (MQXR) service, setting up the default transmission queue, and configuring a telemetry channel.

   For information about performing this manually, see Configuring a queue manager for telemetry on Linux and AIX , or Configuring a queue manager for telemetry on Windows .

   - On Windows systems, enter the following command in a command line:

     ```
     MQINSTDIR\mqxr\samples\SampleMQM.bat
     ```

   - On AIX or Linux systems, enter the following command in a shell window:

     ```
     MQINSTDIR/mqxr/samples/SampleMQM.sh
     ```

   where *MQINSTDIR* is the installation directory for this installation of IBM MQ.

   A queue manager called MQXR_SAMPLE_QM is created, and IBM MQ Telemetry is configured.

3. Run the mqttv3app sample Java application to create a subscription.

   - On Windows systems, enter the following commands in a command line:

     ```
     java -cp
     "CLIENTPACKDIR\SDK\clients\java\org.eclipse.paho.sample.mqttv3app.jar;
     CLIENTPACKDIR\SDK\clients\java\org.eclipse.paho.client.mqttv3.jar"
     org.eclipse.paho.sample.mqttv3app.Sample -a subscribe
     ```

   - On AIX or Linux systems, enter the following commands in a shell window:

     ```
     java -cp
     CLIENTPACKDIR/SDK/clients/java/org.eclipse.paho.sample.mqttv3app.jar:
     CLIENTPACKDIR/SDK/clients/java/org.eclipse.paho.client.mqttv3.jar
     org.eclipse.paho.sample.mqttv3app.Sample -a subscribe
     ```

   The subscription is created, and waits to receive a message.

4. Run the mqttv3app sample Java application to publish to the subscription.

   - On Windows systems, enter the following command in a second command line:

     ```
     java -cp
     "CLIENTPACKDIR\SDK\clients\java\org.eclipse.paho.sample.mqttv3app.jar;
     CLIENTPACKDIR\SDK\clients\java\org.eclipse.paho.client.mqttv3.jar"
     org.eclipse.paho.sample.mqttv3app.Sample -m "Hello from an MQTT v3 application"
     ```

   - On AIX or Linux systems, enter the following command in a second shell window:

     ```
     java -cp
     CLIENTPACKDIR/SDK/clients/java/org.eclipse.paho.sample.mqttv3app.jar:
     CLIENTPACKDIR/SDK/clients/java/org.eclipse.paho.client.mqttv3.jar
     org.eclipse.paho.sample.mqttv3app.Sample -m "Hello from an MQTT v3 application"
     ```

   The message Hello from an MQTT v3 application, that you typed into the second command line or shell window, is published by that application and received by the application in the first window. The application in the first window shows it on the screen.

5. Press **Enter** in the first command line or shell window to end the subscribing application.

6. Remove the queue manager created by the SampleMQM script.

   - On Windows systems, enter the following command in a command line:

     ```
     MQINSTDIR\mqxr\samples\CleanupMQM.bat
     ```

- On AIX or Linux systems, enter the following command in a shell window:

```
MQINSTDIR/mqxr/samples/CleanupMQM.sh
```

Results

If the scripts finished, and messages can be sent and received, the IBM MQ Telemetry installation is verified.

What to do next

If you encounter any problems during the verification process, see IBM MQ Telemetry troubleshooting. You can also view the error log:

- On Windows systems, the default location for the queue manager log is *MQINSTDIR*\qmgrs\MQXR_SAMPLE_QM\mqxr
- On AIX and Linux systems, the default location for the queue manager log is /var/mqm/qmgrs/MQXR_SAMPLE_QM/mqxr/

Linux MQ Adv. Installing RDQM (replicated data queue managers)

Installation tasks associated with RDQM are grouped in this section. RDQM is available on x86-64 for RHEL 8 (8.8 or later) and RHEL 9 (9.2 or later).

Before you begin

RDQM requires that the mqm user has the same UID on each node and that the mqm group has the same GID on each node. You should create the mqm IDs before running the installation procedure, using the **groupadd** and **useradd** commands to set the UID and GID the same on each node. See "Setting up the user and group on Linux" on page 99.

Pacemaker is one of the prerequisites for RDQM. Pacemaker requires that certain Linux packages are installed on the system. The list for supported levels of RHEL 8 and RHEL 9 assumes that a minimal set of system packages has been installed that includes the mandatory and default packages from the mandatory groups of the Server environment group.

The prerequisites for supported levels of RHEL 8 (Pacemaker 2) are:

- cifs-utils
- libtool-ltdl
- libxslt
- net-snmp-libs
- nfs-utils
- perl-TimeDate
- psmisc
- python36
- python3-lxml

The prerequisites for supported levels of RHEL 9 (Pacemaker 2) are:

- libxslt
- net-snmp-libs
- nfs-utils
- nfs-utils-coreos
- perl-TimeDate
- python3-lxml

- python-unversioned-command

Additional prerequisites for installing the drbd-selinux package on SELinux are as follows:

- selinux-policy
- selinux-policy-base
- rpm-plugin-selinux
- selinux-policy-targeted

These packages in turn have their own requirements (which are not listed here). When Pacemaker is installed, it reports any missing packages that also need to be installed before installation can complete successfully.

Note: The Pacemaker component of RDQM requires a user named `hacluster` and a group named `haclient`. By default, these use a uid and gid of 189, although it is possible to specify a different uid and gid if required. The installation of Pacemaker creates the user and group if they do not exist.

About this task

To install support for RDQM (replicated data queue managers), you complete the following tasks:

1. Install DRBD on each node.
2. Install Pacemaker on each node.
3. Install IBM MQ on each node.
4. Install RDQM on each node.

The DRBD and Pacemaker RPM packages are supplied on the IBM MQ media. You should install the versions supplied with IBM MQ. Do not download your own versions, and you should ensure that the install does not pick up any other versions of these packages that you already have on your system.

To ensure that the packages supplied with RDQM are used, add exclude lines to the definition of any yum repository that could supply alternatives, such as the AppStream repository in RHEL 8. The exclude line needs to be applied to any yum repository defined on the system that could supply the standard RHEL alternative to any of the packages supplied with IBM MQ.

For example, for RHEL 8 use the following exclude line:

```
exclude=cluster* corosync* drbd kmod-drbd libqb* pacemaker* resource-agents* ktls-utils*
```

For example, for RHEL 9 use the following exclude line:

```
exclude=cluster* corosync* crm* libknet* libnozzle* libqb* pacemaker* python3-parallax*
resource-agents* ktls-utils*
```

For supported levels of RHEL 8, components are found under the `Advanced/RDQM/PreReqs/el8/` directory. For supported levels of RHEL 9, components are found under the `Advanced/RDQM/PreReqs/el9/` directory.

Attention: If you are using UEFI secure boot, you might need to enroll the key for the DRBD kernel module. See https://linbit.com/drbd-user-guide/drbd-guide-9_0-en/#s-linbit-packages. If UEFI secure boot is in use and the key is not enrolled, you will see the following error message.

```
modprobe: ERROR: could not insert 'drbd': Required key not available
```

The DRBD and Pacemaker packages are signed with the LINBIT GPG key. Use the following steps to download and import the public LINBIT GPG key:

1. Download the `linbit-keyring` package for your operating system version from https://packages.linbit.com/public/linbit-keyring/.
2. Issue the following command to install the `linbit-keyring` package:

```
rpm -i linbit-keyring.rpm
```

3. Issue the following command to import the LINBIT signing key:

```
rpm --import /etc/pki/rpm-gpg/RPM-GPG-KEY-linbit
```

Without this step, an RPM install of these packages issues the following warnings:

```
warning: rpm-name: Header V4 RSA/SHA512 Signature, key ID b826fe48: NOKEY
```

You can have multiple IBM MQ installations on each server, but only one of these installations should be an RDQM installation (see “Installing RDQM alongside other IBM MQ installations” on page 262). You can install the IBM MQ components in a custom location, if required, see “Installing RDQM to a non-default location” on page 263.

Attention: You should retain the installation media, in case there is a need to revert to this level, after upgrading to a later level.

Procedure

Complete the following steps on each node:

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Change into the directory containing the installation image.
3. Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories. For example, on a RHEL 8.10 system, running the helper script **Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver** returns the following information, identifying the kernel module that you need to install:

   ```
   kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
   ```
4. Install the appropriate DRBD kernel module that you identified in step 1. For example, for RHEL 8.10 you run the following command:

   ```
   dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
   ```
5. Install the required DRBD utilities. For example, for RHEL 8.10 you run the following command:

   ```
   dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
   ```
6. Install Pacemaker. For example, for RHEL 8.10 you run the following command:

   ```
   dnf install Advanced/RDQM/PreReqs/el8/pacemaker-2/*
   ```

   The Pacemaker installer reports any missing packages that also need to be installed before the install can complete successfully.
7. Accept the IBM MQ license:

   ```
   ./mqlicense.sh
   ```
8. Install IBM MQ. This is like a standard IBM MQ install. At the minimum, you must install the following:

   ```
   dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime*
   ```
9. Install RDQM:

   ```
   dnf install Advanced/RDQM/MQSeriesRDQM*
   ```

What to do next

You can now configure the Pacemaker cluster and replicated data queue managers, or you can configure disaster recovery replicated data queue managers. See RDQM high availability or RDQM disaster recovery.

Related concepts

“Migrating replicated data queue managers” on page 487

When you need to migrate replicated data queue managers (RDQMs), you must upgrade all nodes in a sequence. Do not try to operate with the nodes at different levels.

“Applying maintenance level updates for RDQM” on page 313

There are different procedures for applying maintenance level updates to a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

Related tasks

“Removing maintenance level updates for RDQM” on page 317

There are different procedures for removing maintenance level updates to a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

Linux MQ Adv. *Uninstalling RDQM (replicated data queue managers) if no longer required*

How to uninstall RDQM if it is no longer required.

Before you begin

Depending on which version of IBM MQ is installed, you might need to remove maintenance before you uninstall the base packages:

- If you are uninstalling a version of IBM MQ at IBM MQ 9.4.0 or later, you do not need to remove maintenance before you uninstall IBM MQ.
- If you are uninstalling a version of IBM MQ before IBM MQ 9.4.0, you must remove any maintenance that is applied to IBM MQ before you can uninstall. The procedure for removing maintenance changed at IBM MQ 9.4.0. Therefore, you must use the procedure that is detailed in earlier versions of the product documentation to remove the maintenance.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

About this task

There are different procedures for uninstalling a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

Important: The following commands are intended as an example of those that would be issued on a system with a single IBM MQ installation. On systems with multiple IBM MQ installations, or where there are other packages installed whose name includes either "drbd" or "linbit", the commands must be updated to ensure that only the packages associated with this IBM MQ installation are removed.

For details of how to uninstall IBM MQ on a system with multiple MQ installations please see “Uninstalling or modifying IBM MQ on Linux using rpm” on page 149.

Procedure

- To uninstall HA RDQM support if it is no longer required:
  a) Delete the RDQM HA queue managers in the HA group, see Deleting an HA RDQM.
  b) Delete the RDQM HA group, see Deleting the Pacemaker cluster (HA group).
  c) Log in as root or switch to superuser using the **su** command.
  d) If you configured a firewall, run the script *MQ_INSTALLATION_PATH*`/samp/rdqm/firewalld/unconfigure.sh` on each node to undo the firewall configuration. You must run this script as `root`.

e) To uninstall IBM MQ and RDQM:

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

Alternatively, to uninstall RDQM but leave the IBM MQ installation:

```
rpm -qa | grep MQSeriesRDQM | xargs dnf -y remove
```

f) Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

g) Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

h) V 10.0.0

Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

- To uninstall DR RDQM support if it is no longer required:
  a) Delete all queue managers on all nodes, see Deleting a DR RDQM.
  b) Log in as root or switch to superuser using the **su** command.
  c) If you configured a firewall, run the script *MQ_INSTALLATION_PATH*`/samp/rdqm/firewalld/unconfigure.sh` on each node to undo the firewall configuration. You must run this script as `root`.
  d) To uninstall IBM MQ and RDQM:

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

Alternatively, to uninstall RDQM but leave the IBM MQ installation:

```
rpm -qa | grep MQSeriesRDQM | xargs dnf -y remove
```

  e) Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

  f) Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

  g) V 10.0.0

Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

- To uninstall DR/HA RDQM support if it is no longer required:
  a) Delete the RDQM HA queue managers in both HA groups on main and recovery sites, see Deleting a DR/HA RDQM.
  b) Delete each RDQM HA group, see Deleting the Pacemaker cluster (HA group).
  c) Log in as root or switch to superuser using the **su** command.
  d) If you configured a firewall, run the script *MQ_INSTALLATION_PATH*`/samp/rdqm/firewalld/unconfigure.sh` on each node to undo the firewall configuration. You must run this script as `root`.
  e) To uninstall IBM MQ and RDQM:

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

Alternatively, to uninstall RDQM but leave the IBM MQ installation:

```
rpm -qa | grep MQSeriesRDQM | xargs dnf -y remove
```

f) Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

g) Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

h) V 10.0.0
Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

Related reference
rdqmadm (administer replicated data queue manager cluster)

Uninstalling RDQM (replicated data queue managers) and upgrading

How to uninstall RDQM in preparation for upgrading IBM MQ and RDQM.

Depending on which version of IBM MQ is installed, you might need to remove maintenance before you uninstall the base packages:

- If you are uninstalling a version of IBM MQ at IBM MQ 9.4.0 or later, you do not need to remove maintenance before you uninstall IBM MQ.
- If you are uninstalling a version of IBM MQ before IBM MQ 9.4.0, you must remove any maintenance that is applied to IBM MQ before you can uninstall. The procedure for removing maintenance changed at IBM MQ 9.4.0. Therefore, you must use the procedure that is detailed in earlier versions of the product documentation to remove the maintenance.

Important: You must stop all IBM MQ queue managers, other objects, and applications, before you begin the process to uninstall or modify IBM MQ.

Note: If you are upgrading the OS RHEL version, you need to follow a different upgrade procedure. See “Applying OS updates with RDQM” on page 263 for upgrading RHEL within a version, or “Migrating an RDQM configuration from RHEL 8 to RHEL 9” on page 486 for updating versions.

This topic describes upgrading RDQM between versions. To apply maintenance level updates to RDQM, see “Applying maintenance level updates for RDQM” on page 313. There are different procedures for uninstalling and then upgrading a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

For HA configurations, complete steps on each node in the HA group in turn. Processing can continue on other nodes while this is in progress.

For all configurations, if the upgrade is to a level of IBM MQ that is at a higher command level then, after a queue manager has been started at the higher level, it cannot run on a node that has not yet been upgraded. You should plan the sequence of upgrades accordingly.

Important: The following commands are intended as an example of those that would be issued on a system with a single IBM MQ installation. On systems with multiple IBM MQ installations, or where there are other packages installed whose name includes either "drbd" or "linbit", the commands must be updated to ensure that only the packages associated with this IBM MQ installation are removed.

For details of how to uninstall IBM MQ on a system with multiple MQ installations please see “Uninstalling or modifying IBM MQ on Linux using rpm” on page 149.

RDQM HA

Complete the following steps to uninstall and update an RDQM HA configuration:

1. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

2. Log in as root or switch to superuser using the **su** command.
3. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

4. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

5. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

6. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

   If either the drbd or drbd_transport_tcp kernel modules are still loaded, they can be unloaded with the following commands:

```
modprobe -r drbd_transport_tcp
modprobe -r drbd
```

   If the unload fails for any reason, reboot the node.

7. V 10.0.0 Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

8. Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).
9. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

   You can now proceed to the next node in the group.

RDQM DR

Complete the following steps to uninstall and update an RDQM DR configuration:

1. Upgrade the DR secondary node:
   a. Log in as root or switch to superuser using the **su** command.
   b. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

   c. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

   d. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

   e. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

If either the drbd or drbd_transport_tcp kernel modules are still loaded, they can be unloaded with the following commands:

```
modprobe -r drbd_transport_tcp
modprobe -r drbd
```

If the unload fails for any reason, reboot the node.

f. V 10.0.0 Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

g. Install the new levels of IBM MQ and RDQM, see Installing RDQM (replicated data queue managers).

2. On the DR primary node, do one of the following steps:
   - End the DR queue managers, or
   - Perform a managed failover of the DR queue managers to the DR secondary node.
3. Upgrade the DR primary node:
   a. Log in as root or switch to superuser using the **su** command.
   b. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

   c. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

   d. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

   e. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

   If either the drbd or drbd_transport_tcp kernel modules are still loaded, they can be unloaded with the following commands:

```
modprobe -r drbd_transport_tcp
modprobe -r drbd
```

   If the unload fails for any reason, reboot the node.

   f. Install the new levels of IBM MQ and RDQM, see Installing RDQM (replicated data queue managers).
4. On the DR primary node, do one of the following steps:
   - Start the DR queue managers (if you previously ended them), or
   - Perform a managed failover of the DR queue managers back to the DR primary node.

RDQM HA/DR

Complete the following steps to uninstall and update an RDQM HA/DR configuration:

1. Upgrade the HA group on your recovery site (presuming that the DR/HA RDQMs are running on the main site). Complete the following steps on each node in the group in turn.
   a. Log in as root or switch to superuser using the **su** command.
   b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

c. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

d. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

e. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

f. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

If either the drbd or drbd_transport_tcp kernel modules are still loaded, they can be unloaded with the following commands:

```
modprobe -r drbd_transport_tcp
modprobe -r drbd
```

If the unload fails for any reason, reboot the node.

g. V 10.0.0 Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

h. Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).

i. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

You can now proceed to the next node in the group.

2. On the HA group at the main site, either stop your queue managers, or perform a managed failover to the HA group that you have just upgraded on the recovery site.
3. Upgrade the HA group on your main site. Complete the following steps on each node in the group in turn.

a. Log in as root or switch to superuser using the **su** command.

b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

c. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

d. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

e. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

f. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

If either the drbd or drbd_transport_tcp kernel modules are still loaded, they can be unloaded with the following commands:

```
modprobe -r drbd_transport_tcp
modprobe -r drbd
```

If the unload fails for any reason, reboot the node.

g. V 10.0.0 Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

h. Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).

i. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

You can now proceed to the next node in the group.

4. You can now either start your queue managers (if you previously stopped them) or fail them back over to the main site from the recovery site.

Related reference

rdqmadm (administer replicated data queue manager cluster)

Linux MQ Adv. *Installing RDQM alongside other IBM MQ installations*

You can install RDQM alongside other installations of IBM MQ although there can only be one RDQM installation.

About this task

When installing multiple instances of IBM MQ on Linux with RPM, you must ensure that each installation is made from packages with unique names. To create unique packages, you run the **crtmqpkg** command:

```
crtmqpkg PACKAGE_SUFFIX
```

Where *PACKAGE_SUFFIX* is a string added to package files to make them unique.

To install RDQM alongside existing IBM MQ installations, you must run **crtmqpkg** twice, once for the main IBM MQ package and once for the RDQM component that has a separate `rpm` file under the `Advanced/RDQM` subdirectory. For both commands, you should specify the same *PACKAGE_SUFFIX*. When you run **crtmqpkg** for the RDQM package, you supply RPMDIR and SPECDIR arguments to specify where the RDQM package files reside.

Note:

- By default, the **crtmqpkg** command writes to the `/var/tmp` directory. To use a different location, you can set the `TMPDIR` environment variable before you run the **crtmqpkg** command.
- Before you can run the **crtmqpkg** command on Linux, you must have the **pax** and **rpmbuild** commands installed. These commands are not supplied as part of the product. You must get them from your Linux distribution supplier. The **rpmbuild** command is located in the **rpm-build** package.

Procedure

To create unique installation packages for RDQM:

1. Decompress the downloaded software to your installation directory, see “Installing the first IBM MQ installation on Linux using the rpm command” on page 112.
2. From your installation directory, create unique packages for the IBM MQ components:

```
./crtmqpkg RDQM
```

3. From your installation directory, create unique packages for the RDQM components:

```
RPMDIR=install_directory_path/MQServer/Advanced/RDQM SPECDIR=install_directory_path/MQServer/
Advanced/RDQM/repackage ./crtmqpkg RDQM
```

   Where *install_directory_path* is the full path to your installation directory.
4. Install IBM MQ with RDQM using the packages you created in this task. Note that, as you are installing an additional instance of IBM MQ, you will need to use the --prefix option with rpm to specify a non-default installation location.
   a) Change to the directory containing the unique packages that were created, for example:

```
cd /var/tmp/mq_rpms/RDQM/x86_64
```

   b) Install IBM MQ and RDQM:

```
rpm -ivh --prefix /opt/customLocation MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime*
MQSeriesRDQM*
```

Linux MQ Adv. *Installing RDQM to a non-default location*

By default, RDQM is installed in location `/opt/mqm` but you can install to a different location, if required.

About this task

To specify a different installation location, you must install the IBM MQ modules by using the **rpm** command together with `--prefix` argument to specify the required location.

You can specify a new location for the RDQM module, and the other IBM MQ modules, but the DRBD and Pacemaker components always install to their default locations and cannot be changed.

Procedure

1. Complete the procedure described in “Installing RDQM (replicated data queue managers)” on page 253 up to the point where you install IBM MQ.
   a) Download the required packages.
   b) Install the DRBD and Pacemaker components.
   c) Accept the license.
2. Install IBM MQ. You must install at least the components in the following example:

```
rpm -ivh --prefix install_location MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime*
```

3. Install the RDQM module:

```
rpm -ivh --prefix install_location Advanced/RDQM/MQSeriesRDQM*
```

Linux MQ Adv. *Applying OS updates with RDQM*

RDQM uses a DRBD kernel module which must be compatible with the current OS kernel level.

Note: You should only apply RHEL updates within a version, for example from 9.2 to 9.3. You should not update versions, for example, from RHEL 8 to RHEL 9. For updating a version, see “Migrating an RDQM configuration from RHEL 8 to RHEL 9” on page 486.

If OS updates are made which update the OS kernel level then a new DRBD kernel module might be required. See https://ibm.biz/mqrdqmkernelmods for guidance on compatibility between DRBD kernels and OS kernels.

Typically, a DRBD kernel update is required when the OS kernel branch is updated. For example, from RHEL 9.2 (5.14.0-284.11.1) to RHEL 9.3 (5.14.0-362.18.1).

In this case, follow the procedure “Update DRBD kernel module before nodes are rebooted into a new kernel” on page 264.

If you have already rebooted nodes into a new kernel, and find that RDQM does not run, follow the procedure "Update DRBD kernel module after a node has rebooted into a new kernel" on page 267.

The **rdqmstatus** command gives information about the OS kernel level and DRBD kernel module level, see Viewing RDQM and HA group status, Viewing DR RDQM status, and Viewing DR/HA RDQM and HA group status.

Related concepts

"Applying maintenance level updates for RDQM" on page 313
There are different procedures for applying maintenance level updates to a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

Linux MQ Adv. *Update DRBD kernel module before nodes are rebooted into a new kernel*

If an OS update requires a DRBD kernel update, you should follow this procedure before you reboot the nodes into the new OS kernel.

About this task

Note: You should only apply RHEL updates within a version, for example from 9.2 to 9.3. You should not update versions, for example, from RHEL 8 to RHEL 9.

There are different procedures for updating the DRBD kernel module for a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

For HA configurations, complete the steps on each node in the HA group in turn. Processing can continue on other nodes while the update is in progress.

Update the DRBD kernel module before a node is rebooted into a new kernel for RDQM HA

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
2. Suspend the node from the HA group:

   ```
   rdqmadm -s
   ```
3. Update the OS. For example:

   ```
   dnf update
   ```
4. Determine which DRBD kernel module is compatible with the new kernel level (see https://ibm.biz/mqrdqmkernelmods for guidance on which kernel module is compatible).

   Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 9.2 system, running the helper script `Advanced/RDQM/PreReqs/el9/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

   ```
   kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64
   ```
5. Update the DRBD kernel module with the one you identified in step 4. For example:

   ```
   dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64.rpm
   ```
6. Reboot the node. This will reboot to the new kernel level:

   ```
   sudo reboot
   ```

7. Resume the node in the HA group:

```
rdqmadm -r
```

Update the DRBD kernel module before nodes are rebooted into a new kernel for RDQM DR

Procedure

1. Update the OS and the DRBD kernel module on the DR secondary node:
   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.
   b. Update the OS. For example:

```
dnf update
```

   c. Determine which DRBD kernel module is compatible with the new kernel level (see https://ibm.biz/mqrdqmkernelmods for guidance on which kernel module is compatible).

      Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 9.2 system, running the helper script `Advanced/RDQM/PreReqs/el9/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64
```

   d. Update the DRBD kernel module with the one you identified in step c. For example:

```
dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64.rpm
```

   e. Reboot the node. This will reboot to the new kernel level:

```
sudo reboot
```

2. On the DR primary node, complete one of the following steps:
   - End the DR queue managers, or
   - Perform a managed failover of the DR queue managers to the DR secondary node.
3. Update the OS and the DRBD kernel module on DR primary node:
   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.
   b. Update the OS. For example:

```
dnf update
```

   c. Determine which DRBD kernel module is compatible with the new kernel level (see https://ibm.biz/mqrdqmkernelmods for guidance on which kernel module is compatible).

      Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 9.2 system, running the helper script `Advanced/RDQM/PreReqs/el9/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64
```

   d. Update the DRBD kernel module with the one you identified in step c. For example:

```
dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64.rpm
```

   e. Reboot the node. This will reboot to the new kernel level:

```
sudo reboot
```

4. On the DR primary node, complete one of the following steps:
   - Start the DR queue managers, or
   - Perform a managed failover of the DR queue managers to the DR primary node.

Update the DRBD kernel module before nodes are rebooted into a new kernel for RDQM DR/HA

Procedure

1. Update the OS and the DRBD kernel module on your recovery site. Complete the following steps on each node in the group in turn.
   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.
   b. Suspend the node from the HA group:

      ```
      rdqmadm -s
      ```

   c. Update the OS. For example:

      ```
      dnf update
      ```

   d. Determine which DRBD kernel module is compatible with the new kernel level (see https://ibm.biz/mqrdqmkernelmods for guidance on which kernel module is compatible).

      Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 9.2 system, running the helper script `Advanced/RDQM/PreReqs/el9/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

      ```
      kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64
      ```

   e. Update the DRBD kernel module with the one you identified in step d. For example:

      ```
      dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64.rpm
      ```

   f. Reboot the node. This will reboot to the new kernel level:

      ```
      sudo reboot
      ```

   g. Resume the node in the HA group:

      ```
      rdqmadm -r
      ```

   You can now repeat this procedure for the next node in the HA group.
2. Update the OS and the DRBD kernel module on your main site. Complete the following steps on each node in the group in turn.
   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.
   b. Suspend the node from the HA group:

      ```
      rdqmadm -s
      ```

   c. Update the OS. For example:

      ```
      dnf update
      ```

   d. Determine which DRBD kernel module is compatible with the new kernel level (see https://ibm.biz/mqrdqmkernelmods for guidance on which kernel module is compatible).

Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 9.2 system, running the helper script `Advanced/RDQM/PreReqs/el9/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64
```

e. Update the DRBD kernel module with the one you identified in step d. For example:

```
dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_5.14.0_284.11.1-1.x86_64.rpm
```

f. Reboot the node. This will reboot to the new kernel level:

```
sudo reboot
```

g. Resume the node in the HA group:

```
rdqmadm -r
```

You can now repeat this procedure for the next node in the HA group.

Linux MQ Adv. *Update DRBD kernel module after a node has rebooted into a new kernel*

If a node was rebooted to a new OS kernel level and the DRBD kernel module is now incompatible with the current OS kernel level then RDQM might fail to start correctly on the node.

About this task

Note: You should only apply RHEL updates within a version, for example from 9.2 to 9.3. You should not update versions, for example, from RHEL 8 to RHEL 9.

For example, if a node was rebooted into a RHEL 9.3 (5.14.0-362.18.1) kernel with a RHEL 9.2 (5.14.0-284.11.1.) DRBD kernel module installed, RDQM does not start. The command `rdqmstatus -m` *qmname* shows an HA `status` of Unknown for an HA or DR/HA queue manager, and a DR `status` of Unknown for a DR queue manager.

The queue manager will not run on this node until the issue is resolved.

The kernel level of the OS and the installed DRBD kernel module level can be displayed by using the following command:

```
$ rdqmstatus
```

The output includes kernel information as shown in the following example:

```
Node:                                 mqhavm07.exampleco.com
OS kernel version:                    5.14.0-362.18.1
DRBD OS kernel version:               5.14.0-362.18.1
DRBD version:                         9.2.7
DRBD kernel module status:            Loaded
```

To recover from this situation, complete the following procedure in turn on each node that has been rebooted into a new kernel.

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

2. Determine which DRBD kernel module is now needed for the system. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories.

   For example, on a RHEL 8.9 system, running the helper script `Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

   ```
   kmod-drbd-9.2.7+ptf.14.gdc5453714_4.18.0_513.5.1-1.x86_64.rpm
   ```

3. Update the DRBD kernel module to the one that you identified in step 2. For example:

   ```
   dnf install kmod-drbd-9.2.7+ptf.14.gdc5453714_4.18.0_513.5.1-1.x86_64.rpm
   ```

4. Reboot the node:

   ```
   sudo reboot
   ```

z/OS Installing IBM MQ for z/OS

Installation tasks that are associated with installing IBM MQ on z/OS systems are grouped in this section.

About this task

IBM MQ for z/OS uses the standard z/OS installation procedure. It is supplied with a Program Directory that contains specific instructions for installing the program on a z/OS system. You must follow the instructions in the appropriate Program Directory. For download links for the Program Directories, see IBM MQ for z/OS Program Directory PDF files.

The Program Directory includes not only details of the installation process, but also information about the prerequisite products and their service or maintenance levels.

SMP/E, used for installation on the z/OS platform, validates the service levels and prerequisite and corequisite products, and maintains the SMP/E history records to record the installation of IBM MQ for z/OS. It loads the IBM MQ for z/OS libraries and checks that the loads have been successful. You then have to customize the product to your own requirements.

Before you install and customize IBM MQ for z/OS, you must decide the following:

- Whether you are going to install one of the optional national language features. See National language support.
- Which communications protocol and distributed queuing facility you are going to use. See Communications protocol and distributed queuing.
- What your naming convention for IBM MQ objects will be. See Naming conventions.
- What command prefix string (CPF) you are going to use for each queue manager. See Using command prefix strings.
- When upgrading from a previous Continuous Delivery release through the installation of PTFs, decide whether any USERMODs that have been applied to IBM MQ for z/OS will still be required. Remove the USERMODs before installation of the Continuous Delivery PTFs, or use the SMP/E BYPASS(ID) option on APPLY. If neither of these actions is performed, an `SMP/E MODID ERROR GIM38201E` will be received.

  The PTFs for the latest Continuous Delivery release can be determined by using SMP/E FIXCAT HOLDDATA category IBM.MQ.V9*R*M*n*, where *R* is the release number, and *n* is the modification level. For example, category IBM.MQ.V9R0M2 identifies fixes that upgrade IBM MQ for z/OS 9.0 Continuous Delivery to modification level 2.

You also need to plan how much storage you require in your z/OS system to accommodate IBM MQ; Planning your storage and performance requirements on z/OS helps you plan the amount of storage required.

Procedure

1. Check that your system hardware, and software levels meet the minimum requirements.
   See “Checking requirements on z/OS” on page 271.
2. Plan your installation
   See “Planning to install IBM MQ for z/OS” on page 271.
3. Install and configure IBM MQ for z/OS, by following the instructions detailed in the Program Directory.
   See also the information in the subtopics for further guidance.

z/OS z/OS installation overview

IBM MQ functions are provided as a number of different products, which are installed together to provide the capability required.

Note: From IBM MQ for z/OS 9.2, the Managed File Transfer for z/OS binary libraries are provided as part of the base IBM MQ for z/OS installation.

The different products are:

IBM MQ for z/OS
Provides IBM MQ capability, connectivity on and off the z/OS platform, and excellent integration with z/OS software, such as CICS®, IMS, WebSphere Application Server, and Db2. Licensed under a Monthly License Charge (MLC) model.

IBM MQ for z/OS Value Unit Edition (VUE)
Same functionality as IBM MQ for z/OS; licensed under a One Time Charge (OTC) model. Can coexist and interact with IBM MQ MLC offerings in other LPARs.

Note that, from an installation perspective, the same FMIDs as for IBM MQ for z/OS are installed, then the **QMGRPROD** attribute must be set to VUE, which changes product usage recording for billing purposes.

IBM MQ Advanced for z/OS
Managed File Transfer (MFT) and Advanced Message Security (AMS) features, plus the Connector Pack. IBM MQ Advanced for z/OS does not include entitlement to run queue managers and so one of IBM MQ for z/OS or IBM MQ for z/OS VUE is a prerequisite.

The Advanced Message Security feature does not require installation. Both the Managed File Transfer feature and the Connector Pack component are installed via separate FMIDs.

IBM MQ Advanced for z/OS Value Unit Edition
Bundling of IBM MQ for z/OS VUE and IBM MQ Advanced for z/OS.

From an installation perspective, the same FMIDs as IBM MQ for z/OS VUE and IBM MQ Advanced for z/OS are installed. Once installed, the **QMGRPROD** attribute must be set to ADVANCEDVUE, which changes product usage recording for billing purposes.

Features

The features are:

Advanced Message Security (AMS)
Provides end to end encryption of messages throughout the IBM MQ network. Data is encrypted at rest, in memory, and when being transmitted over the network.

Managed File Transfer (MFT)
Provides the ability to integrate file data into an IBM MQ network, while providing reliable auditing, management and recovery.

Connector Pack component

The Connector Pack component provides the following capabilities:

- The IBM Aspera® faspio Gateway, which can improve the speed of transfer of IBM MQ data in lossy, high latency, networks.
- The IBM MQ Kafka Connector, which allows data to flow between IBM MQ and Kafka topologies.

Enablement

Enablement of IBM MQ for z/OS VUE or IBM MQ Advanced for z/OS VUE requires setting the **QMGRPROD** attribute; enablement of Advanced Message Security requires setting the **AMSPROD** attribute.

For more information, see “Product usage recording with IBM MQ for z/OS products” on page 275.

Note: Enablement modules for these capabilities are no longer provided.

Licensing models

The two different licensing models, together with their associated bundles, are shown in the following table:

Licensing Model	Product Name	Feature	Product ID
MLC	IBM MQ for z/OS		5656-MQA
OTC	IBM MQ for z/OS Value Unit Edition (VUE)		5656-VUA
OTC	IBM MQ Advanced for z/OS	Advanced Message Security (AMS), Managed File Transfer (MFT)	5656-ADA
OTC	IBM MQ Advanced for z/OS Value Unit Edition	(all included)	5656-AVA

Installation

Program Directories provide instructions for SMP/E installation of the program materials on to a target system. For download links for the Program Directories, see IBM MQ for z/OS Program Directory PDF files.

The Customizing IBM MQ for z/OS topics guide you through customization of the code, and creating customized execution units, for example the queue manager and file transfer agents.

Related concepts

“Managed File Transfer product options” on page 240
Managed File Transfer can be installed as four different options, depending on your operating system and overall setup. These options are Managed File Transfer Agent, Managed File Transfer Service, Managed File Transfer Logger, or Managed File Transfer Tools.

Related tasks

“Maintaining and migrating IBM MQ” on page 287
Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

Installing Advanced Message Security

Use the information for your platform to guide you through installing the Advanced Message Security (AMS) component.

z/OS Checking requirements on z/OS

Before you install IBM MQ on z/OS, you must check for the latest information and system requirements.

About this task

A summary of the tasks that you must complete to check system requirements is listed here with links to further information.

Procedure

1. Check that you have the latest information, including information on hardware and software requirements.

   See “Where to find product requirements and support information” on page 11.
2. Check that your systems meet the hardware and software requirements for IBM MQ on z/OS.

   Before attempting to install and run IBM MQ for z/OS, ensure that your system hardware, and software levels meet the minimum requirements. You can check the minimum required levels on the System Requirements for IBM MQ website. Follow the links for the version of IBM MQ that you are installing in and select the appropriate Detailed System Requirements report for z/OS. There are separate reports for Long Term Support and Continuous Delivery.
3. Check that you have the correct licenses.

   See “License requirements” on page 8 and IBM MQ license information.

z/OS Planning to install IBM MQ for z/OS

To install the IBM MQ product your hardware, and software environment must meet minimum requirement levels. You must also consider the national language features, communications protocols, and naming conventions to be used.

National language support

You can choose one of the following national languages for the IBM MQ operator messages and the IBM MQ operations and control panels (including the character sets used). Each language is identified by one of the following language letters:

C
Simplified Chinese

E
U.S. English (mixed case)

F
French

K
Japanese

U
U.S. English (uppercase)

The samples, IBM MQ commands, and utility control statements are available only in mixed case U.S. English.

Communications protocol and distributed queuing

The distributed queuing facility provided with the base product feature of IBM MQ can either use APPC (LU 6.2), TCP/IP from IBM, or any TCP product that supports the z/OS Unix Sockets API. The distributed queuing facility is also known as the channel initiator and the mover.

You must perform the following tasks to enable distributed queuing:

- Choose which communications interface to use. This can be either, or both, of the following:
  - APPC (LU 6.2)
  - TCP/IP
- Customize the distributed queuing facility and define the IBM MQ objects required.
- Define access security.
- Set up your communications. This includes setting up your TCPIP.DATA data set if you are using TCP/IP, LU names, and side information if you are using APPC. This is described in Setting up communication for z/OS .

Naming conventions

It is advisable to establish a set of naming conventions when planning your IBM MQ systems. The names you choose will probably be used on different platforms, so you should follow the convention for IBM MQ, not for the particular platform.

IBM MQ allows both uppercase and lowercase letters in names, and the names are case sensitive. However, some z/OS consoles fold names to uppercase, so do not use lowercase letters for names unless you are sure that this will not happen.

You can also use numeric characters and the period (.), forward slash (/), underscore (_) and percent (%) characters. The percent sign is a special character to Security Server (previously known as RACF®), so do not use it in names if you are using Security Server as your External Security Manager. Do not use leading or trailing underscore characters if you are planning to use the Operations and Control panels.

For more information, see Rules for naming IBM MQ objects.

Choosing names for queue managers and queue sharing groups

Each queue manager and queue sharing group within a network must have a unique name. Do not use the same name for a queue manager and a queue sharing group. On z/OS the names of queue managers and queue sharing groups can be up to four characters long. Each Db2 system and data-sharing group within the network must also have a unique name.

The names of queue manager and queue sharing groups can use only uppercase alphabetic characters, numeric characters, and dollar sign ($), number sign (#) or at sign (@); they must not start with a numeric character. Queue sharing group names that are less than four characters long are padded internally with at signs, so do not use names ending in the at sign.

The queue manager name is the same as the z/OS subsystem name. You might identify each subsystem as a queue manager by giving it the name `QM` *xx* (where *xx* is a unique identifier), or you might choose a naming convention like ADDX, where A signifies the geographic area, DD signifies the company division, and X is a unique identifier.

You might want to use your naming convention to distinguish between queue managers and queue sharing groups. For example, you might identify each queue sharing group by giving it the name `QG` *xx* (where *xx* is the unique identifier).

Choosing names for objects

Queues, processes, name lists, clusters, and topics can have names up to 48 characters long. Channels can have names up to 20 characters long and storage classes can have names up to 8 characters long.

If possible, choose meaningful names within any constraints of your local conventions. Any structure or hierarchy within names is ignored by IBM MQ, however, hierarchical names can be useful for system management. You can also specify a description of the object when you define it to give more information about its purpose.

Each object must have a unique name within its object type. However, each object type has a separate namespace, so you can define objects of different types with the same name. For example, if a queue has an associated process definition, it is a good idea to give the queue and the process the same name. It is also a good idea to give a transmission queue the same name as its destination queue manager.

You could also use the naming convention to identify whether the object definition is private or a global. For example, you could call a namelist `project_group.global` to indicate that the definition is stored on the shared repository.

Application queues

Choosing names that describe the function of each queue helps you to manage these queues more easily. For example, you might call a queue for inquiries about the company payroll `payroll_inquiry`. The reply-to queue for responses to the inquiries might be called `payroll_inquiry_reply`.

You can use a prefix to group related queues. This means that you can specify groups of queues for administration tasks like managing security and using the dead-letter queue handler. For example, all the queues that belong to the payroll application might be prefixed by `payroll_`. You can then define a single security profile to protect all queues with names beginning with this prefix.

You can also use your naming convention to indicate that a queue is a shared queue. For example, if the payroll inquiry queue was a shared queue, you might call it `payroll_inquiry.shared`.

Storage classes and coupling facility structures

The character set you can use when naming storage classes and coupling facility structures is limited to uppercase alphabetic and numeric characters. You should be systematic when choosing names for these objects.

Storage class names can be up to 8 characters long, and must begin with an alphabetic character. You will probably not define many storage classes, so a simple name is sufficient. For example, a storage class for IMS bridge queues could be called `IMS`.

Coupling facility structure names can be up to 12 characters long, and must begin with an alphabetic character. You could use the name to indicate something about the shared queues associated with the coupling facility structure (that they all belong to one suite of applications for example). Remember that in the coupling facility, the structure names are the IBM MQ name prefixed by the name of the queue sharing group (padded to four characters with @ symbols).

Choosing names for channels

To help you manage channels, it is a good idea if the channel name includes the names of the source and target queue managers. For example, a channel transmitting messages from a queue manager called QM27 to a queue manager called QM11 might be called `QM27/QM11`.

If your network supports both TCP and SNA, you might also want to include the transport type in the channel name, for example `QM27/QM11_TCP`. You could also indicate whether the channel is a shared channel, for example `QM27/QM11_TCP.shared`.

Remember that channel names cannot be longer than 20 characters. If you are communicating with a queue manager on a different platform, where the name of the queue manager might contain more than 4 characters, you might not be able to include the whole name in the name of the channel.

Using command prefix strings

Each instance of IBM MQ that you install must have its own *command prefix* string (CPF). You use the CPF to identify the z/OS subsystem that commands are intended for. It also identifies the z/OS subsystem from which messages sent to the console originate.

You can issue all MQSC commands from an authorized console by inserting the CPF before the command. If you enter commands through the system command input queue (for example, using CSQUTIL), or use the IBM MQ operations and control panels, you do not use the CPF.

To start a subsystem called CSQ1 with CPF that is ' +CSQ1 ', issue the command `+CSQ1 START QMGR` from the operator console (the space between the CPF and the command is optional).

The CPF also identifies the subsystem that is returning operator messages. The following example shows +CSQ1 as the CPF between the message number and the message text.

```
CSQ9022I +CSQ1 CSQNCDSP ' DISPLAY CMDSERV' NORMAL COMPLETION
```

See Defining command prefix strings (CPFs) for information about defining command prefix strings.

z/OS Customizing IBM MQ and its adapters

IBM MQ requires some customization after installation to meet the individual and special requirements of your system, and to use your system resources in the most effective way.

For a list of tasks that you must perform when you customize your system, see Setting up IBM MQ for z/OS.

Using queue sharing groups

If you want to use queue sharing groups, you do not have to set them up when you install IBM MQ, you can do this at any time.

For details of how to manage your queue sharing groups when you have set them up, see Managing queue sharing groups.

z/OS Verifying your installation of IBM MQ for z/OS

After the installation and customization has been completed, you can use the installation verification programs (IVPs) supplied with IBM MQ for z/OS to verify that the installation has been completed successfully.

The IVPs supplied are assembler language programs and you should run them after you have customized IBM MQ for z/OS to suit your needs. They are described in Running the basic installation verification program.

z/OS Macros intended for customer use

The macros identified in this topic are provided as programming interfaces for customers in support of features that are specific to IBM MQ for z/OS.

The 'C' include files, COBOL copy files, PL/I include files and assembler macros that are provided as programming interfaces for customers in support of features that apply across many IBM MQ platforms are described in the Constants section of the documentation.

Note: Do not use as programming interfaces any IBM MQ macros other than those interfaces identified in this topic or in Constants.

General-use programming interface macros

The following assembler macros are provided to enable you to write programs that use the services of IBM MQ. The macros are supplied in library `thlqual.SCSQMACS`.

- CMQXCALA
- CMQXCFBA
- CMQXCFCA
- CMQXCFLA
- CMQXCDFA
- CMQXCINA
- CMQXCVCA

Product-sensitive programming interface macros

The following assembler macros are provided to enable you to write programs that use the services of IBM MQ. The macros are supplied in library `thlqual.SCSQMACS`. Product-sensitive interfaces are open to change between different releases of the product.

- CSQBDEF
- CSQDQEST
- CSQDQIST
- CSQDQJST
- CSQDQLST
- CSQDQMAC
- CSQDQMST
- CSQDQPST
- CSQDQSST
- CSQDQWHC
- CSQDQWHS
- CSQDQ5ST
- CSQDWQ
- CSQDWTAS
- CSQQDEFX
- CSQQLITX

z/OS Product usage recording with IBM MQ for z/OS products

z/OS can measure how much processing time is spent in doing work on behalf of the various processes that make up the IBM MQ product. This is known as product usage recording.

Product usage recording works as follows:

- When the IBM MQ for z/OS product is started, it identifies itself to z/OS and requests that the *System Management Facilities (SMF)* mechanism within z/OS is to automatically measure how much processor time it uses.
- When enabled, the z/OS usage measurement facility collects usage figures for each hour of the day, and generates usage records that are added to a report file on disk.
- At the end of one full month, these usage records are collected by a program, which generates a report of product usage for the month. This report is used to determine the charge for the IBM MQ for z/OS product.

For more information about product usage recording and the Sub-Capacity Reporting Tool (SCRT), see Preparing to use the Sub-Capacity Reporting Tool. For information about the MULCCAPT parameter see, Using CSQ6SYSP.

As IBM MQ for z/OS is available under several different product IDs (PIDs) you need to ensure that it registers itself to z/OS with the PIDs that you are entitled to, which will ensure that you are charged correctly.

This needs to be done for each of the different parts of the IBM MQ for z/OS product that you might be running:

- Queue manager and channel initiator
- Advanced Message Security (AMS)
- Managed File Transfer (MFT)
- mqweb server

This topic describes how you do this.

IBM MQ for z/OS product IDs

Product	Product ID
IBM MQ for z/OS	5656-MQA
IBM MQ for z/OS Value Unit Edition (VUE)	5656-VUA
IBM MQ Advanced for z/OS	5656-ADA
IBM MQ Advanced for z/OS VUE	5656-AVA

Note: From IBM MQ for z/OS 9.1.3, the older IBM MQ Advanced Message Security for z/OS and IBM MQ Managed File Transfer for z/OS products are no longer available separately and are instead features of IBM MQ Advanced for z/OS and IBM MQ Advanced for z/OS VUE.

Associating the queue manager and channel initiator with a PID

The queue manager and channel initiator address spaces are associated with a specific PID using the QMGRPROD attribute. The following table shows how the value of the QMGRPROD attribute maps to a product and PID:

QMGRPROD value	Product	Product ID
MQ	IBM MQ for z/OS	5656-MQA
VUE	IBM MQ for z/OS VUE	5656-VUA
ADVANCEDVUE	IBM MQ Advanced for z/OS VUE	5656-AVA

The product and PID used by the queue manager address space are output at start up in the CSQY036I message. Note that the channel initiator does not output an equivalent message, but it uses the same PID.

There are three distinct methods of setting the **QMGRPROD** attribute:

1. In the CSQ6USGP macro, which is part of the IBM MQ system parameter module. This is the approach you should use for setting **QMGRPROD** permanently.
2. As a parameter on the START QMGR command. This needs to be set for each use of the command.
3. As a parameter on the JCL used to start the queue manager address space. See Using MQSC to start and stop a queue manager on z/OS for more information.

The second and third approaches can be useful the first few times that QMGRPROD is used, or for test systems, and will override the values set by CSQ6USGP.

Associating AMS with a PID

The AMS address space is associated with a specific product using the **AMSPROD** attribute. The table below shows how the value of the **AMSPROD** attribute maps to a particular product:

AMSPROD value	Product	Product ID
ADVANCED	IBM MQ Advanced for z/OS	5656-ADA
ADVANCEDVUE	IBM MQ Advanced for z/OS VUE	5656-AVA

V 10.0.0 V 10.0.0 From IBM MQ for z/OS 10.0.0, if your enterprise wants to use Advanced Message Security, you must ensure that **AMSPROD** is set to either ADVANCED, or ADVANCEDVUE depending on what product you are entitled to. If **SPLCAP(YES)** is set in CSQ6SYSP, indicating that the queue manager is to be enabled for AMS, but **AMSPROD** is not set, then from IBM MQ for z/OS 10.0.0, the value will be set to **ADVANCED**.

The product and PID used by the AMS address space are output at start up in the CSQ0619I message.

There are three distinct methods of setting the **AMSPROD** attribute:

1. In the CSQ6USGP macro, which is part of the IBM MQ system parameter module. This is the approach you should use for setting **AMSPROD** permanently.
2. As a parameter on the START QMGR command. This needs to be set for each use of the command.
3. As a parameter on the JCL used to start the queue manager address space. See Using MQSC to start and stop a queue manager on z/OS for more information.

The second and third approaches can be useful the first few times that **AMSPROD** is used, or for test systems, and will override the values set by CSQ6USGP.

Associating Managed File Transfer with a PID

MFT processes are associated with a specific PID using the fteSetProductId command.

Associating the mqweb server with a PID

The mqweb server that hosts the IBM MQ Console and REST API is associated with the PID provided when it is created using the crtmqweb command.

Once an mqweb server has been created you can change its PID using the setmqweb pid **pid** command.

The PID used by the mqweb server is output at start up in the `messages.log` using the CWWKB0108I message.

For IBM MQ for z/OS, this looks like:

```
CWWKB0108I: IBM CORP product MQM MVS/ESA version V9 R2.0 successfully registered with z/OS.
```

For IBM MQ for z/OS Value Unit Edition (VUE), this looks like:

```
CWWKB0108I: IBM CORP product MQ z/OS VUE version NOTUSAGE successfully registered with z/OS.
```

For IBM MQ Advanced for z/OS VUE, this looks like:

```
CWWKB0108I: IBM CORP product MQ z/OS Adv VUE version NOTUSAGE successfully registered with z/OS.
```

Default PIDs

In most cases, if a specific PID is not selected, a default PID is used for:

- The queue manager and channel initiator, which is IBM MQ for z/OS.
- mqweb servers created prior to IBM MQ for z/OS 9.2.0, which is IBM MQ for z/OS.
- V 10.0.0 V 10.0.0 The AMS address space, which is IBM MQ Advanced for z/OS.

- V 10.0.0 V 10.0.0 MFT processes, which is IBM MQ Advanced for z/OS.

Sample scenarios

You have IBM MQ for z/OS
QMGRPROD does not need to be changed, the default PID of 5656-MQA is used.

You have installed a new IBM MQ Advanced for z/OS Value Unit Edition queue manager, and want to enable AMS
In CSQ6USGP, set QMGRPROD=ADVANCEDVUE and AMSPROD=ADVANCEDVUE; the 5656-AVA PID is used.

Related reference
IBM MQ license information
IBM MQ product identifiers and export information

z/OS Installing and enabling IBM MQ for z/OS Value Unit Edition

IBM MQ for z/OS Value Unit Edition (VUE) provides all the function and capability of base IBM MQ for z/OS, in a format that offers a one-time-charge (OTC) price metric

The OTC price metric provides an alternative pricing model for IBM MQ for z/OS workloads.

VUE can connect to other supported versions of IBM MQ for z/OS for workload federation and systems management.

The VUE feature allows connections from IBM MQ clients, that run on other platforms.

Enabling VUE

VUE uses the same code as IBM MQ for z/OS.

If your enterprise has purchased VUE, you can enable it by setting the QMGRPROD attribute to VUE. See product usage recording with IBM MQ for z/OS products for more information about how to set QMGRPROD.

Characteristics of a VUE-enabled queue manager

A VUE-enabled queue manager has all the function and capability of the base queue manager. Additionally, clients will be enabled during channel initiator startup.

A VUE-enabled queue manager records usage information in SMF89 records with the product name and identifier for VUE instead of those for the IBM MQ product.

A VUE-enabled queue manager can:

- Connect to other queue managers and clients in a network, according to the connectivity capabilities of the base queue manager installation.
- Participate in a queue sharing group with other queue managers provided the base queue manager versions are able to interoperate, regardless of whether other members are standard or VUE function queue managers.

z/OS MQ Adv. z/OS Installing IBM MQ Advanced for z/OS

Installation of IBM MQ Advanced for z/OS consists of installation of the Managed File Transfer (MFT) feature and the Connector Pack component. The Advanced Message Security (AMS) feature does not require installation. You can choose to just install the MFT feature, just the Connector Pack component, or both.

Before you begin

Install either the IBM MQ for z/OS or IBM MQ for z/OS VUE products.

About this task

Use this topic to understand how you install IBM MQ Advanced for z/OS on your system.

Important: V 10.0.0 V 10.0.0 You should only make use of the IBM MQ Advanced Message Security for z/OS feature if you have entitlement to one of the IBM MQ Advanced for z/OS or IBM MQ Advanced for z/OS VUE products.

You should only install and make use of the Managed File Transfer for z/OS feature if you have entitlement to one of the IBM MQ Advanced for z/OS or IBM MQ Advanced for z/OS VUE products.

For information about licensing, see IBM MQ license information and IBM MQ for z/OS product identifiers.

Procedure

1. If you want to use Advanced Message Security, then no installation is required.

   For more information on enabling and configuring Advanced Message Security, see Configuring Advanced Message Security for z/OS.
2. If you want to use Managed File Transfer, first plan your Managed File Transfer installation.

   For more information, see Planning for Managed File Transfer.

   You should then install the Managed File Transfer feature by following the instructions detailed in the IBM MQ Advanced for z/OS Program Directory. For download links for the IBM MQ Advanced for z/OS Program Directory, see IBM MQ for z/OS Program Directory PDF files.
3. If you want to make use of the function in the Connector Pack component, install it by following the instructions detailed in the IBM MQ Advanced for z/OS Program Directory.

What to do next

When you have installed the product, follow the instructions in the Program Directory for activating it.

Related tasks

Configuring Managed File Transfer for z/OS

Planning for Managed File Transfer

z/OS MQ Adv. VUE Installing IBM MQ Advanced for z/OS Value Unit Edition

IBM MQ Advanced for z/OS Value Unit Edition (VUE) is a bundling of the IBM MQ for z/OS VUE and IBM MQ Advanced for z/OS products.

About this task

Use this topic to understand how you install IBM MQ Advanced for z/OS VUE on your system.

Procedure

- Install IBM MQ for z/OS Value Unit Edition.

  For more information, see “Installing and enabling IBM MQ for z/OS Value Unit Edition” on page 278.
- Install IBM MQ Advanced for z/OS capabilities if required.

  For more information, see “Installing IBM MQ Advanced for z/OS” on page 278.

  For download links for the IBM MQ Advanced for z/OS Value Unit Edition Program Directory, see IBM MQ for z/OS Program Directory PDF files.

Related tasks

“Installing IBM MQ Advanced for Multiplatforms” on page 232
Installation tasks associated with IBM MQ Advanced for Multiplatforms are grouped in this section.

Related reference

DISPLAYQMGR ADVCAP

MQCMD_INQUIRE_Q_MGR MQIA_ADVANCED_CAPABILITY

Windows Linux Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows

You can install IBM MQ Explorer from a stand-alone download that is available from Fix Central.

About this task

You can download the stand-alone IBM MQ Explorer (formerly the MS0T SupportPac) from Fix Central and install it as a stand-alone application, running on Linux x86_64 or Windows, on as many machines as you require, either on its own or alongside an installation of IBM MQ of the same version. However, you can only have a single installation of the stand-alone IBM MQ Explorer on a given machine, regardless of version.

From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central.

Linux Installing the stand-alone IBM MQ Explorer on Linux

On Linux, you can install the stand-alone IBM MQ Explorer by using the graphical user interface. Alternatively, you can install with either a silent or a console installation.

Before you begin

Before you install the stand-alone IBM MQ Explorer, review the requirements information in IBM MQ Explorer installation requirements.

If you already have a previous version of IBM MQ Explorer installed, uninstall that version with the supplied uninstaller before installing the new version. For more information, see “Uninstalling the stand-alone IBM MQ Explorer on Linux” on page 282.

If you try to reinstall IBM MQ Explorer and you previously uninstalled it by deleting the files rather than by using the supplied uninstaller, the message `IBM MQ Explorer is already installed` appears. If this situation occurs, you need to complete some additional steps to return to a clean system before you can reinstall the stand-alone IBM MQ Explorer as described in “Uninstalling the stand-alone IBM MQ Explorer on Linux” on page 282.

Note: In addition to the space used by the installed program, the installer uses space in the `/tmp` file system. Allow at least 600 MB, which will be freed after the installation is complete.

To use somewhere other than `/tmp`, export the IATEMPDIR environment variable as shown in the following example:

```
export IATEMPDIR=/var/tmp
```

You must export the environment variable before you run the `./Setup.bin` command .

In addition, allow 400 MB on a file system of your choosing for the `tar.gz` installation image and the contents of the image after the file is decompressed.

About this task

After you download the stand-alone IBM MQ Explorer from Fix Central and decompress the files, you can install IBM MQ Explorer in any of the following ways:

- By using the installation wizard.
- By installing silently, with a response file.
- By installing with a console (text-based) installation.

If you require an accessible version of the installer, then use the silent installation mode to install IBM MQ Explorer. A response file is used to configure a silent installation. An example response file, `silent_install.resp` is provided in the same directory as the IBM MQ Explorer setup program. You can modify this example file as required by using a text editor.

Procedure

1. Download the Linux version of stand-alone IBM MQ Explorer.

   Follow this link to Fix Central, then select the Linux version of the download package.
2. Create an installation directory on the target system.
3. Decompress the `tar.gz` file that you downloaded, for example, `10.0.0.0-IBM-MQ-Explorer-LinuxX64.tar.gz`, to this directory.
4. Install IBM MQ Explorer in one of the following ways:
   - To install by using the installation wizard:
     a. Log in as root and navigate to the directory where you decompressed the files.
     b. Run the command `./Setup.bin` (as root) and follow the onscreen instructions.
     c. Start IBM MQ Explorer either by using the system menu entry, or by using the `MQExplorer` executable file in the installation directory.
   - To install silently, by using a response file:
     a. Use a text editor to modify the example response file, `silent_install.resp`, as required. Make your changes in line with the comments in the file.

        Note: Before running a silent install, the **LICENSE_ACCEPTED** property in the response file must be set to TRUE to indicate that you agree to the terms of the product license. (The license can be found in the `license` folder of the product `.zip` file).
     b. Start the silent installation by using the following command:

        ```
        ./Setup.bin -f silent_install.resp
        ```

     The installation then proceeds without any feedback.
   - To install by using a console (text-based) installation, launch the installer by using the following command:

     ```
     ./Setup.bin -i console
     ```

   Note: If you see the following error message, this might be because you have the **DISPLAY** environment variable set but do not have a valid X configuration:

   ```
   Unable to load and to prepare the installer in console or silent mode.
   ```

   If you do see this message, unset your **DISPLAY** environment variable and retry the operation in console mode.

What to do next

After IBM MQ Explorer has been installed, you can run it from the system menu or by using the **MQExplorer** command. For more information, see Launching IBM MQ Explorer.

Related tasks

Launching IBM MQ Explorer

Uninstalling the stand-alone IBM MQ Explorer on Linux

On Linux, you uninstall the stand-alone IBM MQ Explorer by running the provided uninstaller.

About this task

On Linux, you uninstall the stand-alone IBM MQ Explorer by running the **Change IBM MQ Explorer V10.0 Installation** application.

If you remove the IBM MQ Explorer by deleting the files rather by than using the provided uninstaller, you will be unable to reinstall the product at a later date unless you first carry out some additional steps to return to a clean system. If you do try to reinstall IBM MQ Explorer after you previously uninstalled it by deleting the files, the message `IBM MQ Explorer is already installed` appears.

Procedure

- To uninstall IBM MQ Explorer with the provided uninstaller, go to the installation directory and then go in the directory named '`_IBM MQ Explorer V10.0_installation`', then run (as root) the application named **Change IBM MQ Explorer V10.0 Installation**.
- If you need to get back to a clean system because you want to reinstall IBM MQ Explorer after uninstalling it by deleting the files rather by than using the **Change IBM MQ Explorer V10.0 Installation** application, complete the following steps:

  a) Locate and edit the file `.com.zerog.registry.xml`.

  The `.com.zerog.registry.xml` file is found either in the `/var` directory or alternatively in the user's home directory. Make a backup of this file then edit it by deleting the section that begins with the XML tag: '`<product name="IBM MQ Explorer `' or '`<product name="IBM WebSphere MQ Explorer `' and ends with the next `</product>` tag. Save the file.

  b) Delete the directory `/etc/opt/ibm/MQ_Explorer` and/or `/etc/opt/ibm/WebSphere_MQ_Explorer`.

  You should now be able to reinstall IBM MQ Explorer as described in "Installing the stand-alone IBM MQ Explorer on Linux" on page 280.

Windows Installing the stand-alone IBM MQ Explorer on Windows

On Windows, you can install the stand-alone IBM MQ Explorer by using the graphical user interface. Alternatively, you can install IBM MQ Explorer with either a silent or a console installation.

Before you begin

Before you install the stand-alone IBM MQ Explorer, review the requirements information in IBM MQ Explorer installation requirements.

If you already have a previous version of IBM MQ Explorer installed, uninstall that version before you proceed with the installation of the new version.

Note: Ensure that the *MQ_EXPLORER_INSTALLATION_PATH*`\jre\jre\lib\ext` directory and its contents have been removed before installing the new version. Failure to do so can result in the installation of the new version failing with the following error:

```
JVMJ9VM149E <JAVA_HOME>/lib/ext is no longer supported. Please add the required libraries/jar
files to the classpath.
```

About this task

After you download the stand-alone IBM MQ Explorer from Fix Central and decompress the files, you can install IBM MQ Explorer in any of the following ways:

- By using the installation wizard.
- By installing silently, with a response file.

- By installing with a console (text-based) installation.

If you require an accessible version of the installer, then use the silent installation mode to install IBM MQ Explorer. A response file is used to configure a silent installation. An example response file, `silent_install.resp` is provided in the same directory as the IBM MQ Explorer setup program. You can modify this example file as required by using a text editor.

Note: If you silently install the stand-alone IBM MQ Explorer on a Windows system with User Account Control (UAC) enabled, you must also remove it silently and not by using **Programs and Features** in the Control Panel.

Procedure

1. Download the Windows version of the stand-alone IBM MQ Explorer.

   Follow this link to Fix Central and select the Windows version of the download package.
2. Create an installation directory on the target system.
3. Decompress the `.zip` file that you downloaded, for example, `10.0.0.0-IBM-MQ-Explorer-Win64.zip`, to this directory.
4. Install IBM MQ Explorer in one of the following ways:
   - To install by using the installation wizard:
     a. Double-click **Setup.exe** and follow the onscreen instructions.
     b. Start the IBM MQ Explorer either by using the **Start** menu entry, or by using the `MQExplorer` executable file in the installation directory.
   - To install silently, by using a response file:
     a. Use a text editor to modify the example response file, `silent_install.resp`, as required. Make your changes in line with the comments in the file.

        Note: Before installing silently, the **`LICENSE_ACCEPTED`** property in the response file must be sent to TRUE to indicate that you agree to the terms of the product license. (The license can be found in the `license` folder of the product `.zip` file).
     b. Start the silent installation by using the following command:

        ```
        Setup.exe -f silent_install.resp
        ```

     The installation then proceeds without any feedback.
   - To install by using a console (text-based) installation, start the installer by using the following command:

     ```
     Setup.exe -i console
     ```

What to do next

After IBM MQ Explorer has been installed, you can run it from the Windows start menu or by using the **`MQExplorer`** command. For more information, see Launching IBM MQ Explorer.

Related tasks
Launching IBM MQ Explorer

Windows Uninstalling the stand-alone IBM MQ Explorer on Windows

On Windows, you can either uninstall the stand-alone IBM MQ Explorer by using the Control Panel or by performing a silent uninstallation.

About this task

On Windows, you can uninstall the stand-alone IBM MQ Explorer by using either **Add or Remove Programs** or **Programs and Features**, unless you installed IBM MQ Explorer silently on a Windows system with User Account Control (UAC). On Windows UAC platforms, if you performed a silent installation, you must also perform the uninstallation silently,

If you see the following error message it is most likely because you are trying to use **Programs and Features** to uninstall an installation of the stand-alone IBM MQ Explorer that was installed silently

```
You do not have sufficient access to uninstall IBM MQ Explorer 10.0.
Please contact your system administrator.
```

.

Procedure

- To uninstall the stand-alone IBM MQ Explorer by using the Control Panel, use either **Add or Remove Programs** or **Programs and Features** as appropriate.
- To perform a silent uninstallation, go to the directory named `_IBM MQ Explorer V10.0_installation` in the installation directory and run the following command:

```
"Change IBM MQ Explorer V10.0 Installation.exe" -i silent
```

Installing and uninstalling IBM MQ Internet Pass-Thru

This section contains tasks to install any uninstall IBM MQ Internet Pass-Thru (MQIPT).

About this task

MQIPT is an optional component of IBM MQ that can be used to implement messaging solutions between remote sites across the internet. For more information about MQIPT, see IBM MQ Internet Pass-Thru

If you are upgrading from a previous version of MQIPT, or applying maintenance to an MQIPT installation, see “Migrating IBM MQ Internet Pass-Thru” on page 506.

Related tasks

Configuring IBM MQ Internet Pass-Thru

Installing MQIPT

IBM MQ Internet Pass-Thru (MQIPT) is available on AIX, Linux, and Windows. You can install MQIPT wherever you want on your computer, and can have several installations on the same system.

About this task

Each installation can be used and maintained separately. For example, you can have different fix pack levels of MQIPT installed in different locations if you choose.

The installation location is not fixed. MQIPT can be installed anywhere on the system. It is not necessary to set the system **PATH** or **CLASSPATH** environment variables to refer to MQIPT.

You might choose to add the MQIPT `bin` directory to the **PATH** environment variable for convenience, but it is not mandatory to do so.

You can also install MQIPT alongside previous versions of MQIPT.

Procedure

To install MQIPT, complete the following steps:

1. Download the MQIPT package for the platform that you require from IBM Fix Central for IBM MQ. The MQIPT packages for IBM MQ 10.0.x are available under the following names:

Platform	Archive file
AIX	`10.0.x.0-IBM-MQIPT-AIXPPC64.tar.Z`
Linux for x86-64	`10.0.x.0-IBM-MQIPT-LinuxX64.tar.gz`
Linux on IBM Z®	`10.0.x.0-IBM-MQIPT-LinuxS390X.tar.gz`
Linux on Power Systems - Little Endian	`10.0.x.0-IBM-MQIPT-LinuxPPC64LE.tar.gz`
Windows (64 bit)	`10.0.x.0-IBM-MQIPT-Win64.zip`

2. Choose the location where you want MQIPT to be installed.

   Create a new directory where you want MQIPT to be installed.

   For example, on AIX and Linux, you might use the following command:

   ```
   mkdir /opt/mqipt/installation1
   ```

   When you unpack the MQIPT installation archive file, a directory called `mqipt` is created, and the installation files are placed in this directory. On Windows, the MQIPT installation archive file also contains a directory called `META-INF` that contains files relating to code signature verification.

3. Unpack the installation archive file into the MQIPT directory by using an appropriate tool for your platform.

   Note: The **`tar`** command on AIX and Linux systems must be run as the root user when installing MQIPT. Failure to run the **`tar`** command as root is likely to result in "permission denied" errors.

   For example, on a Linux platform, you might use the following commands, if the archive file was downloaded to the `/tmp` directory:

   ```
   cd /opt/mqipt/installation1
   su root
   tar xzvf /tmp/10.0.0.0-IBM-MQIPT-LinuxX64.tar.gz
   ```

4. To increase security, set the file permissions for the installed files so that they are read-only:

   - Linux AIX On AIX and Linux systems, you can use the **chmod** command. For example:

     ```
     chmod -R a-w /opt/mqipt/installation1/mqipt
     ```

   - Windows On Windows platforms, right-click the installation directory and select **Properties**. You can change the file permissions on the **Security** tab.

5. If you subsequently receive error message MQCPE080 `Unable to determine MQIPT installation directory`, set the **`MQIPT_PATH`** environment variable to the absolute path of the MQIPT installation directory.

   You do not normally have to set the **PATH** or **CLASSPATH** environment variables for MQIPT because the installation includes a Java runtime environment (JRE). However, under some circumstances (for example, if you use symbolic links), MQIPT commands are unable to determine the installation directory. This can be corrected by setting the **`MQIPT_PATH`** environment variable.

For example, if your installation directory is `/opt/mqipt/installation1/mqipt`, you might use the following commands:

```
MQIPT_PATH=/opt/mqipt/installation1/mqipt
export MQIPT_PATH
```

6. Windows
   On Windows platforms, create MQIPT icons on the Start menu.
   Run the following command from an administrator command prompt:

   ```
   C:\mqipt_path\bin\mqiptIcons -install installation_name
   ```

   where

   - *mqipt_path* is the directory where MQIPT is installed.
   - *installation_name* is a name that you choose to distinguish this installation from any other. The name is appended to the name of the MQIPT icons.

What to do next

Follow the scenarios in Getting started with IBM MQ Internet Pass-Thru to verify that MQIPT is installed correctly, and to configure MQIPT in simple scenarios.

For information on configuring and administering MQIPT, see Administering and configuring IBM MQ Internet Pass-Thru.

Uninstalling MQIPT

Follow this procedure to uninstall MQIPT.

Procedure

1. Make appropriate backups in case you later have to restore any data. See Making backups for details.
2. Prevent the system from trying to start MQIPT automatically, if the MQIPT service has been installed.
   - Linux AIX On AIX and Linux, remove the MQIPT service by changing to the `bin` directory in the MQIPT installation path, and issuing the following command:

     ```
     ./mqiptService -remove
     ```

   - Windows On Windows, follow these steps to stop and remove the MQIPT service:
     a. Stop MQIPT from the Windows services panel.
     b. Open an administration command prompt, go to the `bin` directory in the MQIPT installation path, and enter the command:

        ```
        mqiptService -remove
        ```

   Note: Only the installation of MQIPT that installed the service can be used to remove it. Attempting to remove the service using a different installation causes error MQCPE083.
3. Windows On Windows platforms, remove the MQIPT icons from the **Start** menu by clicking the MQIPT icon, **Remove these icons** on the **Start** menu.
4. Delete the directory where MQIPT is currently installed.
   You will need to have root access to the system in order to delete the MQIPT installation directory.

Linux Installing the stand-alone IBM MQ Web Server

From IBM MQ 9.4.0, you can install the stand-alone IBM MQ Web Server from a download that is available from Fix Central.

About this task

The IBM MQ Web Server runs the IBM MQ Console and REST API. You can download the stand-alone IBM MQ Web Server from Fix Central and install it as a stand-alone application on as many systems as you require.

The stand-alone IBM MQ Web Server is available only on the following platforms:

- Linux for x86-64
- Linux on Power Systems - Little Endian
- Linux on IBM Z

Note: You can also install the IBM MQ Console and REST API as an optional component of an IBM MQ installation. For more information about the installation options for the IBM MQ component that runs the IBM MQ Console and REST API, see The IBM MQ Console and REST API.

Procedure

1. Download the stand-alone IBM MQ Web Server installation file.

   Follow this link to Fix Central. Select the correct version of the download package for your system. The download package is a `tar.gz` file, for example `10.0.0.0-IBM-MQ-Web-Server-LinuxX64.tar.gz`.
2. Create an installation directory on the target system.
3. Decompress the `tar.gz` file that you downloaded to the installation directory.

What to do next

Configure the mqweb server to run the IBM MQ Console and REST API. For more information, see Configuring the stand-alone IBM MQ Web Server.

Maintaining and migrating IBM MQ

Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

About this task

Attention: The information in this section applies to both Continuous Delivery (CD) and Long Term Support (LTS) releases.

Any information that applies specifically to an LTS or CD release is marked with the appropriate icon.

IBM MQ uses the terms *maintenance*, *upgrade* and *migration* as follows:

Maintenance is the application of a fix pack, cumulative security update (CSU), interim fix or Program Temporary Fix (PTF).

Maintenance has one main characteristic. Those fixes, whether they are applied by using a maintenance installation tool, or installed by using a manufacturing refresh on top of an installation, are at the same command level as the existing code. No migration is required after applying maintenance. The installation can be restored to its previous level and any changed queue managers or applications will continue to work at the restored code level. However, you should test applications with the new level of IBM MQ code.

For more information, see “Applying maintenance to IBM MQ” on page 291.

Upgrading is the process of taking an existing IBM MQ installation and upgrading to a new level of code.

Unless you are upgrading the fix level of IBM MQ, but not its command level, an upgrade must be followed by migration. Upgrades can be backed out, as long as no migration has taken place. The process of removing an upgrade varies by platform and how the upgrade was applied. Upgrades that change the command level of IBM MQ require queue manager migration before applications can reconnect.

For more information, see “Upgrading IBM MQ” on page 334.

Migration is the process of updating queue manager data to match a newer level of code.

Migration occurs the first time a queue manager is started with the newer level of code, and always follows an upgrade that changes the queue manager command level, both automatic and manual changes. Migration is the transformation of queue manager data, applications, and the environment that the queue manager runs in. Once migration has occurred, the queue manager can no longer be started by an earlier code level. On most platforms, queue manager migration is not reversible:

- Multi Migration cannot be reversed on IBM MQ for Multiplatforms. This restriction applies whether your enterprise uses the Long Term Support (LTS) release or Continuous Delivery (CD) release model.
- z/OS IBM MQ for z/OS queue managers can only be backwards migrated from an LTS release to an earlier LTS release. This statement also applies to those CD releases that have the same VRM as an LTS release, for example IBM MQ 10.0.0 CD. See IBM MQ release types and versioning.

For more information, see “Migrating IBM MQ” on page 351.

Related concepts

“Characteristics of upgrades and fixes” on page 289
For IBM MQ, the term upgrade applies to upgrading an existing installation of the product to a new level of code. The term fix applies to a change the maintenance level of an existing installation.

Related reference

z/OS IBM MQ for z/OS Program Directory PDF files

Where to find more information about maintaining and migrating

Where to look for more information, for example if you are getting started with migrating and maintaining IBM MQ.

Getting started with maintaining and migrating IBM MQ

If you are not familiar with IBM MQ migration, start by reading the “Migration concepts and methods” on page 356 section. Use these topics to find out more about the concepts that you must understand before planning migration tasks, including the difference between maintenance, migration, and upgrading and which migration paths are supported.

ALW For tutorials to help you with installing and upgrading, see A collection of tutorials for installing and upgrading IBM MQ on AIX, Linux, and Windows. The tutorials cover:

- Preparing a host for IBM MQ.
- Downloading the IBM MQ code.
- Installing and uninstalling the IBM MQ code, and applying fix packs.
- Upgrading from one version of IBM MQ to another, and moving a queue manager from one host to another.

New features and changes in this release

For information about new features and changes in this release, see the following information:

- V 10.0.0 What's new and changed in IBM MQ 10.0.0

New features and changes in earlier releases

Some new features and changes from earlier releases might have an impact on planning your migration because they affect the behavior of existing applications or the automation of management tasks. For information on where to find details of these changes in the product documentation for earlier releases, see What was new and changed in earlier releases.

System requirements and prerequisites

You can use the Software Product Compatibility Reports (SPCR) tool to find information on supported operating systems, system requirements, prerequisites, and optional supported software for IBM MQ. For more information about the SPCR tool and links to reports for each supported platform, see the System Requirements for IBM MQ web page.

For information about limitations and known problems for the current and earlier versions of IBM MQ, see the appropriate product readme file, which is available from the IBM MQ, WebSphere MQ, and MQSeries product readmes web page.

Related concepts

IBM MQ 10.0 in the IBM Documentation Offline app

IBM MQ 10.0 PDF files for product documentation and Program Directories

Characteristics of upgrades and fixes

For IBM MQ, the term upgrade applies to upgrading an existing installation of the product to a new level of code. The term fix applies to a change the maintenance level of an existing installation.

Characteristics of fixes

The application of a fix pack, cumulative security update (CSU), or interim fix on Multiplatforms, or a program temporary fix (PTF) on z/OS is called a fix. You apply fixes by using a maintenance installation tool.

On the following platforms, fixes that are applied by using a maintenance installation tool can be rolled back completely if no queue manager migration has taken place:

- AIX AIX
- Windows Windows
- z/OS z/OS

and IBM MQ is returned to its previous code level.

On all other platforms you must reinstall the product.

Attention: z/OS CD On z/OS Continuous Delivery releases, certain PTFs will increase the modification level, and therefore, should be considered an upgrade.

Characteristics of different types of upgrade

An upgrade can take one of three different forms:

1. Installation of new code on top of existing code. You might be able to roll back an upgrade applied in this way; it depends on the platform. Generally speaking, you cannot roll back the installation of

new code. To restore the old code level, you must retain the old installation media, and any fixes you applied.

2. Removal of the old level of code, followed by installation of the new level. The installers on very few platforms require you to remove an old installation first. Needless to say, to restore the old code level, you must reinstall it and any fixes.
3. Side by side installation.

   - z/OS On z/OS you can install different code levels alongside each other on the same server. In the JCL to start a subsystem, you select the code level to use.
   - ALW On AIX, Linux, and Windows, you associate a queue manager with an installation, and start the queue manager. In IBM MQ, running multiple queue managers at different command levels on the same server is termed queue manager coexistence.

   You must not infer from this, that you can select different installations to run a queue manager at different times. Once a queue manager has been run, it is subject to the rules regarding reverting to earlier or later command levels.

Note: The term upgrade does not imply that an IBM MQ installation can be directly upgraded from one level to another. On some platforms, an upgrade requires that you remove the previous IBM MQ installation. You can retain any queue managers that you have created.

z/OS On z/OS, reversibility of an upgrade has two parts; backout of the installation to the previous code level, and reversion of any queue managers that have been started at the new code level, to work with the previous code level again. See “Upgrade and migration of IBM MQ on z/OS ” on page 462 for more information.

The rules regarding the reversibility of an queue manager to run on a previous code level is dependent on the platform.

On the following platforms, changes in version, release, or modification level are not fully reversible, but changes in fix level are reversible under certain conditions.

- AIX AIX
- Linux Linux
- Windows Windows
- IBM i IBM i

An irreversible upgrade implies that you must back up the queue managers, or your system, before upgrading, to be able to restore your queue managers. Taking a backup of a queue manager requires you to stop the queue manager. If you do not take a backup, you are not able to restore IBM MQ to its previous level. Any changes you make on the new level cannot be restored onto the backup system. Changes include the creation or deletion of persistent messages, and changes to queue managers, channels, topics, and queues.

Related concepts

“Upgrade and migration of IBM MQ on z/OS ” on page 462
You can install new releases of IBM MQ to upgrade IBM MQ to a new version, release or modification (VRM) level. Running a queue manager at a higher level to the one it previously ran on requires migration.

Related tasks

“Applying maintenance to IBM MQ” on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

“Upgrading IBM MQ” on page 334
Upgrading is the process of taking an existing IBM MQ installation and upgrading to a new level of code.

“Migrating IBM MQ” on page 351

Migration is the conversion of programs and data to work with a new code level of IBM MQ. Some types of migration are required, and some are optional. Queue manager migration is never required after applying a maintenance level update, that does not change the command level. Some types of migration are automatic, and some are manual. Queue manager migration is typically automatic and required after releases and manual and optional after a maintenance level upgrade that introduces a new function. Application migration is typically manual and optional.

Applying maintenance to IBM MQ

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Before you begin

This task assumes that you understand the difference between Long Term Support and Continuous Delivery releases, and the maintenance delivery model that applies in each case. For more information, see IBM MQ Release Types and versioning.

About this task

About applying maintenance

Maintenance deliveries for a particular version/release are cumulative, from the initial release. You can apply any higher numbered fix pack or cumulative security update (CSU) of the same version/release to upgrade directly to that version level. You do not have to apply the intervening fixes.

You can also refresh the full version of IBM MQ by installing a manufacturing refresh that is available online or on physical media. The result of installing a manufacturing refresh is the same as applying a maintenance delivery to an earlier fix level of IBM MQ. However, on platforms other than Windows and Linux, there is one important difference: Fix packs and CSUs are applied using a maintenance procedure, manufacturing refreshes are installed using an installation procedure. You can "unapply" a fix pack or CSU to return to the previous fix level you had installed. You can only uninstall a manufacturing refresh, which removes IBM MQ from your system.

In addition to manufacturing refreshes and maintenance deliveries, you might occasionally be directed by IBM Support to apply an interim fix. Interim fixes are also known as emergency or test fixes, and are used to apply urgent updates that cannot wait for the next maintenance delivery. Interim fixes are known by a unique fix name, which will include the target version and platform, and other identifying context, such as a support case reference or APAR number. When you apply a new CSU, fix pack, or manufacturing refresh, all interim fixes are removed. The documentation with maintenance delivery or manufacturing refresh includes a "fix list" page, stating which APAR fixes are included in the deliverable. This list tells you if the APARs associated with the interim fixes that you have applied have been fixed in the latest maintenance. If they have not, check to see if there are new interim fixes, at the new level, for the APARs that concern you. If there are not, consult IBM Support. They might tell you to reapply the interim fix, or they might supply a new interim fix.

You get manufacturing refreshes, maintenance deliveries and interim fixes through Passport Advantage and Fix Central. See “Where to find downloadable installation images” on page 12.

- Manufacturing refreshes are available through Passport Advantage.
- Fix packs and CSUs are available through Fix Central.
- Interim fixes are typically provided directly by IBM Support through a support case, and occasionally provided through Fix Central.

About removing maintenance

An important characteristic of applying maintenance is that it must be reversible. Reversibility implies two things:

1. The previous level of code is fully restored.

2. Changes that are made to IBM MQ objects are compatible. Changes are things like the creation or deletion of persistent messages, changes to queue managers, channels, topics, and queues. New and modified objects continue to work correctly with the restored level of code.

The reversibility of a maintenance package limits the extent of functional changes that are included in a maintenance package. No irreversible changes are included in a maintenance package. But, reversibility has limits. A maintenance package might include new programming and administrative interfaces. If you build new or modified applications to use the new interfaces, those applications do not work if the maintenance package is removed.

On a smaller scale, a fix pack, CSU, or interim fix might introduce a new configuration parameter to solve a problem. If you remove the fix pack, CSU, or interim fix, although the new interface introduced by the change is not available any more, IBM MQ works with any objects that have been changed by the configuration parameter. For example, a new Java system property might introduce a parameter to set a code page for queue manager data conversion. The fix does not change any existing persistent queue manager state information. It can be removed, and the queue manager continues to work as before, but without the capability introduced in the fix.

On different platforms, you employ different mechanisms to install and maintain software releases. Installing a release at a new maintenance level, and applying maintenance level updates to update an earlier release to the same maintenance level, have different results.

When you update the maintenance or fix level of IBM MQ by applying a regular maintenance level update, you can reverse the update by removing the fix. When you update the maintenance or fix level of IBM MQ by applying a maintenance level update containing a new function, you can reverse that update and all previously reversible updates until a queue manager associated with the installation enables the new function.

Maintenance levels and fix levels are both supplied from Fix Central. For information on where to find direct links to specific fix packs, CSUs, and other IBM MQ resources on Fix Central, see IBM MQ downloads.

Procedure

- To check the IBM MQ maintenance level:
  - Type the command **dspmqver**, or **DSPMQMVER** on IBM i. The returned messages include the three-digit VRM or, if maintenance has been applied, the four-digit VRMF.
  - Use the REST API GET method.
  - Linux Windows View the queue manager property panel in IBM MQ Explorer.
  - z/OS Look at the CSQY000I message in the queue manager job log. This message is issued when the queue manager starts, and shows the release level and release type.
- To apply or remove maintenance level updates, follow the appropriate links for the platforms that your enterprise uses.

Related concepts

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

Related tasks

Backing up and restoring a queue manager

AIX Applying and removing maintenance on AIX

Maintenance tasks associated with AIX are grouped in this section.

Related tasks

"Applying maintenance to IBM MQ" on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

AIX *Applying maintenance level updates on AIX*

You apply maintenance level updates to IBM MQ for AIX by using **installp**.

Before you begin

1. Ensure that you have enough disk space to apply maintenance level updates. A maintenance level update requires hard disk space for installation. In addition, the installation process might require a similar amount of disk space to save the previous level. For example, a 16 MB update might require 32 MB of space. The additional space allows a maintenance level update to be removed, and the previous level to be restored automatically.
2. If you are running on a server with multiple IBM MQ installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.

Note: Downloadable installation images for AIX are compressed and have a .Z extension. After downloading the installation image, you need to:

1. Decompress the tar file, by using the following command:

```
uncompress IBM_MQ_9.4.0_AIX.tar.Z
```

2. Extract the installation files from the tar file, by using the following command:

```
tar -xvf IBM_MQ_9.4.0_AIX.tar
```

About this task

To install maintenance level updates to clients and servers, you must first stop any applications that are using the installation and then use the **installp** command to install the update. Alternatively, if the installation is in the default installation location, you can use the *System Management Interface Tool*, SMIT.

Important: You cannot go back from a later version of the product to a prior version of the product, for example from IBM MQ 10.0 to IBM MQ 9.4.

You can apply and remove maintenance from an IBM MQ MQI client that is not installed on the same server as a queue manager. You do not have to stop any queue managers or logon as administrator. Because you do not have to stop any queue managers, do not do steps "1" on page 293 to "4" on page 294 in the following maintenance procedure.

Major full versions of the base product are COMMITTED by default. Fix packs on a full base version can be in APPLIED state, and you can go back one release level.

If you need the ability to revert to an earlier version, you should perform a side-by-side migration, and migrate your queue managers to the later version at any time. See "Migrating on AIX and Linux: side-by-side" on page 424 for further information.

However, if you start a queue manager under IBM MQ 8.0 or later, that queue manager is automatically migrated, and cannot be downgraded to the previous version.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.

3. Stop the mqweb server that is associated with the IBM MQ installation:
   a) Check whether the mqweb server is running by entering the following command:

   ```
   dspmqweb status
   ```

   b) Stop the mqweb server by entering the following command:

   ```
   endmqweb
   ```

4. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

   Run either of the following commands from the installation that you are updating:

   ```
   dspmq -o installation -o status
   dspmq -a
   ```

   dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

   dspmq -a displays the status of active queue managers associated with the installation from which the command is run.

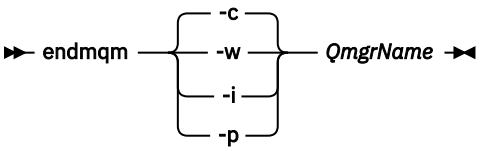
   b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

   ```
   echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
   ```

   c) If the installation includes queue managers in a cluster, suspend the cluster queue managers by using the **SUSPEND QMGR** command.

   For more information, see Maintaining a queue manager in a cluster.

   d) Run the **endmqm** command to stop each running queue manager associated with this installation.



   The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

   For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

   You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

   Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

   Note: “Applying maintenance level updates to multi-instance queue managers on Linux” on page 311 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

e) Stop any listeners associated with the queue managers, using the command:

```
endmqlsr -m QMgrName
```

5. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.
6. Install the update in one of the following ways:

   - Update the whole installation in the default location:

     ```
     installp -agXYd . all
     ```

   - Update selected filesets in the default location:

     ```
     installp -agXYd . list of file sets
     ```

   - Update the whole product in a non-default location using the -R flag:

     ```
     installp -R USIL_Directory -agXYd . all
     ```

   - Update selected filesets in a non-default location using the -R flag:

     ```
     installp -R USIL_Directory -agXYd . list of file sets
     ```

   USIL_Directory is the installation parent directory. IBM MQ is installed underneath the directory. For example, if `/USIL1` is specified, the IBM MQ product files are located in `/USIL1/usr/mqm`. `/USIL1/usr/mqm` is known as the *MQ_INSTALLATION_PATH*.

Related tasks

Stopping a queue manager

Related reference

dspmq

AIX *Reverting to the previous maintenance level on AIX*

You can revert to a previous maintenance level by using the *System Management Interface Tool* (SMIT).

Before you begin

If you are running on a server with multiple IBM MQ installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.

About this task

You can back out maintenance level updates and restore your system to the previous maintenance or installation level, for any component of IBM MQ for AIX that is in the **APPLIED** state.

IBM MQ for AIX uses the following directory trees that are mutually exclusive, which are, for the :

- Executable libraries and shared libraries, is `/usr/mqm`
- Data for the queue managers and other configuration files, is `var/mqm`.

Because the directory trees are mutually exclusive, when you apply or remove maintenance only the files in `usr/mqm` are affected.

The procedure detailed within this topic removes all the maintenance level updates installed. See “Uninstalling a single maintenance level update on AIX” on page 297 for details on removing a single maintenance level update from your system.

You can apply and remove maintenance from an IBM MQ MQI client that is not installed on the same server as a queue manager. You do not have to stop any queue managers or logon as administrator. Because you do not have to stop any queue managers, do not do steps “1” on page 296 to “3” on page 296 in the following maintenance procedure.

Use the following command to display the current state of the IBM MQ for AIX filesets:

```
lslpp [ -R usil ] -l "mqm*"
```

To back out a maintenance update, as the user root, issue the command:

```
installp [ -R usil ] -r "mqm*"
```

Otherwise:

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

      Run either of the following commands from the installation that you are updating:

      ```
      dspmq -o installation -o status
      dspmq -a
      ```

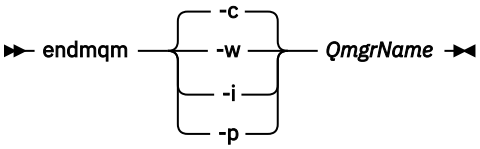
      dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

      dspmq -a displays the status of active queue managers associated with the installation from which the command is run.

   b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```

   c) Run the **endmqm** command to stop each running queue manager associated with this installation.

      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

      You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

Note: "Applying maintenance level updates to multi-instance queue managers on Linux" on page 311 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

d) Stop any listeners associated with the queue managers, using the command:

```
endmqlsr -m QMgrName
```

4. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website. This information also applies to UNIX systems in general.

5. Open the appropriate **smit** panel using this sequence:

```
Software Installation and Maintenance
Software Maintenance and Utilities
Reject Applied Software Updates (Use Previous Version)
```

   Alternatively, use a fast path command, `smit[ty] install_update`.

6. Complete the **SOFTWARE** name field.

   Enter `mqm*` to restore all applicable file set updates to your installation.

   Note: If an option to restore only selected file set updates for IBM MQ for AIX appears, avoid it. The option results in all applicable file set updates for the maintenance level update being restored.

7. Click **Enter** to reject the current maintenance level and reinstate the previous maintenance or installation level.

   a) Accept displayed default values for all other fields

   b) Dismiss the confirmation message

   The reject process starts. While the command runs, it displays progress messages terminating with an **Install Summary** table.

   a) Check the table to see which components of IBM MQ for AIX have been rejected

Related tasks

Stopping a queue manager

"Applying maintenance level updates to multi-instance queue managers on AIX" on page 302
On AIX, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

Related reference

dspmq

DISPLAY LSSTATUS

endmqm (end queue manager)

endmqlsr (end listener)

AIX *Uninstalling a single maintenance level update on AIX*

You can remove a single maintenance level update by using the **installp** command.

About this task

For example, you have installed IBM MQ for AIX 9.1.0.0 base, the IBM MQ for AIX 9.1.0.7 fix pack and the IBM MQ for AIX 9.1.0.8 fix pack.

You want to remove the 9.1.0.8 fix pack and leave the 9.1.0.7 fix pack.

Look at the installp command in the AIX manual, and specifically the information on the **-r** (reject) parameter.

The AIX manual lists a number of options for the **installp -r** parameter, and the one that is relevant is the **-f** *ListFile* option.

The description of the **-f** *ListFile* option includes the following statement: *Output from the installp -l command is suitable for input to this flag*.

You need to obtain a text file using the **installp -l** command. The AIX manual shows the following invocation for **installp -l** parameter:

```
installp { -l | -L } [ -eLogFile ] [ -d Device ] [ -B ] [ -I ] [ -q ] [-E ]
[ -zBlockSize ] [ -O { [ s ] [ u ] } ]
```

Note: The principles apply to a User Specified Installation Location (USIL) by using the **-R** *usil-directory* option, and to other IBM MQ fix packs.

See Life cycle for a USIL in AIX for non-default installations of MQ for more information on a USIL.

Carry out the following procedure to remove the latest 9.1.0.8 fix pack, and leave the base IBM MQ for AIX 9.1.0.0 and 9.1.0.7 fix packs in place.

Procedure

1. Issue the following command, `# lslpp -la "mqm*"`:
   You see the following output:

```
+-----------------------------------------------------------------------------+
INSTALL ROOT PATH = /
+-----------------------------------------------------------------------------+
Fileset Level State Description
-------------------------------------------------------------------------------
Path: /usr/lib/objrepos
mqm.amqp.rte             9.1.0.0 COMMITTED IBM MQ AMQP Service
                  9.1.0.7 APPLIED IBM MQ AMQP Service
                  9.1.0.8 APPLIED IBM MQ AMQP Service
mqm.ams.rte              9.1.0.0 COMMITTED IBM MQ Advanced - Advanced Message Security
                  9.1.0.7 APPLIED IBM MQ Advanced - Advanced Message Security
                  9.1.0.8 APPLIED IBM MQ Advanced - Advanced Message Security
mqm.base.runtime         9.1.0.0 COMMITTED IBM MQ Runtime for Client and Server
                  9.1.0.7 APPLIED IBM MQ Runtime for Client and Server
                  9.1.0.8 APPLIED IBM MQ Runtime for Client and Server
```

2. Go to the original directory where the IBM MQ for AIX `tar.Z` file with the fix pack code, that was downloaded, was stored in the machine and unpacked; for example, `cd /downloads/mq9108`.
   Expand `9.1.0-IBM-MQ-AixPPC64-FP0008.tar.Z` and you see:

```
+++ROOT+++ aglet: /downloads/mq9108
# ls
.toc mqm.msg.Zh_CN.9.1.0.8.U202341
9.1.0-IBM-MQ-AixPPC64-FP0008.tar mqm.msg.Zh_TW.9.1.0.8.U202343
mq9108.installpl.txt mqm.msg.cs_CZ.9.1.0.8.U202327
mqm.amqp.rte.9.1.0.8.U202313 mqm.msg.de_DE.9.1.0.8.U202328
mqm.ams.rte.9.1.0.8.U202312 mqm.msg.en_US.9.1.0.8.U202329
mqm.base.runtime.9.1.0.8.U202314 mqm.msg.es_ES.9.1.0.8.U202330
mqm.base.samples.9.1.0.8.U202315 mqm.msg.fr_FR.9.1.0.8.U202331
mqm.base.sdk.9.1.0.8.U202316 mqm.msg.hu_HU.9.1.0.8.U202332
mqm.client.rte.9.1.0.8.U202317 mqm.msg.it_IT.9.1.0.8.U202333
mqm.ft.agent.9.1.0.8.U202318 mqm.msg.ja_JP.9.1.0.8.U202334
mqm.ft.base.9.1.0.8.U202319 mqm.msg.ko_KR.9.1.0.8.U202336
mqm.ft.logger.9.1.0.8.U202320 mqm.msg.pl_PL.9.1.0.8.U202337
mqm.ft.service.9.1.0.8.U202321 mqm.msg.pt_BR.9.1.0.8.U202338
mqm.ft.tools.9.1.0.8.U202322 mqm.msg.ru_RU.9.1.0.8.U202339
mqm.gskit.rte.9.1.0.8.U202323 mqm.msg.zh_CN.9.1.0.8.U202340
mqm.java.rte.9.1.0.8.U202324 mqm.msg.zh_TW.9.1.0.8.U202342
mqm.jre.rte.9.1.0.8.U202325 mqm.server.rte.9.1.0.8.U202344
```

```
mqm.man.en_US.data.9.1.0.8.U202326 mqm.web.rte.9.1.0.8.U202346
mqm.msg.Ja_JP.9.1.0.8.U202335 mqm.xr.service.9.1.0.8.U202345
```

3. Issue the following command to obtain the text file `mq9108.installpl.txt`, to be used later in the procedure: `# installp -l -d /downloads/mq9108 > mq9108.installpl.txt`

   The output text file looks like the following text.

   Note: Only the first few lines are shown here.

```
 Fileset Name Level I/U Q Content
 ================================================================
 mqm.amqp.rte 9.1.0.8 S N usr (R)
# IBM MQ AMQP Service
 mqm.ams.rte 9.1.0.8 S N usr (R)
# IBM MQ Advanced - Advanced Message Security
 mqm.base.runtime 9.1.0.8 S N usr,root (R)
# IBM MQ Runtime for Client and Server
 mqm.base.samples 9.1.0.8 S N usr (R)
# IBM MQ Samples
```

4. Use the output file from Step "3" on page 299 as input to the following command: `# installp -r -f mq9108.installpl.txt`

```
Verifying selections...
done
Verifying requisites...done
Results...
SUCCESSES
---------
 Filesets listed in this section passed pre-reject verification
 and will be rejected.
 Selected Filesets
 -----------------Page 5 of 5
 mqm.amqp.rte 9.1.0.8 # IBM MQ AMQP Service
 mqm.ams.rte 9.1.0.8 # IBM MQ Advanced - Advanced M...
 mqm.base.runtime 9.1.0.8 # IBM MQ Runtime for Client an...
...
+-----------------------------------------------------------------------------+
Installation Summary
--------------------
Name         Level   Part       Event Result
-------------------------------------------------------------------------------
mqm.amqp.rte 9.1.0.8 USR REJECT SUCCESS
mqm.ams.rte 9.1.0.8 USR REJECT SUCCESS
mqm.base.runtime 9.1.0.8 ROOT REJECT SUCCESS
```

Attention: Note the following:

a. There will be around 30-40 blank lines following "*Verifying selections...*" and it took some time. you need to wait until the command produces meaningful output.

b. The output in the preceding text shows only a few lines of the final summary at the end and the result column shows SUCCESS.

5. Issue the command `# lslpp -la "mqm*"` again, and you see that the ones for 9.1.0.8 are no longer included:

   You see the following output:

```
+-----------------------------------------------------------------------------+
INSTALL ROOT PATH = /
+-----------------------------------------------------------------------------+
Fileset Level State Description
----------------------------------------------------------------------------
Path: /usr/lib/objrepos
mqm.amqp.rte             9.1.0.0 COMMITTED IBM MQ AMQP Service
                 9.1.0.7 APPLIED IBM MQ AMQP Service
mqm.ams.rte              9.1.0.0 COMMITTED IBM MQ Advanced - Advanced Message Security
                 9.1.0.7 APPLIED IBM MQ Advanced - Advanced Message Security
mqm.base.runtime         9.1.0.0 COMMITTED IBM MQ Runtime for Client and Server
                 9.1.0.7 APPLIED IBM MQ Runtime for Client and Server
```

Related tasks

"Reverting to the previous maintenance level on AIX" on page 295
You can revert to a previous maintenance level by using the *System Management Interface Tool* (SMIT).

AIX *Staging maintenance level updates on AIX*

On AIX, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

Before you begin

The steps in this task are based on an example scenario in which it is assumed that you have two copies of IBM MQ named `Inst_1` and `Inst_2`, and a number of applications and two queue managers, `QM1` and `QM2`, running on a server. To set up your configuration for this scenario, complete the following steps:

1. Install two copies of IBM MQ. In this example, they are named `Inst_1` and `Inst_2`.
2. Make `Inst_1` primary by running **`setmqinst`**.
3. Associate all the queue managers on the server with `Inst_1` by running **`setmqm`**.
4. Start all the queue managers on the server.

Note: From 1Q 2023, for Multiplatforms, there are two types of maintenance:

- Fix packs, which contain roll-ups of all defects fixed since the previous fix pack delivery (or GA). Fix packs are produced exclusively for Long Term Support (LTS) releases during their normal support lifecycle.
- Cumulative security updates (CSUs), which are smaller updates and contain security patches released since the previous maintenance (GA). CSUs are produced for LTS releases (including releases in extended support), and also for the latest IBM MQ Continuous Delivery (CD) release, as required to deliver relevant security patches.

For maintenance releases in or after 1Q 2023, the fourth value in the VRMF (that is, the "F" value) represents either a fix pack number or a CSU number. Both types of maintenance are mutually cumulative (that is, they contain everything included in older CSUs and fix packs), and both are installed using the same mechanisms for applying maintenance. Both types of maintenance update the F-value of the VRMF to a higher number than any previous maintenance: fix packs use "F" values divisible by 5, CSUs use "F" values not divisible by 5.

For maintenance releases before 1Q 2023, the fourth value in the VRMF always represents the fix pack level. For example, the first fix pack of the IBM MQ 9.3.0 LTS release is numbered 9.3.0.1.

For more information, see Changes to IBM MQ's maintenance delivery model.

About this task

You can install multiple copies of IBM MQ on a server to stage the release of IBM MQ maintenance level updates. For example, as in the scenario that is described in the task steps, by using two installations to roll out maintenance level updates, you maintain two maintenance levels on a server, with the aim of getting all queue managers and applications to the production maintenance level before replacing the previous level of maintenance with the next level.

Which installation an application uses is driven by the queue manager that an application connects to. The **`setmqm`** command associates a queue manager with an installation. You can associate a queue manager with a different installation as long as the installation is at the same or higher command level. In this scenario, all the installations are at the same command level. You can associate or reassociate a queue manager with either of the installations running any of the fix packs or cumulative security updates (CSUs).

In this scenario, an application links to the primary installation. When it connects to a queue manager, IBM MQ switches the linkage to the installation associated with the queue manager; see "Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374.

For applications built with the link options described in the product documentation, the simplest way to configure the link library search path for IBM MQ applications is to make an installation primary. Only if it is important to pick up a fix in the IBM MQ link library itself, must you review the search path. Either you must make the installation with the IBM MQ link library fix primary, or make a local adjustment for the application, perhaps by running the **setmqenv** command.

Running commands is a different matter. Commands are always run from the primary installation, or the installation you have selected by running the **setmqenv** command. If you run a command from the wrong installation, the command fails. For example, if QM1 is associated with Inst_1, running the command *Inst_2_Installation_path*/bin/strmqm QM1 fails.

Procedure

Apply the first maintenance level update to Inst_2.

1. Download the first fix pack or cumulative security update (CSU) for the version of your product when it is released.

   See "Where to find downloadable installation images" on page 12.
2. Apply the fix pack or cumulative security update (CSU) that you downloaded to Inst_2.

   For more information, see "Applying maintenance level updates on AIX" on page 293.
3. Verify Inst_2.
4. Transfer the queue managers to Inst_2 one at a time.
   a) Stop QM1 and the applications connected to it.

      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      Note: "Applying maintenance level updates to multi-instance queue managers on AIX" on page 302 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

   b) Set up the local environment to the installation Inst_2.

      ```
      . Inst_2_INSTALLATION_PATH/bin/setmqenv -s
      ```

   c) Associate the queue manager with Inst_2.

      ```
      setmqm -m QM1 -n Inst_2
      ```

   d) Start QM1.

      ```
      strmqm QM1
      ```

   e) Repeat substeps c and d for QM2.
5. Set Inst_2 primary.

   ```
   Inst_2_INSTALLATION_PATH/bin/setmqinst -i -n Inst_2
   ```

Apply the second maintenance level update to Inst_1.

6. Download the next fix pack or cumulative security update (CSU), for the version of your product when it is released.

   For more information, see "Where to find downloadable installation images" on page 12.
7. Apply the fix pack or cumulative security update (CSU), that you have just downloaded to Inst_1.
8. Verify Inst_1.
9. Transfer the queue managers to Inst_1 one at a time.

   Follow the procedure in step "4" on page 301, replacing Inst_2 by Inst_1 in the instructions.
10. Set Inst_1 primary.

    ```
    Inst_1_INSTALLATION_PATH/bin/setmqinst -i -n Inst_1
    ```

For subsequent maintenance updates, alternate between `Inst_2` and `Inst_1`.

11. Alternate between repeating steps "1" on page 301 to "5" on page 301 for `Inst_2` and steps "6" on page 301 to "10" on page 301 for `Inst_1`.

Related concepts

"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

"Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Associating a queue manager with an installation
Changing the primary installation

Related reference

setmqenv
setmqinst
setmqm

AIX *Applying maintenance level updates to multi-instance queue managers on AIX*

On AIX, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

Before you begin

Before starting this task, read through the prerequisites described in *Before you begin* in "Applying maintenance level updates on AIX" on page 293.

Before starting this task, see that the maintenance is applied to the IBM MQ installation on a server and not to individual queue managers. Before you apply maintenance, you must stop all the queue managers, and any IBM MQ service, on a server.

If you want a queue manager to keep running while maintenance is applied, you must configure it as a multi-instance queue manager, and have a standby instance running on another server. If the queue manager that you want to keep running is an existing single instance queue manager, you must convert it to a multi-instance queue manager. For prerequisites and guidance how to create a multi-instance queue manager, see Multi-instance queue managers.

If you are running multi-instance queue managers, you then can apply a maintenance update to a running queue manager by switching the active instance to a different server.

Typically, active and standby installations are maintained at the same maintenance level. Consult the maintenance instructions for each update. Consult the instructions to see if it is possible to run the active and standby instances at different maintenance levels. Check whether fail over from higher to lower, or only lower to higher maintenance level is possible.

The instructions for applying a maintenance update might require you to stop a multi-instance queue manager completely.

If you have a primary server for running active queue manager instances, and a secondary server that runs standby instances, you have a choice of updating the primary or secondary server first. If you update the secondary server first, you must switch back to the primary server when both servers have been updated.

If you have active and standby instances on several servers, you must plan in what order you update the servers to minimize the disruption caused by ending the active instances on each server you update.

About this task

Combine the steps in this task with the maintenance update procedure for applying maintenance to an IBM MQ server installation.

Procedure

1. Where the maintenance update procedure instructs you to stop all running queue managers, or quiesce IBM MQ do the following instead:

   See: "Applying and removing maintenance on AIX" on page 293

   a) If the queue manager is running as standby:

      - End the standby with the **endmqm** `-x` *QMgrName* command.

   b) If the queue manager is running as the active instance:

      End the instance and transfer control to the standby instance with the **endmqm** command. For example, **endmqm** *-shutdown_option* `-s` *QMgrName*, where *-shutdown_option* is an optional parameter specifying the type of shutdown. For more information, see endmqm.

      If there is no standby instance running, the command fails, and you must start a standby instance on a different server.

   c) If a queue manager is running as a single instance queue manager, you have no alternative but to stop the queue manager before applying the maintenance update.

   When you complete this step, no queue manager instances are left running on the server you intend to update.
2. Continue with the maintenance update procedure, following the step to issue the **endmqm** command, or quiesce IBM MQ and apply maintenance to the IBM MQ server.
3. When you have completed the maintenance update, restart all the queue managers on the IBM MQ server, permitting standby instances:

   Use the following command:

   ```
   strmqm -x QmgrName
   ```
4. Repeat the procedure on the standby server, to update its maintenance level.
5. If necessary, switch the active instances back to the primary servers:

   Use the **endmqm** *-shutdown_option* `-s` *QMgrName* command, and the restart the instances using the **strmqm** `-x` *QmgrName* command.

IBM i Applying and removing maintenance on IBM i

Maintenance tasks associated with IBM i platforms are grouped in this section.

Procedure

- To apply maintenance level updates, see "Applying maintenance level updates on IBM i" on page 304.
- To restore a queue manager to the previous version of the product from the latest version, see "Restoring a queue manager to a previous release on IBM i" on page 306.
- For information on how to use use multi-instance queue managers to reduce the outage caused by applying maintenance updates, see "Applying maintenance updates to multi-instance queue managers on IBM i" on page 307.

Related tasks

"Applying maintenance to IBM MQ" on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

IBM i *Applying maintenance level updates on IBM i*

You apply maintenance level updates on the latest release by stopping IBM MQ and using the IBM i standard maintenance procedure.

Before you begin

To find out what version you have currently installed, use the following commands:

Table 36. IBM MQ commands to display the installed versions

IBM MQ Product	Version command
IBM MQ Server	`DSPMQMVER`

IBM MQ Java	IBM MQ classes for Java:
	`java com.ibm.mq.MQJavaLevel`
	Note: For this command to work, you might need to set your environment classpath to include:
	• `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.jar`
	IBM MQ classes for Java Message Service:
	`java com.ibm.mq.jms.MQJMSLevel`
	Note: For this command to work, you might need to set your environment classpath to include:
	• `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.jakarta.client.jar` (Jakarta Messaging 3.0) or `/QIBM/ProdData/mqm/java/lib/com.ibm.mq.allclient.jar` (JMS 2.0)
	See Environment variables relevant to IBM MQ classes for Java and Environment variables relevant to IBM MQ classes for JMS.

IBM MQ Client	`DSPMQMVER`

About this task

Maintenance updates for IBM i are supplied as PTFs (Program Temporary Fixes). They are available for download from the web as save files, which are normally stored in the QGPL library. IBM i PTF's can be found in Fix Central.

Procedure

Prepare to quiesce queue managers:

1. Read the cover letter carefully to see if you need to take any special actions.
2. Sign on to a new interactive IBM i session, ensuring that you are not accessing any IBM MQ objects.
3. Ensure that you have the following authorities:
   - `*ALLOBJ` authority, or object management authority for the `QMQM` library.
   - Sufficient authority to use the ENDSBS command.
4. Warn all users that you are going to stop IBM MQ.

5. Stop the mqweb server by entering the following command:

```
ENDMQWEB
```

Quiesce all queue managers:

6. Run the ENDMQM command:

```
ENDMQM MQMNAME(*ALL) OPTION(*CNTRLD) ENDCCTJOB(*YES) RCDMQMIMG(*YES)
TIMEOUT( 15 )
```

Where *15* is a timeout value in seconds.

If the ENDMQM command has not completed within a reasonable period (at least 10 minutes), use the WRKMQM command. This command identifies the queue managers that are still ending. Then force each one in turn to stop by running the following command:

```
ENDMQM MQMNAME( QMGRNAME ) OPTION(*IMMED)
```

Where *QMGRNAME* is the name of the queue manager.

Complete the tidying up of shared memory by running the following command:

```
ENDMQM MQMNAME(*ALL) OPTION(*IMMED) ENDCCTJOB(*YES) RCDMQMIMG(*NO)
TIMEOUT( 15 )
```

If the commands in the previous step do not complete, end the subsystem immediately:

7. Run the following command:

```
ENDSBS SBS(QMQM) OPTION(*IMMED)
```

If the command in the previous step also does not complete, use the operating system command ENDJOB to end all jobs in the subsystem QMQM:

Note: Do not use ENDJOBABN unless you intend to perform an IPL on the machine before starting IBM MQ. Ending IBM MQ jobs using ENDJOBABN can lead to damaged semaphores, which in turn can prevent your queue manager from starting.

8. If a QMGR must be shut down manually, end the jobs (ENDJOB) in the following order. Wait a few minutes for AMQA* or AMQZ* jobs to tidy up.
    a. RUNMQLSR - TCP listener (multi-threaded)
    b. AMQCLMAA - TCP listener (single-threaded)
    c. AMQRMPPA - Channel process pooling job
    d. RUNMQCHI - channel initiator
    e. AMQCRSTA - receiving MCA jobs
    f. RUNMQCHL - sending MCA jobs
    g. AMQCRS6B - LU62 receiver channel
    h. AMQPCSEA - command server
    i. RUNMQTRM - Application trigger monitor
    j. RUNMQDLQ - Dead letter queue handler
    k. AMQFCXBA - IBM Integration Bus Worker Job
    l. AMQFQPUB - Queued Publish/Subscribe Daemon
    m. RUNMQBRK - IBM Integration Bus Control Job
    n. AMQZMUC0 ('0' is a zero) - Utility Manager
    o. AMQZMUF0 ('0' is a zero) - Utility Manager
    p. AMQZMUR0 ('0' is a zero) - Utility Manager
    q. AMQZMGR0 ('0' is a zero) - Process Controller

r. AMQRRMFA - cluster repository manager
s. AMQZDMAA - deferred message manager
t. AMQZFUMA - object authority manager
u. AMQZLSA0 ('0' is a zero) - LQM agents
v. AMQZLAA0 ('0' is a zero) - LQM agents
w. AMQZXMA0 ('0' is a zero) - Execution Controller

9. Run the following command:

```
ENDMQM MQMNAME( QMGRNAME ) OPTION(*IMMED)
```

10. Run the following command:

```
ENDMQM MQMNAME(*ALL) OPTION(*CNTRLD) ENDCCTJOB(*YES) RCDMQMIMG(*NO)
TIMEOUT( 05 )
```

Where *05* is a timeout value in seconds.

11. Manually clean up shared memory.

Run the following command:

```
EDTF '/QIBM/UserData/mqm/qmgrs'
```

then:

a. Take option 5 for **&SYSTEM** and check that the following directories are empty: `isem, esem, msem, ssem,` and `shmem`.
b. Take option 5 for **QMGRNAME** and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.
c. Take option 5 for **&ipcc** in the QMGRNAME directory and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.
d. Take option 5 for **&qmpersist** in the QMGRNAME directory and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.
e. Take option 5 for **&app** and check that the following directories are empty: `isem, esem, msem, ssem,` and `shmem`.

Apply a PTF:

12. Load and apply a PTF.

IBM i *Restoring a queue manager to a previous release on IBM i*

On IBM i, you can restore a queue manager to the previous version of the product from the latest version, if you have made a backup of the system or queue manager. If you have started the queue manager and processed any messages, or changed the configuration, the task cannot give you any guidance on restoring the current state of the queue manager.

Before you begin

1. You must have made a backup of the system or queue manager before you upgraded to the later version. For more information, see Backing up and restoring IBM MQ queue manager data.
2. If any messages were processed after starting the queue manager, you cannot easily undo the effects of processing the messages. You cannot revert the queue manager to the earlier version of the product in its current state. The task cannot give you any guidance how to deal with subsequent changes that have occurred. For example, messages that were indoubt in a channel, or in a transmission queue on another queue manager, might have been processed. If the queue manager is part of a cluster, then configuration messages and application messages might have been exchanged.

About this task

When you revert to a earlier version of a queue manager, you revert the queue manager to its earlier code level. Queue manager data is reverted to the state it was in when the queue manager was backed up.

Important: If the queue manager is a member of one or more IBM MQ clusters, you should also refer to Clustering: Availability, multi-instance, and disaster recovery for more information and review and follow the steps described in Recovering a cluster queue manager.

Procedure

1. Stop the queue manager.
2. If you performed a slip installation, you must reinstall IBM MQ.
   a) Uninstall the earlier installation.
   b) Reinstall the product from a manufacturing refresh.
   c) Apply the fix pack and interim fixes that restore IBM MQ to its previous level.
   d) Restore the queue manager data from the backup taken before installing the later version.
3. Restart the earlier version queue manager.

Related tasks

Backing up and restoring a queue manager

IBM i *Applying maintenance updates to multi-instance queue managers on IBM i*

On IBM i, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

Before you begin

Before starting this task, see that the maintenance is applied to the IBM MQ installation on a server and not to individual queue managers. Before you apply maintenance, you must stop all the queue managers, and any IBM MQ service, on a server.

If you want a queue manager to keep running while maintenance is applied, you must configure it as a multi-instance queue manager, and have a standby instance running on another server. If the queue manager that you want to keep running is an existing single instance queue manager, you must convert it to a multi-instance queue manager. For prerequisites and guidance how to create a multi-instance queue manager, see Multi-instance queue managers.

If you are running multi-instance queue managers, you then can apply a maintenance update to a running queue manager by switching the active instance to a different server.

Typically, active and standby installations are maintained at the same maintenance level. Consult the maintenance instructions for each update. Consult the instructions to see if it is possible to run the active and standby instances at different maintenance levels. Check whether fail over from higher to lower, or only lower to higher maintenance level is possible.

The instructions for applying a maintenance update might require you to stop a multi-instance queue manager completely.

If you have a primary server for running active queue manager instances, and a secondary server that runs standby instances, you have a choice of updating the primary or secondary server first. If you update the secondary server first, you must switch back to the primary server when both servers have been updated.

If you have active and standby instances on several servers, you must plan in what order you update the servers to minimize the disruption caused by ending the active instances on each server you update.

About this task

Combine the steps in this task with the maintenance update procedure for applying maintenance to an IBM MQ server installation.

Procedure

1. Where the maintenance update procedure instructs you to stop all running queue managers, or quiesce IBM MQ do the following instead:

   See: “Applying and removing maintenance on IBM i” on page 303.

   a) If the queue manager is running as standby:

      End the standby by adding the `INSTANCE(*STANDBY)` option to the **ENDMQM** command.

   b) If the queue manager is running as the active instance:

      End the instance and transfer control to the standby instance by adding the `ALWSWITCH(*YES)` option to the **ENDMQM** command.

      If there is no standby instance running, the command fails, and you must start a standby instance on a different server.

   c) If a queue manager is running as a single instance queue manager, you have no alternative but to stop the queue manager before applying the maintenance update.

   When you complete this step, no queue manager instances are left running on the server you intend to update.
2. Continue with the maintenance update procedure, following the step to issue the **endmqm** command, or quiesce IBM MQ and apply maintenance to the IBM MQ server.
3. When you have completed the maintenance update, restart all the queue managers on the IBM MQ server, permitting standby instances:

   Add the `STANDBY(*YES)` option to the **STRMQM** command.
4. Repeat the procedure on the standby server, to update its maintenance level.
5. If necessary, switch the active instances back to the primary servers:

   Use the **ENDMQM** command with the `ALWSWITCH(*YES)` option, and then restart the instances using the **STRMQM** command with the `STANDBY(*YES)` option.

Linux Applying and removing maintenance on Linux

Maintenance tasks associated with Linux are grouped in this section.

Related tasks

“Applying maintenance to IBM MQ” on page 291

Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Applying maintenance on Linux

From IBM MQ 9.4.0, you apply maintenance by upgrading IBM MQ.

About this task

Maintenance updates are cumulative. You can apply your chosen update directly, without applying any previous updates first. The maintenance level updates might contain updates for one or more packages. Apply those parts of an update that correspond to the packages that are applied in your installation.

Procedure

- To upgrade by using rpm, follow the steps in “Upgrading an IBM MQ installation on Linux using the rpm command” on page 336.
- To upgrade by using dnf, follow the steps in “Upgrading an IBM MQ installation on Linux Red Hat using dnf” on page 339.
- To upgrade by using dpkg, follow the steps in “Upgrading an IBM MQ installation on Linux Ubuntu using dpkg” on page 342.
- To upgrade by using apt, follow the steps in “Upgrading an IBM MQ installation on Linux Ubuntu using apt” on page 344.

Linux *Staging maintenance level updates on Linux*

On Linux, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

Before you begin

The steps in this task are based on an example scenario in which it is assumed that you have two copies of IBM MQ named `Inst_1` and `Inst_2`, and a number of applications and two queue managers, `QM1` and `QM2`, running on a server. To set up your configuration for this scenario, complete the following steps:

1. Install two copies of IBM MQ. In this example, they are named `Inst_1` and `Inst_2`.
2. Make `Inst_1` primary by running **setmqinst**.
3. Associate all the queue managers on the server with `Inst_1` by running **setmqm**.
4. Start all the queue managers on the server.
5. Show and connect all direct connections with the queue managers associated with `Inst_1` in IBM MQ Explorer.
6. Set up remote connections to all the queue managers in each instance of IBM MQ Explorer.

Note: From 1Q 2023, for Multiplatforms, there are two types of maintenance:

- Fix packs, which contain roll-ups of all defects fixed since the previous fix pack delivery (or GA). Fix packs are produced exclusively for Long Term Support (LTS) releases during their normal support lifecycle.
- Cumulative security updates (CSUs), which are smaller updates and contain security patches released since the previous maintenance (GA). CSUs are produced for LTS releases (including releases in extended support), and also for the latest IBM MQ Continuous Delivery (CD) release, as required to deliver relevant security patches.

For maintenance releases in or after 1Q 2023, the fourth value in the VRMF (that is, the "F" value) represents either a fix pack number or a CSU number. Both types of maintenance are mutually cumulative (that is, they contain everything included in older CSUs and fix packs), and both are installed using the same mechanisms for applying maintenance. Both types of maintenance update the F-value of the VRMF to a higher number than any previous maintenance: fix packs use "F" values divisible by 5, CSUs use "F" values not divisible by 5.

For maintenance releases before 1Q 2023, the fourth value in the VRMF always represents the fix pack level. For example, the first fix pack of the IBM MQ 9.3.0 LTS release is numbered 9.3.0.1.

For more information, see Changes to IBM MQ's maintenance delivery model.

About this task

You can install multiple copies of IBM MQ on a server to stage the release of IBM MQ maintenance level updates. For example, as in the scenario that is described in the task steps, by using two installations to roll out maintenance level updates, you maintain two maintenance levels on a server, with the aim of getting all queue managers and applications to the production maintenance level before replacing the previous level of maintenance with the next level.

Which installation an application uses is driven by the queue manager that an application connects to. The **setmqm** command associates a queue manager with an installation. You can associate a queue manager with a different installation as long as the installation is at the same or higher command level. In this scenario, all the installations are at the same command level. You can associate or reassociate a queue manager with either of the installations running any of the fix packs or cumulative security updates (CSUs).

In this scenario, an application links to the primary installation. When it connects to a queue manager, IBM MQ switches the linkage to the installation associated with the queue manager; see “Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374.

For applications built with the link options described in the product documentation, the simplest way to configure the link library search path for IBM MQ applications is to make an installation primary. Only if it is important to pick up a fix in the IBM MQ link library itself, must you review the search path. Either you must make the installation with the IBM MQ link library fix primary, or make a local adjustment for the application, perhaps by running the **setmqenv** command.

Running commands is a different matter. Commands are always run from the primary installation, or the installation you have selected by running the **setmqenv** command. If you run a command from the wrong installation, the command fails. For example, if QM1 is associated with Inst_1, running the command, Inst_2_Installation_path/bin/strmqm QM1 fails.

Linux If you are using IBM MQ Explorer and you have two installations, you also have two IBM MQ Explorer instances. One linked to one installation, and one to the other. Each IBM MQ Explorer shows locally connected queue managers that are associated with the same installation as the instance of IBM MQ Explorer. To monitor all the queue managers on a server, set up remote connections to the queue managers associated with the other installations.

Procedure

Apply the first maintenance level update to Inst_2.

1. Download the first fix pack or cumulative security update (CSU) when it is released.
   For more information, see "Where to find downloadable installation images" on page 12.
2. Apply the fix pack or cumulative security update (CSU) you downloaded to Inst_2.
   For more information, see "Applying maintenance on Linux" on page 308.
3. Verify Inst_2.
4. Transfer the queue managers to Inst_2 one at a time.
   a) Stop QM1 and the applications connected to it.
      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      Note: "Applying maintenance level updates to multi-instance queue managers on Linux" on page 311 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.
   b) Set up the local environment to the installation Inst_2.

      ```
      . Inst_2_INSTALLATION_PATH/bin/setmqenv -s
      ```
   c) Associate the queue manager with Inst_2.

      ```
      setmqm -m QM1 -n Inst_2
      ```
   d) Start QM1.

      ```
      strmqm QM1
      ```
   e) Repeat substeps c and d for QM2.
   f) Linux
      Set up IBM MQ Explorer for Inst_2.
      i) Start the Inst_2 instance of IBM MQ Explorer
      ii) Click **IBM MQ** > **Queue Managers** > **Show/Hide Queue Managers...** >
      iii) Click each directly connected queue manager listed in the **Hidden Queue Managers** list > **Show**.
      iv) Click **Close**.
5. Set Inst_2 primary.

```
Inst_2_INSTALLATION_PATH/bin/setmqinst -i -n Inst_2
```

Apply the second maintenance level update to `Inst_1`.

6. Download the next fix pack or cumulative security update (CSU), for the version of your product when it is released.

   For more information, see "Where to find downloadable installation images" on page 12.
7. Apply the fix pack or cumulative security update (CSU), that you have just downloaded to `Inst_1`.

   For more information, see "Applying maintenance on Linux" on page 308.
8. Verify `Inst_1`.
9. Transfer queue managers to `Inst_1` one at a time.
   a) Follow the procedure in step "4" on page 310

      Replacing `Inst_2` by `Inst_1` in the instructions.
10. Set `Inst_1` primary.

```
Inst_1_INSTALLATION_PATH/bin/setmqinst -i -n Inst_1
```

For subsequent maintenance fixes, alternate between `Inst_2` and `Inst_1`.

11. Alternate between repeating steps "1" on page 310 to "5" on page 310 for `Inst_2` and steps "6" on page 311 to "10" on page 311 for `Inst_1`.

Related concepts

"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

"Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Associating a queue manager with an installation
Changing the primary installation

Related reference

setmqenv
setmqinst
setmqm

Linux *Applying maintenance level updates to multi-instance queue managers on Linux*

On Linux, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

Before you begin

Before starting this task, see that the maintenance is applied to the IBM MQ installation on a server and not to individual queue managers. Before you apply maintenance, you must stop all the queue managers, and any IBM MQ service, on a server.

If you want a queue manager to keep running while maintenance is applied, you must configure it as a multi-instance queue manager, and have a standby instance running on another server. If the queue manager that you want to keep running is an existing single instance queue manager, you must convert it to a multi-instance queue manager. For prerequisites and guidance how to create a multi-instance queue manager, see Multi-instance queue managers.

If you are running multi-instance queue managers, you then can apply a maintenance update to a running queue manager by switching the active instance to a different server.

Typically, active and standby installations are maintained at the same maintenance level. Consult the maintenance instructions for each update. Consult the instructions to see if it is possible to run the active and standby instances at different maintenance levels. Check whether fail over from higher to lower, or only lower to higher maintenance level is possible.

The instructions for applying a maintenance update might require you to stop a multi-instance queue manager completely.

If you have a primary server for running active queue manager instances, and a secondary server that runs standby instances, you have a choice of updating the primary or secondary server first. If you update the secondary server first, you must switch back to the primary server when both servers have been updated.

If you have active and standby instances on several servers, you must plan in what order you update the servers to minimize the disruption caused by ending the active instances on each server you update.

About this task

Combine the steps in this task with the maintenance update procedure for applying maintenance to an IBM MQ server installation.

Procedure

1. Ensure that no queue manager instances are running on the server that you intend to apply maintenance to:
   - If the queue manager is running as standby, end the standby with the following command:

     ```
     endmqm -x QMgrName
     ```

   - If the queue manager is running as the active instance, end the instance and transfer control to the standby instance with the **endmqm** command. For example:

     ```
     endmqm -shutdown_option -s QMgrName
     ```

     where *-shutdown_option* is an optional parameter specifying the type of shutdown. For more information, see endmqm.

     If there is no standby instance running, the command fails, and you must start a standby instance on a different server.
   - If a queue manager is running as a single instance queue manager, you have no alternative but to stop the queue manager before applying the maintenance update.

   When you complete this step, no queue manager instances are left running on the server you intend to update.
2. From IBM MQ 9.4.0, you install the maintenance updates by upgrading IBM MQ. Follow the appropriate steps outlined in one of the following topics to install the maintenance updates on the server:
   - To upgrade by using rpm, follow the steps in “Upgrading an IBM MQ installation on Linux using the rpm command” on page 336.
   - To upgrade by using dnf, follow the steps in “Upgrading an IBM MQ installation on Linux Red Hat using dnf” on page 339.
   - To upgrade by using dpkg, follow the steps in “Upgrading an IBM MQ installation on Linux Ubuntu using dpkg” on page 342.
   - To upgrade by using apt, follow the steps in “Upgrading an IBM MQ installation on Linux Ubuntu using apt” on page 344.

3. When you have completed the maintenance update, restart all the queue managers on the IBM MQ server, permitting standby instances:

   Use the following command:

   ```
   strmqm -x QmgrName
   ```

4. Repeat the procedure on the standby server to update its maintenance level.
5. If necessary, switch the active instances back to the primary servers:

   a) End the instances by using the following command:

   ```
   endmqm -shutdown_option -s QMgrName
   ```

   where *-shutdown_option* is an optional parameter specifying the type of shutdown. For more information, see endmqm.

   b) Restart the instances by using the following command:

   ```
   strmqm -x QMgrName
   ```

Applying maintenance level updates for RDQM
There are different procedures for applying maintenance level updates to a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

RDQM HA

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Change into the directory containing the maintenance packages.
3. Suspend the HA group on the node, by entering the following command:

   ```
   rdqmadm -s
   ```

4. If DRBD has been updated in the Fix Pack, complete the following steps:

   a. Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories. For example, on a RHEL 8.10 system, running the helper script `Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

   ```
   kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
   ```

   b. Update the appropriate DRBD kernel module that you identified. For example, for RHEL 8.10 you run the following command:

   ```
   dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
   ```

   c. Update the DRBD utilities. For example, for RHEL 8 you run the following command:

   ```
   dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
   ```

5. If Pacemaker has been updated in the Fix Pack, update it in RDQM. For example, for RHEL 8, run the following command:

   ```
   dnf install --allowerasing Advanced/RDQM/PreReqs/el8/pacemaker-2/*
   ```

6. Apply the FixPack by using the procedure for upgrading on Linux using dnf, see "Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339. For an RDQM install, the minimum packages are:

```
dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime* Advanced/RDQM/MQSeriesRDQM*
```

7. If DRBD or Pacemaker have been updated in the Fix Pack, reboot the node, for example:

```
reboot
```

8. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

9. Proceed to the next node in the HA group and repeat the procedure.

RDQM DR

1. Apply maintenance level updates for DR RDQM on the DR secondary node:
   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.
   b. Change into the directory containing the maintenance packages.
   c. If DRBD has been updated in the Fix Pack, complete the following steps:
      i) Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the kmod-drbd-9 directories. For example, on a RHEL 8.10 system, running the helper script Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

      ii) Update the appropriate DRBD kernel module that you identified. For example, for RHEL 8.10 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-
drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

      iii) Update the DRBD utilities. For example, for RHEL 8 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
```

   d. If Pacemaker has been updated in the Fix Pack, update it in RDQM. For example, for RHEL 8, run the following command:

```
dnf install --allowerasing Advanced/RDQM/PreReqs/el8/pacemaker-2/*
```

   e. Apply the FixPack by using the procedure for upgrading on Linux using dnf, see "Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339. For an RDQM install, the minimum commands are:

```
dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime* Advanced/RDQM/MQSeriesRDQM*
```

   f. If DRBD or Pacemaker have been updated in the Fix Pack, reboot the node, for example:

```
reboot
```

2. On the DR primary node, either end the DR queue managers or perform a managed failover of the DR queue managers to the DR secondary node.
3. Apply maintenance level updates to the DR primary node:

a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

b. Change into the directory containing the maintenance packages.

c. If DRBD has been updated in the Fix Pack, complete the following steps:

i) Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories. For example, on a RHEL 8.10 system, running the helper script `Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

ii) Update the appropriate DRBD kernel module that you identified. For example, for RHEL 8.10 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-
drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

iii) Update the DRBD utilities. For example, for RHEL 8 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
```

d. If Pacemaker has been updated in the Fix Pack, update it in RDQM. For example, for RHEL 8 run the following command:

```
dnf install --allowerasing Advanced/RDQM/PreReqs/el8/pacemaker-2/*
```

e. Apply the FixPack by using the procedure for upgrading on Linux using `dnf`, see "Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339. For an RDQM install, the minimum commands are:

```
dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime* Advanced/RDQM/MQSeriesRDQM*
```

f. If DRBD or Pacemaker have been updated in the Fix Pack, reboot the node, for example:

```
reboot
```

4. On the DR primary node, either start the DR queue managers or perform a managed failover of the DR queue managers to the DR primary node.

RDQM HA/DR

1. Apply maintenance to the HA group on your recovery site. Complete the following steps on each node in the group in turn.

a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

b. Change into the directory containing the maintenance packages.

c. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

d. If DRBD has been updated in the Fix Pack, complete the following steps:

i) Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories. For example, on a RHEL 8.10

system, running the helper script `Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

ii) Update the appropriate DRBD kernel module that you identified. For example, for RHEL 8.10 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-
drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

iii) Update the DRBD utilities. For example, for RHEL 8 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
```

e. If Pacemaker has been updated in the Fix Pack, update it in RDQM. For example, for RHEL 8, run the following command:

```
dnf install --allowerasing Advanced/RDQM/PreReqs/el8/pacemaker-2/*
```

f. Apply the FixPack by using the procedure for upgrading on Linux using `dnf`, see "Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339. For an RDQM install, the minimum commands are:

```
dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime* Advanced/RDQM/MQSeriesRDQM*
```

g. If DRBD or Pacemaker have been updated in the Fix Pack, reboot the node, for example:

```
reboot
```

h. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

2. Apply maintenance to the HA group on your main site. Complete the following steps on each node in the group in turn.

a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

b. Change into the directory containing the maintenance packages.

c. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

d. If DRBD has been updated in the Fix Pack, complete the following steps:

i) Determine which DRBD kernel module is needed for the system on which RDQM is being installed. See https://ibm.biz/mqrdqmkernelmods for up-to-date kernel module information. Helper scripts are provided in the `kmod-drbd-9` directories. For example, on a RHEL 8.10 system, running the helper script `Advanced/RDQM/PreReqs/el8/kmod-drbd-9/modver` returns the following information, identifying the kernel module that you need to install:

```
kmod-drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

ii) Update the appropriate DRBD kernel module that you identified. For example, for RHEL 8.10 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/kmod-drbd-9/kmod-
drbd-9.0.23_4.18.0-553-1.x86_64.rpm
```

iii) Update the DRBD utilities. For example, for RHEL 8 you run the following command:

```
dnf install Advanced/RDQM/PreReqs/el8/drbd-utils-9/*
```

e. If Pacemaker has been updated in the Fix Pack, update it in RDQM. For example, for RHEL 8, run the following command:

```
dnf install --allowerasing Advanced/RDQM/PreReqs/el8/pacemaker-2/*
```

f. Apply the Fix Pack using the procedure for upgrading on Linux using `dnf`, see "Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339. For an RDQM install, the minimum commands are:

```
dnf install MQSeriesGSKit* MQSeriesServer* MQSeriesRuntime* Advanced/RDQM/MQSeriesRDQM*
```

g. If DRBD or Pacemaker have been updated in the Fix Pack, reboot the node, for example:

```
reboot
```

h. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

Related tasks

"Installing RDQM (replicated data queue managers)" on page 253
Installation tasks associated with RDQM are grouped in this section. RDQM is available on x86-64 for RHEL 8 (8.8 or later) and RHEL 9 (9.2 or later).

Linux *Removing maintenance level updates for RDQM*

There are different procedures for removing maintenance level updates to a high availability (HA) configuration, a disaster recovery (DR) configuration, or a combined DR/HA configuration.

Remove maintenance level updates for HA RDQM

Procedure

1. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
2. Suspend the HA group on the node, by entering the following command:

   ```
   rdqmadm -s
   ```
3. Remove the Fix Pack using the procedure for removing maintenance level updates on Linux, see "Removing maintenance on Linux using dnf" on page 320. For example, to remove the 9.4.0.1 Fix Pack:

   ```
   dnf -y downgrade pathToInstallationFiles/MQSeries*
   ```
4. Resume the node:

   ```
   rdqmadm -r
   ```

Remove maintenance level updates for DR RDQM

Procedure

1. Remove maintenance level updates to the DR secondary node:

   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

b. Remove the Fix Pack using the procedure for removing maintenance level updates on Linux, see “Removing maintenance on Linux using dnf” on page 320. For example, to remove the 9.4.0.1 Fix Pack:

```
dnf -y downgrade pathToInstallationFiles/MQSeries*
```

2. On the DR primary node, either end the DR queue managers or perform a managed failover of the DR queue managers to the DR secondary node.
3. Remove maintenance level updates to the DR primary node:

   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   b. Remove the Fix Pack using the procedure for removing maintenance level updates on Linux, see “Removing maintenance on Linux using dnf” on page 320. For example, to remove the 9.4.0.1 Fix Pack:

```
dnf -y downgrade pathToInstallationFiles
```

4. On the DR primary node either start the DR queue managers or perform a managed failover of the DR queue managers to the DR primary node.

Remove maintenance level updates for DR/HA RDQM

Procedure

1. Remove maintenance from the HA group on your recovery site. Complete the following steps on each node in the group in turn:

   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

   c. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   d. Remove the Fix Pack using the procedure for removing maintenance level updates on Linux, see “Removing maintenance on Linux using dnf” on page 320. For example, to remove the 9.4.0.1 Fix Pack:

```
dnf -y downgrade pathToInstallationFiles
```

   e. Resume the node:

```
rdqmadm -r
```

   Proceed to the next node in the HA group and repeat the procedure.
2. Remove maintenance from the HA group on your main site. Complete the following steps on each node in the group in turn.

   a. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

c. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

d. Remove the Fix Pack using the procedure for removing maintenance level updates on Linux, see "Removing maintenance on Linux using dnf" on page 320. For example, to remove the 9.4.0.1 Fix Pack:

```
dnf -y downgrade pathToInstallationFiles
```

e. Resume the node:

```
rdqmadm -r
```

Proceed to the next node in the HA group and repeat the procedure.

Removing maintenance on Linux using rpm

From IBM MQ 9.4.0, you can use the **rpm** command to remove maintenance from an IBM MQ installation on Linux systems.

Before you begin

When you use **rpm** the IBM MQ installation that includes the maintenance level is replaced with an installation at an earlier level of IBM MQ. Therefore, you must decide which level of IBM MQ you want to revert to. Then you must ensure that the installation files for the earlier level of IBM MQ are available on the system.

About this task

You can use **rpm** only to roll back the fix pack level. You cannot use the command to roll back the version, release, or modification level of your IBM MQ installation. To roll back the version, release, or modification level of your installation, you must uninstall the higher level and then install the earlier level that you require. However, any queue managers that are running at a higher version or release of IBM MQ cannot then be started on the earlier version or release. For more information, see "Queue manager migration" on page 359.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.

2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

3. Set your current directory to the location of the earlier level installation files. The location might be a network location, or a local file system directory.
4. Optional: If there is more than one installation on the system, or if you want to remove maintenance from an IBM MQ installation in a nondefault location, create a unique set of packages:
   a) Run the **crtmqpkg** to create a unique set of packages:

      ```
      ./crtmqpkg suffix
      ```

      where *suffix* specifies a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

      Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is at `/var/tmp`. Ensure that the system has enough available space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

      ```
      $ TMPDIR=/test ./crtmqpkg suffix installationPath
      ```

   b) Set your current directory to the location that is specified when the **crtmqpkg** command operation completes successfully.
5. Remove the IBM MQ maintenance level:
   - To remove the maintenance level from all available components in the default location, use the following command:

     ```
     rpm --oldpackage -Uvh pathToInstallationFiles/MQSeries*
     ```

     where *pathToInstallationFiles* specifies the path where the earlier level IBM MQ rpm installation files are located.
   - To remove the maintenance level from all available components in a nondefault location, use the following command:

     ```
     rpm --oldpackage --prefix installationPath -Uvh pathToInstallationFiles/MQSeries*
     ```

     where *installationPath* specifies the path where IBM MQ is installed and *pathToInstallationFiles* specifies the path where the earlier level IBM MQ rpm installation files are located.
6. Use the **dspmqver** command to verify that the level is as expected:

   ```
   dspmqver
   ```

Removing maintenance on Linux using dnf

From IBM MQ 9.4.0, you can use the `dnf` command to remove maintenance from an IBM MQ installation on Linux Red Hat systems.

Before you begin

When you use `dnf` the IBM MQ installation that includes the maintenance level is replaced with an installation at an earlier level of IBM MQ. Therefore, you must decide which level of IBM MQ you want to revert to. Then you must ensure that the installation files for the earlier level of IBM MQ are available on the system.

About this task

You can use `dnf` only to roll back the fix pack level of your installation. You cannot use the command to roll back the version, release, or modification level of your IBM MQ installation. To roll back the version, release, or modification level of your installation, you must uninstall the higher level and then install the earlier level that you require. However, any queue managers that are running at a higher version or release

of IBM MQ cannot then be started on the earlier version or release. For more information, see "Queue manager migration" on page 359.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.
2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
3. Set your current directory to the location of the earlier level installation files. The location might be a network location, or a local file system directory.
4. Optional: If there is more than one installation on the system, or if you want to remove maintenance from an IBM MQ installation in a nondefault location, create a unique set of packages:
   a) Run the **crtmqpkg** to create a unique set of packages:

      ```
      ./crtmqpkg suffix
      ```

      where *suffix* specifies a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

      Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is at `/var/tmp`. Ensure that the system has enough available space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

      ```
      $ TMPDIR=/test ./crtmqpkg suffix installationPath
      ```

   b) Set your current directory to the location that is specified when the **crtmqpkg** command operation completes successfully.
5. Clear the repository cache by entering the following command:

   ```
   dnf clean all
   ```
6. Remove the IBM MQ maintenance level:
   - To remove the maintenance level from all installed components in the default location, use the following command:

     ```
     dnf -y downgrade pathToInstallationFiles/MQSeries*
     ```

     where *pathToInstallationFiles* specifies the path where the earlier level IBM MQ installation files are located.

- To remove the maintenance level from all installed components in a nondefault location, use the following command:

  ```
  dnf -y downgrade pathToInstallationFiles/MQSeries*suffix*
  ```

  where *pathToInstallationFiles* specifies the path where the earlier level IBM MQ rpm installation files are located, and *suffix* specifies the suffix that was chosen when you ran the **crtmqpkg** command.

7. Use the **dspmqver** command to verify that the level is as expected:

   ```
   dspmqver
   ```

Removing maintenance on Linux Ubuntu using dpkg

From IBM MQ 9.4.0, you can use the **dpkg** command to remove maintenance from an IBM MQ installation on Linux Ubuntu systems.

Before you begin

When you use **dpkg** to remove fix pack maintenance, the IBM MQ installation that includes the maintenance level is replaced with an installation at an earlier level of IBM MQ. Therefore, you must decide which level of IBM MQ you want to revert to. Then you must ensure that the installation files for the earlier level of IBM MQ are available on the system.

About this task

You can use **dpkg** only to roll back the fix pack level of your installation. You cannot use the command to roll back the version, release, or modification level of your IBM MQ installation. To roll back the version, release, or modification level of your installation, you must uninstall the higher level and then install the earlier level that you require. However, any queue managers that are running at a higher version or release of IBM MQ cannot then be started on the earlier version or release. For more information, see "Queue manager migration" on page 359.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.

2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

3. Set your current directory to the location of the earlier level installation files. The location might be a network location, or a local file system directory.
4. Remove maintenance from each IBM MQ package by using the following command for each package:

```
dpkg -i pathToInstallationFiles/packageName
```

where *pathToInstallationFiles* specifies the path where the earlier level IBM MQ installation files are located, and *packageName* specifies the name of the package to remove maintenance from.

Important: You cannot specify multiple package files in the same command because of inter-package dependencies. Change the packages individually in the order shown. If you use apt to remove maintenance, the inter-package dependencies are handled for you. For more information, see "Removing maintenance on Linux Ubuntu using apt" on page 323.

- ibmmq-runtime
- ibmmq-jre
- ibmmq-java
- ibmmq-gskit
- ibmmq-server
- ibmmq-web
- ibmmq-ftbase
- ibmmq-ftagent
- ibmmq-ftservice
- ibmmq-ftlogger
- ibmmq-fttools
- ibmmq-amqp
- ibmmq-ams
- ibmmq-xrservice
- ibmmq-explorer
- ibmmq-client
- ibmmq-man
- ibmmq-msg_*language*
- ibmmq-samples
- ibmmq-sdk

5. Use the **dspmqver** command to verify that the level is as expected:

```
dspmqver
```

Removing maintenance on Linux Ubuntu using apt

From IBM MQ 9.4.0, you can use the **apt** command to remove maintenance from an IBM MQ installation on Linux Ubuntu systems.

Before you begin

When you use **apt** the IBM MQ installation that includes the maintenance level is replaced with an installation at an earlier level of IBM MQ. Therefore, you must decide which level of IBM MQ you want to revert to. Then you must ensure that the installation files for the earlier level of IBM MQ are available on the system.

About this task

You can use **apt** only to roll back the fix pack level of your installation. You cannot use the command to roll back the version, release, or modification level of your IBM MQ installation. To roll back the version, release, or modification level of your installation, you must uninstall the higher level and then install the earlier level that you require. However, any queue managers that are running at a higher version or release

of IBM MQ cannot then be started on the earlier version or release. For more information, see "Queue manager migration" on page 359.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.
2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
3. Set your current directory to the location of the earlier level installation files. The location might be a network location, or a local file system directory.
4. Open the `IBM_MQ.list` file from the `/etc/apt/sources.list.d` directory.
5. Add the following line to the end of the `IBM_MQ.list` file:

   ```
   deb [trusted=yes] file:installationFileLocation ./
   ```

   where *installationFileLocation* is the directory where the earlier level IBM MQ installation files are located.
6. Refresh the repository index by using the following command:

   ```
   apt-get update
   ```
7. Remove the IBM MQ maintenance level by using the following command:

   ```
   apt-get -y --allow-downgrades install "ibmmq-*"=version
   ```

   where *version* specifies the version of IBM MQ that matches the earlier level IBM MQ installation files that are in the current directory.
8. Use the **dspmqver** command to verify that the level is as expected:

   ```
   dspmqver
   ```

Windows Applying and removing maintenance on Windows

Maintenance tasks associated with IBM MQ on Windows are grouped in this section.

Procedure

- To apply maintenance level updates, see "Applying maintenance level updates on Windows" on page 325.

- To remove updates and revert to the previous maintenance level, see “Removing maintenance level updates on Windows” on page 331.
- For information on how to use multiple installations of IBM MQ on the same server to control the release of maintenance fixes, see “Staging maintenance level updates on Windows” on page 326.
- For information on how to use use multi-instance queue managers to reduce the outage caused by applying maintenance updates, see “Applying maintenance level updates to multi-instance queue managers on Windows” on page 329.

Related tasks

“Applying maintenance to IBM MQ” on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Windows *Applying maintenance level updates on Windows*

From IBM MQ 9.4.0, you apply maintenance for server and client installations by upgrading IBM MQ.

About this task

Note: From 1Q 2023, for Multiplatforms, there are two types of maintenance:

- Fix packs, which contain roll-ups of all defects fixed since the previous fix pack delivery (or GA). Fix packs are produced exclusively for Long Term Support (LTS) releases during their normal support lifecycle.
- Cumulative security updates (CSUs), which are smaller updates and contain security patches released since the previous maintenance (GA). CSUs are produced for LTS releases (including releases in extended support), and also for the latest IBM MQ Continuous Delivery (CD) release, as required to deliver relevant security patches.

For maintenance releases in or after 1Q 2023, the fourth value in the VRMF (that is, the "F" value) represents either a fix pack number or a CSU number. Both types of maintenance are mutually cumulative (that is, they contain everything included in older CSUs and fix packs), and both are installed using the same mechanisms for applying maintenance. Both types of maintenance update the F-value of the VRMF to a higher number than any previous maintenance: fix packs use "F" values divisible by 5, CSUs use "F" values not divisible by 5.

For maintenance releases before 1Q 2023, the fourth value in the VRMF always represents the fix pack level. For example, the first fix pack of the IBM MQ 9.3.0 LTS release is numbered 9.3.0.1.

For more information, see Changes to IBM MQ's maintenance delivery model.

Procedure

- To upgrade a server installation by using the launchpad, follow the steps in “Upgrading an IBM MQ server installation using the Launchpad” on page 347.
- To upgrade a server installation by using msiexec, follow the steps in “Upgrading an IBM MQ server installation using msiexec” on page 348.
- To upgrade a client installation by using the GUI installer, follow the steps in “Upgrading an IBM MQ client installation using the GUI installer” on page 349.
- To upgrade a client installation by using msiexec, follow the steps in “Upgrading an IBM MQ client installation using msiexec” on page 350.

Windows *Staging maintenance level updates on Windows*

On Windows systems, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

Before you begin

The steps in this task are based on an example scenario in which it is assumed that you have two copies of IBM MQ named `Inst_1` and `Inst_2`, and a number of applications and two queue managers, `QM1` and `QM2`, running on a server. To set up your configuration for this scenario, complete the following steps:

1. Install two copies of IBM MQ. In this example, they are named `Inst_1` and `Inst_2`.
2. Make `Inst_1` primary by running **setmqinst**.
3. Associate all the queue managers on the server with `Inst_1` by running **setmqm**.
4. Start all the queue managers on the server.
5. Show and connect all direct connections with the queue managers associated with `Inst_1` in IBM MQ Explorer.
6. Set up remote connections to all the queue managers in each instance of IBM MQ Explorer.

Note: From 1Q 2023, for Multiplatforms, there are two types of maintenance:

- Fix packs, which contain roll-ups of all defects fixed since the previous fix pack delivery (or GA). Fix packs are produced exclusively for Long Term Support (LTS) releases during their normal support lifecycle.
- Cumulative security updates (CSUs), which are smaller updates and contain security patches released since the previous maintenance (GA). CSUs are produced for LTS releases (including releases in extended support), and also for the latest IBM MQ Continuous Delivery (CD) release, as required to deliver relevant security patches.

For maintenance releases in or after 1Q 2023, the fourth value in the VRMF (that is, the "F" value) represents either a fix pack number or a CSU number. Both types of maintenance are mutually cumulative (that is, they contain everything included in older CSUs and fix packs), and both are installed using the same mechanisms for applying maintenance. Both types of maintenance update the F-value of the VRMF to a higher number than any previous maintenance: fix packs use "F" values divisible by 5, CSUs use "F" values not divisible by 5.

For maintenance releases before 1Q 2023, the fourth value in the VRMF always represents the fix pack level. For example, the first fix pack of the IBM MQ 9.3.0 LTS release is numbered 9.3.0.1.

For more information, see Changes to IBM MQ's maintenance delivery model.

About this task

You can install multiple copies of IBM MQ on a server to stage the release of IBM MQ maintenance level updates. For example, as in the scenario that is described in the task steps, by using two installations to roll out maintenance level updates, you maintain two maintenance levels on a server, with the aim of getting all queue managers and applications to the production maintenance level before replacing the previous level of maintenance with the next level.

Which installation an application uses is driven by the queue manager that an application connects to. The **setmqm** command associates a queue manager with an installation. You can associate a queue manager with a different installation as long as the installation is at the same or higher command level. In this scenario, all the installations are at the same command level. You can associate or reassociate a queue manager with either of the installations running any of the fix packs or cumulative security updates (CSUs).

In this scenario, an application links to the primary installation. When it connects to a queue manager, IBM MQ switches the linkage to the installation associated with the queue manager; see “Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374.

For applications built with the link options described in the product documentation, the simplest way to configure the link library search path for IBM MQ applications is to make an installation primary. Only if it is important to pick up a fix in the IBM MQ link library itself, must you review the search path. Either you must make the installation with the IBM MQ link library fix primary, or make a local adjustment for the application, perhaps by running the **setmqenv** command. See "Migrating IBM MQ library loading to a later version on Windows" on page 408.

Running commands is a different matter. Commands are always run from the primary installation, or the installation you have selected by running the **setmqenv** command. If you run a command from the wrong installation, the command fails. For example, if QM1 is associated with Inst_1, running the command Inst_2_Installation_path/bin/strmqm QM1 fails.

If you are using IBM MQ Explorer and you have two installations, you also have two IBM MQ Explorer instances. One linked to one installation, and one to the other. Each IBM MQ Explorer shows locally connected queue managers that are associated with the same installation as the instance of IBM MQ Explorer. To monitor all the queue managers on a server, set up remote connections to the queue managers associated with the other installations.

Procedure

Apply the first maintenance level update to Inst_2.

1. Download the first fix pack or cumulative security update (CSU) when it is released.

   For more information, see "Where to find downloadable installation images" on page 12.
2. Upgrade IBM MQ to apply the fix pack or cumulative security update (CSU) that you downloaded to Inst_2.

   For more information, see "Upgrading an IBM MQ installation on Windows" on page 347.
3. Verify Inst_2.
4. Transfer the queue managers to Inst_2 one at a time.
   a) Stop QM1 and the applications connected to it.

      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      Note: "Applying maintenance level updates to multi-instance queue managers on Windows" on page 329 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

   b) Set up the local environment to the installation Inst_2 by using the **setmqenv** command

      ```
      "Inst_2_INSTALLATION_PATH\bin\setmqenv" -s
      ```

      The -s option sets up the environment for the installation that runs the **setmqenv** command.

   c) Associate the queue manager with Inst_2 by using the **setmqm** command:

      ```
      setmqm -m QM1 -n Inst_2
      ```

   d) Start QM1 by using the **strmqm** command:

      ```
      strmqm QM1
      ```

   e) Repeat substeps c and d for QM2.

   f) Set up IBM MQ Explorer for Inst_2.

      i) Start the Inst_2 instance of IBM MQ Explorer

         Tip: On Windows, hover over the IBM MQ icon in the system tray. The hover help shows the installation name associated with the IBM MQ Explorer instance.

      ii) Click **IBM MQ** > **Queue Managers** > **Show/Hide Queue Managers...** >

iii) Click each directly connected queue manager listed in the **Hidden Queue Managers** list > **Show**.

iv) Click **Close**.

5. Set `Inst_2` primary by using the **setmqinst** command:

```
"Inst_2_INSTALLATION_PATH\bin\setmqinst" -i -n Inst_2
```

Apply the second maintenance level update to `Inst_1`.

6. Download the next fix pack or cumulative security update (CSU), for the version of your product when it is released.

   For more information, see “Where to find downloadable installation images” on page 12.

7. Upgrade IBM MQ to apply the fix pack or cumulative security update (CSU) that you downloaded to `Inst_1`.

   For more information, see “Upgrading an IBM MQ installation on Windows” on page 347.

8. Verify `Inst_1`.
9. Transfer queue managers to `Inst_1` one at a time.

   a) Follow the procedure in step “4” on page 327

   Replacing `Inst_2` by `Inst_1` in the instructions.

10. Set `Inst_1` primary by using the **setmqinst** command:

```
"Inst_1_INSTALLATION_PATH\bin\setmqinst" -i -n Inst_1
```

For subsequent maintenance fixes, alternate between `Inst_2` and `Inst_1`.

11. Alternate between repeating steps “1” on page 327 to “5” on page 328 for `Inst_2` and steps “6” on page 328 to “10” on page 328 for `Inst_1`.

Related concepts

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

“Installing IBM MQ server on Windows” on page 174
On Windows, IBM MQ is installed by using the Microsoft Installer (MSI). You can either use the Installation Launchpad to invoke MSI or alternatively, you can invoke MSI directly.

Associating a queue manager with an installation

Changing the primary installation

Related reference

setmqenv

setmqinst

setmqm

Windows *Applying maintenance level updates to multi-instance queue managers on Windows*

On Windows platforms, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

Before you begin

Before starting this task, see that the maintenance is applied to the IBM MQ installation on a server and not to individual queue managers. Before you apply maintenance, you must stop all the queue managers, and any IBM MQ service, on a server.

If you want a queue manager to keep running while maintenance is applied, you must configure it as a multi-instance queue manager, and have a standby instance running on another server. If the queue manager that you want to keep running is an existing single instance queue manager, you must convert it to a multi-instance queue manager. For prerequisites and guidance how to create a multi-instance queue manager, see Multi-instance queue managers.

If you are running multi-instance queue managers, you then can apply a maintenance update to a running queue manager by switching the active instance to a different server.

Typically, active and standby installations are maintained at the same maintenance level. Consult the maintenance instructions for each update. Consult the instructions to see if it is possible to run the active and standby instances at different maintenance levels. Check whether fail over from higher to lower, or only lower to higher maintenance level is possible.

The instructions for applying a maintenance update might require you to stop a multi-instance queue manager completely.

If you have a primary server for running active queue manager instances, and a secondary server that runs standby instances, you have a choice of updating the primary or secondary server first. If you update the secondary server first, you must switch back to the primary server when both servers have been updated.

If you have active and standby instances on several servers, you must plan in what order you update the servers to minimize the disruption caused by ending the active instances on each server you update.

About this task

Follow these steps to apply maintenance to a multi-instance queue manager on Windows.

Procedure

1. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
2. Find out the current state of the queue managers and their associated listeners associated with the IBM MQ installation.
   a) From the installation that you are updating, use the **dspmq** command to list the state of the queue managers:
      - To display the installation name and status of queue managers associated with all installations of IBM MQ, run the following command:

        ```
        dspmq -o installation -o status
        ```

      - To display the status of active queue managers associated with the installation from which you are running the command, run the following command:

        ```
        dspmq -a
        ```

b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

```
echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
```

3. Use the **endmqm** command to stop each running queue manager associated with this installation.
   - If the queue manager is running as standby, run the **endmqm** command to end the standby as shown in the following example:

     ```
     endmqm -x QMgrName
     ```

   - If the queue manager is running as the active instance, run the **endmqm** command to end the active instance and transfer control to the standby instance as shown in the following example:

     ```
     endmqm -shutdown_option -s QMgrName
     ```

     where *-shutdown_option* is an optional parameter specifying the type of shutdown. For more information about optional parameters for the **endmqm** command, see endmqm.

     If there is no standby instance running, and the command fails, start a standby instance on a different server.

   - If a queue manager is running as a single instance queue manager, stop the queue manager. In the case of a single queue manager you have no alternative but to stop the queue manager before applying the maintenance update. For more information about how to stop a queue manager, see Stopping a queue manager.

   Stop any listeners associated with the queue managers by using the **endmqlsr** command as shown in the following example:

   ```
   endmqlsr -m QMgrName
   ```

   After you complete this step, no queue manager instances are left running on the server that you intend to update.
4. Upgrade IBM MQ to apply maintenance to the IBM MQ server.

   Follow the instructions in "Upgrading an IBM MQ installation on Windows" on page 347.
5. When you have completed the maintenance update, use the **strmqm** command to restart all the queue managers on the IBM MQ server, permitting standby instances, as shown in the following example:

   ```
   strmqm -x QmgrName
   ```
6. Repeat the procedure on the standby server, to update its maintenance level.
7. If necessary, switch the active instances back to the primary servers:

   a) Stop the instances by using the **endmqm** command as shown in the following example:

   ```
   endmqm -shutdown_option -s QMgrName
   ```

   b) Restart the instances by using the **strmqm** command as shown in the following example:

   ```
   strmqm -x QmgrName
   ```

Related tasks

Stopping a queue manager

Related reference

dspmq (display queue managers)

DISPLAYLSSTATUS

endmqm (end queue manager)

endmqlsr (end listener)

strmqm (start queue manager)

Windows *Removing maintenance level updates on Windows*

From IBM MQ 9.4.0, you remove maintenance for server and client installations by uninstalling IBM MQ and then reinstalling an earlier level.

About this task

Considerations for uninstalling and reinstalling IBM MQ at an earlier level:

- When you uninstall IBM MQ, your IBM MQ data is not removed. Therefore, when you reinstall the earlier level, your queue managers are preserved.
- Any queue managers that are running at a higher version or release of IBM MQ cannot be started on an earlier version or release. Therefore, when removing maintenance, ensure that you reinstall a version of IBM MQ at the same version and release, but a different maintenance level. For more information, see "Queue manager migration" on page 359.

Procedure

- To uninstall IBM MQ on Windows, see "Uninstalling IBM MQ on Windows" on page 224.
- To install an IBM MQ server on Windows, see "Installing IBM MQ server on Windows" on page 174.
- To install an IBM MQ client on Windows, see "Installing an IBM MQ client on Windows" on page 200.

Related tasks

"Applying maintenance level updates on Windows" on page 325
From IBM MQ 9.4.0, you apply maintenance for server and client installations by upgrading IBM MQ.

"Applying maintenance level updates to multi-instance queue managers on Windows" on page 329
On Windows platforms, you can use multi-instance queue managers to reduce the outage caused by applying maintenance updates.

z/OS Applying and removing maintenance on z/OS

You can install maintenance to update IBM MQ for z/OS to a new maintenance level.

Before you begin

This task assumes that you understand the difference between Long Term Support and Continuous Delivery releases, and the maintenance delivery model that applies in each case. For more information, see IBM MQ Release Types and versioning.

The command level of a queue manager is the four-digit VVRM level. An IBM MQ program can call `MQINQ`, passing the `MQIA_COMMAND_LEVEL` selector, to get the command level of the queue manager it is connected to.

About this task

IBM MQ for z/OS uses PTFs for Maintenance.

LTS PTFs are specific to a particular set of libraries corresponding to specific release level. For UNIX System Services features (that is, JMS and WEB UI, Connector Pack, and Managed File Transfer) the z/OS PTFs are aligned directly with the Multiplatforms fix packs and cumulative security updates (CSUs). These fixes are cumulative, and are made available at the same time as the equivalent Multiplatforms fix pack or CSU.

CD CD CSUs are not usually made available between CD releases, but are included in the next IBM MQ for z/OS CD release. You can also contact support to request a ++USERMOD.

Other fixes on IBM MQ for z/OS are distinct fixes on particular parts. These fixes resolve specific issues, are not cumulative, and are made available as and when they are produced.

PTFs are applied to and removed from the installed code using SMP/E. For more information about SMP/E, see "Installing IBM MQ for z/OS" on page 268 and "z/OS installation overview" on page 269 and the appropriate Program Directory. For download links for the Program Directories, see IBM MQ for z/OS Program Directory PDF files.

Apart from any exceptions documented with the PTFs, PTFs do not change the correct operation of IBM MQ, and are reversible. Nonetheless, you must check that the fixes have not changed the operation of critical programs unexpectedly.

Applying PTFs does not change the version, release, or maintenance level of the code. No queue manager migration is required after applying maintenance. PTFs are grouped into Recommended Service Updates (RSUs) that have been tested together in a Consolidated Service Test (CST); see Consolidated Service Test and the RSU.

PTFs that apply to a category of software fixes might be grouped together and identified using a fix category. For more information, see IBM Fix category values and descriptions.

Procedure

1. Open Downloading IBM MQ 10.0.
2. To access the latest CD level, click the CD tab.
   a) Find the section **Downloading the CD release for z/OS**.
   b) To get the latest CD level, click **Download the IBM MQ 10.0.x base install image and PTFs from Shopz**.

      Either order the features as a new product installation, or download and apply PTFs to a previously installed release.

      Note that there is no CSU download for z/OS; it will be included in the next IBM MQ 10.0 CD release.
3. To access the latest LTS downloads, click the LTS tab.

   From this tab you can download the latest LTS base install level, and either an LTS fix pack or an LTS CSU, whichever is the latest.
   a) Find the section **Downloading the LTS release for z/OS**.
   b) To get the latest LTS base install level, click **Download the IBM MQ 10.0 LTS base install image and PTFs from Shopz**.

      Either order the features as a new product installation, or download and apply PTFs to a previously installed release.
   c) To get the latest PTF or LTS CSU, click **Download maintenance release PTFs from Shopz**.

Related concepts
IBM MQ release types and versioning
"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

Applying WebSphere Liberty interim fixes to the mqweb server

You can apply WebSphere Liberty interim fixes to the WebSphere Liberty that runs the mqweb server.

About this task

This task applies to both IBM MQ Long Term Support and IBM MQ Continuous Delivery.

Important: If an interim fix is not available for the WebSphere Liberty version that is installed in the IBM MQ installation, then you should contact IBM Support. You should NOT look to change the WebSphere

Liberty version that is used by the IBM MQ Console and REST API and should only look to apply a WebSphere Liberty interim fix.

Note: This information does NOT apply to IBM MQ Appliance.

Procedure

1. Check the Liberty version.

   To do this, run the following command:

   ```
   <MQ_INSTALLATION_PATH>/web/bin/productInfo version --ifixes
   ```

2. Use the security link or the information on the page for the Liberty APAR to locate the correct archive interim fix (iFix) for the version that is installed.

   Liberty archive interim fixes come in a JAR format, and have an associated readme file that you can refer to for installation instructions. Download both files into a temporary directory.

3. After the interim fix has been downloaded, start a console and navigate to the directory that contains the interim fix JAR file.
4. Stop the mqweb server by using the command:

   ```
   <MQ_INSTALLATION_PATH>/bin/endmqweb
   ```

5.

   As an administrative user, run the following command to set the umask for the user to 022:

   ```
   umask 022
   ```

6. As an administrative user, run the following command to install the interim fix:

   ```
   java -jar <iFix JAR> -installLocation <MQ_INSTALLATION_PATH>/web
   ```

7. Run the following command and check the output to confirm that the interim fix has been installed correctly:

   ```
   <MQ_INSTALLATION_PATH>/web/bin/productInfo version --ifixes
   ```

8. Restart the mqweb server by using the command:

   ```
   <MQ_INSTALLATION_PATH>/bin/strmqweb
   ```

Results

When the mqweb server restarts, the interim fix should be loaded.

Example

The following example shows how to apply a WebSphere Liberty interim fix for APAR PH31442 to an IBM MQ 9.1.0.8 installation on Linux.

1. Run the following command to check the version of Liberty installed with IBM MQ 9.1.0.8:

   ```
   /opt/mqm/web/bin/productInfo version --ifixes
   ```

   This command generates the following output, which indicates that the Liberty version is 21.0.0.3:

   ```
   Product name: WebSphere Application Server
   Product version: 21.0.0.3
   Product edition: BASE
   ```

2. Go to the web page for APAR PH31442.
3. In the **Download Package** section of the web page, click the download link for the archive **21003-wlp-archive-IFPH34122**.
4. After you have been redirected to Fix Central, download the following files into a temporary directory:

- `21003-wlp-archive-IFPH34122-ReadMe.txt`
- `21003-wlp-archive-ifph34122.jar`

5. Start a console, and navigate to the temporary directory.
6. Stop the mqweb server by using the command:

```
/opt/mqm/bin/endmqweb
```

7. Run the following command as a root user to set the umask to 022:

```
umask 022
```

8. Next, as the same root user, run the following command to install the interim fix:

```
java -jar 21003-wlp-archive-ifph34122.jar --installLocation /opt/mqm/web
```

   All being well, you should see the following output:

```
Applying fix to Liberty install directory at /opt/mqm/web now.
lib/com.ibm.ws.ui.tool.javaBatch_1.0.50.cl210320210319-1444.jar
lib/com.ibm.ws.ui.tool.explore_1.0.50.cl210320210319-1444.jar
lib/com.ibm.ws.ui_1.0.50.cl210320210319-1444.jar
Fix has been applied successfully.
Successfully extracted all product files.
```

9. Run the following command to check that the interim fix has been installed correctly:

```
/opt/mqm/web/bin/productInfo version --ifixes
```

   You should see the following output:

```
Product name: WebSphere Application Server
Product version: 21.0.0.3
Product edition: BASE

PH34122 in the iFix(es): [21003-wlp-archive-IFPH34122]
```

10. Restart the mqweb server by using the command:

```
/opt/mqm/bin/strmqweb
```

Related tasks
Collecting troubleshooting information
Related reference
endmqweb (end mqweb server)
strmqweb (start mqweb server)

Upgrading IBM MQ

Upgrading is the process of taking an existing IBM MQ installation and upgrading to a new level of code.

Before you begin

This task assumes that you understand the difference between Long Term Support and Continuous Delivery releases, and the maintenance delivery model that applies in each case. For more information, see IBM MQ Release Types and versioning.

About this task

When you upgrade from one release to another, or apply maintenance, including fix packs, cumulative security updates (CSUs), or interim fixes, the impact of the change depends on the extent of the change in the VRMF level:

- The term *upgrade* applies to increasing the version V, release R, or modification M level.
- The term *fix* applies to increasing the fix F level.

At each change of the V, R, or M level, the command level on the queue manager changes. On a change to the F level, the command level does not change.

Multi On Multiplatforms, after an upgrade has been applied, the only way to back out a VRM change is by taking one of the following actions:

- Uninstalling the product code and reinstalling the code.
- Installing the old level of code alongside the existing code and using the setmqm command to associate the queue manager with the other installation.

The general rule is that, if you have carried out an installation that causes the command level of the new installation to be updated, and started the queue manager, you cannot back out the changes.

z/OS On z/OS, you can install new releases of IBM MQ to upgrade IBM MQ to a new VRM level. For more information, see "Upgrade and migration of IBM MQ on z/OS " on page 462.

Procedure

1. Open Downloading IBM MQ 10.0.
2. To access links to the latest CD downloads, click the CD tab.

   From this tab you can access the latest CD level and the latest CD CSU. If you are not running the latest CD level, you must download and install it before you can apply the latest CSU. z/OS Note that there is no CSU download for z/OS; it will be included in the next IBM MQ for z/OS 10.0 CD release.

   The format of the download is platform-specific.For AIX and Linux, you download one or more base install parts from Passport Advantage and a maintenance release from Fix Central. For Windows and Linux, you download a maintenance release from Fix Central, which includes the base install image. You can also download a base install image from Passport Advantage if you prefer. For z/OS you download PTFs from Shopz. For IBM MQ Appliance you download firmware images from Fix Central.
3. To access the latest LTS downloads, click the LTS tab.

   From this tab you can access the latest LTS base install level, and either an LTS fix pack or an LTS CSU, whichever is the latest (fix packs and CSUs are cumulative, so you need only one).

   The format of the download is platform-specific. For Multiplatforms you download one or more parts from Passport Advantage or Fix Central. For z/OS you download PTFs from Shopz. For the Appliance you download firmware images from Fix Central.

Related tasks

"Applying maintenance to IBM MQ" on page 291
Maintenance is the application of a reversible fix. Any changes to queue manager data are compatible with the previous code level.

Linux Upgrading an IBM MQ installation on Linux

You can upgrade an IBM MQ installation on Linux systems without uninstalling the earlier version.

Before you begin

The version that you are upgrading from must be IBM MQ 9.2.0, or later.

If your current version is at IBM MQ 9.4.0 or higher, you can upgrade your installation with fix packs installed. That is, the fix pack number in the version.release.modification.fixpack (V.R.M.F) release identifier does not need to be 0.

If your current version is earlier than IBM MQ 9.4.0, you can upgrade only if no fix packs are installed. That is, the fix pack number in the version.release.modification.fixpack (V.R.M.F) release identifier must be 0.

About this task

You can use rpm, a Debian installer on Linux Ubuntu, or the dnf installer on Linux Red Hat.

Before you begin, ensure that you have backed up your data.

Note:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ install package. It remains available as a separate download. For more information, see Installing and uninstalling IBM MQ Explorer as a stand-alone application on Linux and Windows.

  On Linux for x86-64 only, if you are migrating on an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 9.3.0 or later.
- From IBM MQ 10.0.0 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so may result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

Procedure

- To upgrade a server installation using rpm, see “Upgrading an IBM MQ installation on Linux using the rpm command” on page 336
- To upgrade a server installation on Linux Red Hat using dnf, see “Upgrading an IBM MQ installation on Linux Red Hat using dnf” on page 339
- To upgrade a server installation on Linux Ubuntu using a Debian installer, see “Upgrading an IBM MQ installation on Linux Ubuntu using apt” on page 344

Upgrading an IBM MQ installation on Linux using the rpm command

You can use rpm to upgrade an IBM MQ installation on Linux systems.

Before you begin

The version that you are upgrading from must be IBM MQ 9.2.0, or later.

If your current version is at IBM MQ 9.4.0 Fix Pack 5 or later, you can use the `rpm -Uvh` command to upgrade your installation with fix packs installed. That is, the fix pack number in the

version.release.modification.fixpack (`V.R.M.F`) release identifier does not need to be `0`. If your current version is earlier than IBM MQ 9.4.0 Fix Pack 5, use the `rpm -Uvh` command to upgrade only if no fix packs are installed.

Important:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ install package. On Linux for x86-64 only, if you are migrating on an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 9.3.0 or later.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

For more information about modifying an IBM MQ installation using rpm, see “Uninstalling or modifying IBM MQ on Linux using rpm” on page 149.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.
2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

3. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the file:
   a) Decompress the file by using the following command:

   ```
   gunzip partName.tar.gz
   ```

   where *partName* is the name of the installation image file.

   b) Extract the installation files from the file by using the following command:

   ```
   tar -xvf partName.tar
   ```

   where *partName* is the name of the installation image file.

   Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.
4. Set your current directory to the location of the installation files. The location might be a network location, or a local file system directory.
5. Optional: If this is not the only installation on the system, or if you want to upgrade an IBM MQ installation in a non default location, run the **crtmqpkg** to create a unique set of packages to upgrade:

   ```
   ./crtmqpkg suffix
   ```

   where *suffix* specifies a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.

   Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is located at `/var/tmp`. You must ensure that the system has enough free space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

   ```
   $ TMPDIR=/test ./crtmqpkg suffix installationPath
   ```
6. Set your current directory to the location of the installation packages. If you used the **crtmqpkg** command, this directory is the location that is specified when the **crtmqpkg** command operation completes successfully.
7. From IBM MQ 9.2.0, you have the option of accepting the license before or after you install the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:
   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```
   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

   See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.
8. Upgrade IBM MQ:
   - To upgrade all available components in the default location, use the following command:

     ```
     rpm -Uvh MQSeries*
     ```

- To upgrade specific components in the default location, use the following command:

  ```
  rpm -Uvh packageName.rpm
  ```

  where *packageName.rpm* is a list of one of more components to upgrade. For a full list of components, see "IBM MQ rpm components for Linux systems" on page 108.
- To upgrade all available components in a non default location, use the following command:

  ```
  rpm --prefix installationPath -Uvh MQSeries*
  ```

  where *installationPath* specifies the path where IBM MQ is installed.
- To upgrade specific components in a non default location, use the following command:

  ```
  rpm --prefix installationPath -Uvh packageName.rpm
  ```

  where *installationPath* specifies the path where IBM MQ is installed, and *packageName.rpm* is a list of one of more components to upgrade. For a full list of components, see "IBM MQ rpm components for Linux systems" on page 108.

9. Use the **dspmqver** command to verify that the version is as expected:

   ```
   dspmqver
   ```

Related tasks

"Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339
You can use `dnf` to upgrade an IBM MQ installation on Linux Red Hat systems.

"Upgrading an IBM MQ installation on Linux Ubuntu using apt" on page 344
You can use apt to upgrade an IBM MQ installation on Linux Ubuntu systems.

Upgrading an IBM MQ installation on Linux Red Hat using dnf

You can use `dnf` to upgrade an IBM MQ installation on Linux Red Hat systems.

Before you begin

The version that you are upgrading from must be IBM MQ 9.2.0, or later.

If your current version is at IBM MQ 9.4.0 or higher, you can upgrade your installation with fix packs installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier does not need to be 0.

If your current version is earlier than IBM MQ 9.4.0, you can upgrade only if no fix packs are installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier must be 0.

Important:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.

- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. On Linux for x86-64 only, if you are migrating on an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 9.3.0 or later.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so may result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

For more information about modifying an IBM MQ installation by using `dnf`, see “Uninstalling or modifying IBM MQ on Linux Red Hat using dnf” on page 151.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.

2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

3. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the file:
   a) Decompress the file by using the following command:

      ```
      gunzip partName.tar.gz
      ```

      where *partName* is the name of the installation image file.

   b) Extract the installation files from the file by using the following command:

      ```
      tar -xvf partName.tar
      ```

      where *partName* is the name of the installation image file.

      Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.

4. Set your current directory to the location of the installation packages.

The location might be a network location, or a local file system directory. See Where to find downloadable installation images.

5. Optional: If this installation is not the only installation on the system, or if you want to upgrade an IBM MQ installation in a non default location, run the **crtmqpkg** to create a unique set of packages to upgrade:

   ```
   ./crtmqpkg suffix installationPath
   ```

   where:

   - *suffix* specifies a name of your choosing that uniquely identifies the installation packages on the system. *suffix* is not the same as an installation name, although the names can be identical. *suffix* is limited to 16 characters in the ranges A-Z, a-z, and 0-9.
   - *installationPath* specifies the path where the installation that you want to upgrade is installed.

   Note: This command creates a full copy of the installation packages in a temporary directory. By default, the temporary directory is at `/var/tmp`. Ensure that the system has enough available space before you run this command. To use a different location, you can set the *TMPDIR* environment variable before you run the **crtmqpkg** command. For example:

   ```
   $ TMPDIR=/test ./crtmqpkg suffix installationPath
   ```

6. Set your current directory to the location of the installation packages.

   If you used the **crtmqpkg** command, this directory is the location that is specified when the **crtmqpkg** command operation completes successfully.

7. Update the repository file:

   a) Open the repository file. The file is in the `/etc/yum.repos.d` directory, and has a suffix of `.repo`. For example, `IBM_MQ.repo`.

   b) Add the following contents to the repository file. Replace *installationFilesLocation* with the location of the installation files for the version that you want to upgrade to. Replace *v.r.m* with the version, release, and modification number for the version of IBM MQ that you want to upgrade to:

   ```
   [IBM-MQ-v.r.m-x86_64]
   name=IBM MQ v.r.m x86_64
   baseurl=file:///installationFilesLocation
   enabled=1
   gpgcheck=0
   ```

   c) Clear the repository cache by using the following command:

   ```
   dnf clean all
   ```

   d) Check that the IBM MQ repository is available by using the following command:

   ```
   dnf repolist
   ```

8. From IBM MQ 9.2.0, you have the option of accepting the license before or after you install the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:

   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```

   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.

9. Upgrade IBM MQ:
   - To upgrade all installed components, use the following command:

     ```
     dnf -y upgrade MQSeries*
     ```

   - To upgrade all installed components in a non default location, use the following command:

     ```
     dnf -y upgrade MQSeries*suffix*
     ```

     where *suffix* specifies the suffix that was chosen when you ran **crtmqpkg** in step “5” on page 341.
10. Use the **dspmqver** command to verify that the version is as expected:

    ```
    dspmqver
    ```

Related tasks

“Upgrading an IBM MQ installation on Linux using the rpm command” on page 336
You can use rpm to upgrade an IBM MQ installation on Linux systems.

“Upgrading an IBM MQ installation on Linux Ubuntu using apt” on page 344
You can use apt to upgrade an IBM MQ installation on Linux Ubuntu systems.

Upgrading an IBM MQ installation on Linux Ubuntu using dpkg

You can use dpkg to upgrade an IBM MQ installation on Linux Ubuntu systems.

Before you begin

The version that you are upgrading from must be IBM MQ 9.2.0, or later.

If your current version is at IBM MQ 9.4.0 or higher, you can upgrade your installation with fix packs installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier does not need to be 0.

If your current version is earlier than IBM MQ 9.4.0, you can upgrade only if no fix packs are installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier must be 0.

Important:

1. Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
2. Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

   On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
3. Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

   Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

   Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

   On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.

4. From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ install package. On Linux for x86-64 only, if you are migrating on an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 9.3.0 or later.

For more information about modifying an IBM MQ installation on Ubuntu, see "Uninstalling or modifying IBM MQ on Linux Ubuntu using Debian packages" on page 153.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.
2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.
3. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the file:
   a) Decompress the file by using the following command:

      ```
      gunzip partName.tar.gz
      ```

      where *partName* is the name of the installation image file.

   b) Extract the installation files from the file by using the following command:

      ```
      tar -xvf partName.tar
      ```

      where *partName* is the name of the installation image file.

      Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.
4. Set your current directory to the location of the installation files.
5. From IBM MQ 9.2.0, you have the option of accepting the license before or after you install the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:

   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```

   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

See “Accepting the license on IBM MQ for Linux” on page 107 for more information about license acceptance.

6. Upgrade each IBM MQ package by using the following command for each package:

```
dpkg -i packageName
```

where *packageName* specifies the name of the package to upgrade.

Important: Although **dpkg** permits multiple package files in the same command, this does not work for IBM MQ because of inter-package dependencies. You must upgrade the packages individually in the order shown. If you use apt to upgrade, the inter-package dependencies are handled for you. For more information, see “Upgrading an IBM MQ installation on Linux Ubuntu using apt” on page 344.

- ibmmq-runtime
- ibmmq-jre
- ibmmq-java
- ibmmq-gskit
- ibmmq-server
- ibmmq-web
- ibmmq-ftbase
- ibmmq-ftagent
- ibmmq-ftservice
- ibmmq-ftlogger
- ibmmq-fttools
- ibmmq-amqp
- ibmmq-ams
- ibmmq-xrservice
- ibmmq-explorer
- ibmmq-client
- ibmmq-man
- ibmmq-msg_*language*
- ibmmq-samples
- ibmmq-sdk

7. Use the **dspmqver** command to verify that the version is as expected:

```
dspmqver
```

Upgrading an IBM MQ installation on Linux Ubuntu using apt

You can use apt to upgrade an IBM MQ installation on Linux Ubuntu systems.

Before you begin

The version that you are upgrading from must be IBM MQ 9.2.0, or later.

If your current version is at IBM MQ 9.4.0 or higher, you can upgrade your installation with fix packs installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier does not need to be 0.

If your current version is earlier than IBM MQ 9.4.0, you can upgrade only if no fix packs are installed. That is, the fix pack number in the version.release.modification.fixpack (`V.R.M.F`) release identifier must be 0.

Important:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ install package. On Linux for x86-64 only, if you are migrating on an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 9.3.0 or later.
- V 10.0.0 From IBM MQ 9.4.4 Continuous Delivery, the Russian language translation support is removed. If you are upgrading from an earlier version that includes this component on the Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 9.x.x-0 is needed by (installed) MQSeriesMsg_ru-9.x.x-0.x86_64
```

For more information about modifying an IBM MQ installation on Ubuntu, see “Uninstalling or modifying IBM MQ on Linux Ubuntu using Debian packages” on page 153.

Procedure

1. Complete the following tasks:
   a) Stop all your IBM MQ applications.

      If you use the Managed File Transfer (MFT) component, ensure that any file transfers that MFT agents are engaged in are completed. The SYSTEM.FTE.STATE queues must contain no messages.

   b) Stopped the mqweb server by using the **endmqweb** command.

   c) Stopped your listeners by using the **endmqlsr** command.

   d) Stopped all your queue managers by using the **endmqm** command.

      If a queue manager is part of a cluster, you must suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.

   e) Backed up your data.

      For more information, see Backing up and restoring queue manager data.
2. Log in as root, or switch to the root user by using the **su** or **su -** commands. Alternatively, you can use the **sudo** command to run commands as the root user, if your system administrator gave you the privilege to do so.

   To use the **sudo** command, add **sudo** before the command that you want to run. For more information about the **su** and **sudo** commands, see Exploring the differences between **sudo** and **su** commands in Linux on the Red Hat website.

3. Optional: If your installation media is a downloadable installation image, obtained from Passport Advantage, you must decompress the `tar.gz` file and extract the installation files from the file:
   a) Decompress the file by using the following command:

      ```
      gunzip partName.tar.gz
      ```

      where *partName* is the name of the installation image file.
   b) Extract the installation files from the file by using the following command:

      ```
      tar -xvf partName.tar
      ```

      where *partName* is the name of the installation image file.

      Important: You must use GNU tar (also known as `gtar`) to unpack any `tar` images.
4. Set your current directory to the location of the installation files.
5. From IBM MQ 9.2.0, you have the option of accepting the license before or after you install the product. To accept the license before installing, run the `mqlicense.sh` script. The license agreement is displayed in a language appropriate to your environment and you are prompted to accept or decline the terms of the license:
   - To display the license agreement in the default manner, which uses an X-window where possible, use the following command:

     ```
     ./mqlicense.sh
     ```
   - To display the license agreement as text in the current shell, which can be read by a screen reader, use the following command:

     ```
     ./mqlicense.sh -text_only
     ```

   See "Accepting the license on IBM MQ for Linux" on page 107 for more information about license acceptance.
6. Open the `IBM_MQ.list` file from the `/etc/apt/sources.list.d` directory.
7. Add the following line to the end of the `IBM_MQ.list` file:

   ```
   deb [trusted=yes] file:installationFileLocation ./
   ```

   where *installationFileLocation* is the directory where the unpacked files are located.
8. Refresh the repository index by using the following command:

   ```
   apt-get update
   ```
9. Upgrade IBM MQ by using the following command:

   ```
   apt-get upgrade "ibmmq-*"
   ```
10. Use the **dspmqver** command to verify that the version is as expected:

    ```
    dspmqver
    ```

Related tasks

"Upgrading an IBM MQ installation on Linux using the rpm command" on page 336
You can use rpm to upgrade an IBM MQ installation on Linux systems.

"Upgrading an IBM MQ installation on Linux Red Hat using dnf" on page 339

You can use `dnf` to upgrade an IBM MQ installation on Linux Red Hat systems.

Windows Upgrading an IBM MQ installation on Windows

To upgrade an IBM MQ server installation on Windows, from one version, release, and modification level to a later one, you can use either the Launchpad or msiexec. To upgrade a client installation, you can use either the GUI installer or msiexec.

About this task

Before you begin, ensure that you have backed up your data.

Procedure

- To upgrade a server installation, see "Upgrading an IBM MQ server installation using the Launchpad" on page 347 or "Upgrading an IBM MQ server installation using msiexec" on page 348.
- To upgrade a client installation, see "Upgrading an IBM MQ client installation using the GUI installer" on page 349 or "Upgrading an IBM MQ client installation using msiexec" on page 350.

Windows *Upgrading an IBM MQ server installation using the Launchpad*

How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using the Launchpad.

Before you begin

Ensure that you have:

1. Stopped all your IBM MQ applications
2. Shut down your listeners
3. Stopped all your queue managers. If the queue manager is part of a cluster, suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.
4. Backed up your data

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.
2. Locate `Setup.exe` in the base directory of the IBM MQ installation image.
   - From a network location, this location might be *m:*`\`*instmqs*`\Setup.exe`
   - From a local file system directory, this location might be *C:*`\`*instmqs*`\Setup.exe`
3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.
4. Follow the instructions on screen.
5. Select **Installing a new instance**, if you see a panel asking you to choose between installing a new instance, or maintaining or upgrading an existing instance, when you click the **Launch IBM MQ Installer** button.

You use the other option when adding or removing features from an already installed IBM MQ.

6. On the next panel, choose between **Install leaving the existing installation(s) untouched** or **Upgrade an existing named installation already on the machine**, and click **Next**.

   Attention: If you do not see this screen, it means that there was no IBM MQ server installation on the machine that could be upgraded by this installer.

7. Follow the installer prompts to upgrade your IBM MQ server installation.

Related tasks

"Upgrading an IBM MQ server installation using msiexec" on page 348
How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using msiexec.

"Upgrading an IBM MQ client installation using the GUI installer" on page 349
How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using the GUI installer.

"Upgrading an IBM MQ client installation using msiexec" on page 350
How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using msiexec.

Windows *Upgrading an IBM MQ server installation using msiexec*

How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using msiexec.

Before you begin

Ensure that you have:

1. Stopped all your IBM MQ applications
2. Shut down your listeners
3. Stopped all your queue managers. If the queue manager is part of a cluster, suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.
4. Backed up your data

Procedure

1. Access the IBM MQ installation image.

   The location might be a network location, or a local file system directory. See Where to find downloadable installation images.

2. Locate `IBM MQ.msi` in the MSI directory of the IBM MQ installation image.
   - From a network location, this location might be *m:*`\instmqs\MSI\IBM MQ.msi`
   - From a local file system directory, this location might be *C:*`\instmqs\MSI\IBM MQ.msi`
3. Optional: If you are upgrading the only IBM MQ server installation, where the installation has the default value `Installation1` issue the following command:

   ```
   msiexec /i "InstallationImage\MSI\IBM MQ.msi" /q AGREETOLICENSE=YES
   INSTALLATIONNAME="Installation1"
   ```

4. Optional: If you are upgrading an installation on a machine that already has one or more IBM MQ server installations of the level you are upgrading to, you must provide additional parameters to select a free MSI instance ID.

   See "Choosing MSI Instance IDs for multiple server installations" on page 178 for more information.

   In this case, the command might look something like this:

```
msiexec /i "InstallationImage\MSI\IBM MQ.msi" /q AGREETOLICENSE=YES
INSTALLATIONNAME="Installation2" NEWINSTANCE=1
TRANSFORMS=":InstanceId2.mst;1033.mst"
```

Related tasks

"Upgrading an IBM MQ server installation using the Launchpad" on page 347
How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using the Launchpad.

"Upgrading an IBM MQ client installation using the GUI installer" on page 349
How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using the GUI installer.

"Upgrading an IBM MQ client installation using msiexec" on page 350
How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using msiexec.

Windows *Upgrading an IBM MQ client installation using the GUI installer*

How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using the GUI installer.

Before you begin

Ensure that you have:

1. Stopped all your IBM MQ applications
2. Shut down your listeners
3. Stopped all your queue managers. If the queue manager is part of a cluster, suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.
4. Backed up your data

Procedure

1. Access the IBM MQ installation image.

   See Where to find downloadable installation images.
2. Locate `Setup.exe` in the `Windows` directory of the IBM MQ installation image.
3. Start the installation process.

   Either run `Setup.exe` from a command prompt, or double-click `Setup.exe` from Windows Explorer.

   Note: If you are installing on a Windows system with UAC enabled, accept the Windows prompt to allow the launchpad to run as elevated. During installation, you might also see **Open File - Security Warning** dialog boxes that list International Business Machines Limited as the publisher. Click **Run** to allow the installation to continue.

   The IBM MQ Installation window is displayed.
4. Follow the instructions on screen. When you click the **Launch IBM MQ Installer** button, if you see a panel asking you to choose between installing a new instance, or maintaining or upgrading an existing instance, select **Installing a new instance**.
5. On the next panel, choose between **Install leaving the existing installation(s) untouched** or **Upgrade an existing named installation already on the machine**, and click **Next**.

   Attention: If you do not see this screen, it means that there was no IBM MQ client installation on the machine that could be upgraded by this installer.
6. Follow the installer prompts to upgrade your IBM MQ client installation.

Related tasks

"Upgrading an IBM MQ client installation using msiexec" on page 350

How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using msiexec.

"Upgrading an IBM MQ server installation using the Launchpad" on page 347
How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using the Launchpad.

"Upgrading an IBM MQ server installation using msiexec" on page 348
How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using msiexec.

Windows *Upgrading an IBM MQ client installation using msiexec*

How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using msiexec.

Before you begin

Ensure that you have:

1. Stopped all your IBM MQ applications
2. Shut down your listeners
3. Stopped all your queue managers. If the queue manager is part of a cluster, suspend the queue manager before you stop it. For more information, see Maintaining a queue manager in a cluster.
4. Backed up your data

Procedure

1. Access the IBM MQ installation image.

   See Where to find downloadable installation images.
2. Locate `IBM MQ.msi` in the `Windows\MSI` directory of the IBM MQ installation image.
3. Optional: If you are upgrading the only IBM MQ client installation, where the installation has the default value `Installation1` issue the following command:

   ```
   msiexec /i "InstallationImage\Windows\MSI\IBM MQ.msi" /l*v install_log_path
   /q TRANSFORMS="1033.mst" REINSTALL=ALL REINSTALLMODE=vomus
   ```
4. Optional: If you are upgrading an installation on a machine that already has one or more IBM MQ client installations of the level you are upgrading to, you must provide additional parameters to select a free MSI instance ID.

   See "Choosing MSI Instance IDs for multiple client installations" on page 203 for more information.

   In this case, the command might look something like this:

   ```
   msiexec /i "InstallationImage\MSI\IBM MQ.msi" /q AGREETOLICENSE=YES
   INSTALLATIONNAME="Installation2" NEWINSTANCE=1
   TRANSFORMS=":InstanceId2.mst;1033.mst"
   ```

Related tasks

"Upgrading an IBM MQ client installation using the GUI installer" on page 349
How you upgrade an IBM MQ client installation on Windows to a newer version, release, or modification, using the GUI installer.

"Upgrading an IBM MQ server installation using the Launchpad" on page 347
How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using the Launchpad.

"Upgrading an IBM MQ server installation using msiexec" on page 348

How you upgrade an IBM MQ server installation on Windows to a newer version, release, or modification, using msiexec.

Migrating IBM MQ

Migration is the conversion of programs and data to work with a new code level of IBM MQ. Some types of migration are required, and some are optional. Queue manager migration is never required after applying a maintenance level update, that does not change the command level. Some types of migration are automatic, and some are manual. Queue manager migration is typically automatic and required after releases and manual and optional after a maintenance level upgrade that introduces a new function. Application migration is typically manual and optional.

Before you begin

Before upgrading your IBM MQ installation or migrating your queue managers, you must read “Changes that affect migration” on page 352 to identify what migration tasks you must plan for.

About this task

Whenever you upgrade IBM MQ to a new release that changes its command level, migration is performed by the queue manager. Whenever you upgrade IBM MQ to a new maintenance or fix level, which introduces a new function using a new command level, you can migrate the queue manager to use the new command level and thereby the new function.

If you start a queue manager running on a later release level, then migration of the queue manager to that release level is required. .

Multi On IBM MQ for Multiplatforms, you cannot easily revert to a previous level of IBM MQ after installation. If you install a copy of IBM MQ obtained from Passport Advantage or from physical media, the installer uninstalls IBM MQ, if it is present. It then installs the new level of IBM MQ. To revert to the previous level of IBM MQ, you must keep the earlier installation image and any fixes you applied. Then you must uninstall the new level, reinstall the previous release level, and reapply the required fixes. If you have started any queue managers at the later level, they will not work with the restored level of IBM MQ. (Unless you installed a later maintenance level upgrade, not a new release or version: then you could revert to an earlier maintenance level by reinstalling the earlier maintenance level upgrade. Queue manager data is compatible between maintenance levels.) To restore IBM MQ to its previous level, after starting any queue managers, you must first back up the queue managers. You can then restore the backup queue managers after restoring the previous level of IBM MQ.

z/OS LTS On IBM MQ for z/OS you can backwards migrate from a Long Term Support (LTS) release. This also applies to CD releases that have the same VRM as an LTS release, for example IBM MQ 10.0.0 CD.

z/OS Backwards migration is not supported to or from a Continuous Delivery (CD) release on z/OS, unless those releases have the same VRM as an LTS release, for example IBM MQ 10.0.0 CD.

Important: From IBM MQ 9.4.0, AMQP channels no longer support CMS key repository files. Instead, you need to use PKCS #12 key repositories and protect the key repository passwords by using the IBM MQ password protection system. You set the password in the queue manager's **KEYRPWD** attribute.

If you are migrating a queue manager with an AMQP configuration to IBM MQ 9.4.0 or later, and your queue manager is currently configured with a CMS keystore, you must convert it to PKCS12 format before proceeding with the migration. For more information on how to perform this conversion, see SSL/TLS support in Securing AMQP Clients.

Related concepts

IBM MQ release types and versioning

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374

You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is

particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

Related tasks
Backing up and restoring a queue manager

Changes that affect migration

Changes to the product might affect the migration of a queue manager from an earlier release to the current release of IBM MQ, or affect existing applications or configurations. Review these changes before upgrading queue managers to the latest product version and decide whether you must plan to make changes to existing applications, scripts, and procedures before starting to migrate your systems.

Changes in the current release

For details of changes in the current release, including those that affect migration, see the following information:

- What's new and changed in IBM MQ 10.0.0
- LTS CD IBM MQ, WebSphere MQ, and MQSeries product readmes

Changes in earlier versions

For information about what changed in an earlier release of the product, see the *What's new* and *What's changed* sections in the product documentation for that version of the product:

- IBM MQ 9.4
  - What's new and changed in IBM MQ 9.4
  - What's new and changed in IBM MQ 9.4 Continuous Delivery
  - What's changed in IBM MQ 9.4 Long Term Support
- IBM MQ 9.3
  - What's new and changed in IBM MQ 9.3.0
  - What's new and changed in IBM MQ 9.3.x Continuous Delivery
  - What's changed in IBM MQ 9.3.0 Long Term Support
  - LTS CD IBM MQ, WebSphere MQ, and MQSeries product readmes
- IBM MQ 9.2
  - What's new and changed in IBM MQ 9.2
  - CD What's new and changed in IBM MQ 9.2.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.2.0 Long Term Support
- IBM MQ 9.1
  - What's new and changed in IBM MQ 9.1
  - CD What's new and changed in IBM MQ 9.1.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.1.0 Long Term Support
- IBM MQ 9.0
  - What's new and changed in IBM MQ 9.0.0

  - CD What's new and changed in IBM MQ 9.0.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.0.0.x Long Term Support
- IBM MQ 8.0
  - What's new in IBM MQ 8.0
  - What's changed in IBM MQ 8.00
  - What's changed in IBM MQ 8.0 Fix Packs
- IBM WebSphere MQ 7.5
  - What's new in IBM WebSphere MQ 7.5
  - What's changed in IBM WebSphere MQ 7.5
  - What's changed in IBM WebSphere MQ 7.5 Fix Packs

For older, out of support, versions of the product, the documentation is not available in the online IBM Documentation, but is available for you to download for offline use. For more information, see Documentation for older versions of IBM MQ.

Restrictions on reversing queue manager migration

Attention:

Multi On IBM MQ for Multiplatforms, you cannot reverse queue manager migration to remove the effect of changes. This restriction applies whether your enterprise uses the Long Term Support (LTS) release or Continuous Delivery (CD) release model.

z/OS LTS On IBM MQ for z/OS, you can reverse queue manager migration as long as you have migrated from an earlier LTS release to a more recent LTS release. This statement also applies to those CD releases that have the same VRM as an LTS release, for example IBM MQ 10.0.0 CD.

z/OS See “Migration paths: IBM MQ for z/OS” on page 354 for a table of the migration paths available from IBM MQ 9.0 onwards.

For more information, see IBM MQ release types: planning considerations.

Related concepts

“Migration concepts and methods” on page 356
An overview of the various concepts and methods for migrating from one release of the product to another.

Migration paths

An overview of the migration paths between different IBM MQ versions. For some IBM MQ for z/OS migration paths, you can revert to the version you were using prior to migration. For IBM MQ for Multiplatforms, you cannot easily revert to a previous version.

Note: Before each new version of the product is released, it is tested for migration from earlier versions that are in support at that time. Direct migration from a version that is out of support might also work, but is neither tested nor supported. Therefore, to migrate to the latest version from a version that is out of support, you should first migrate to an interim version that was released before the earlier version went out of support.

- “Migration paths: IBM MQ for Multiplatforms” on page 354
- “Migration paths: IBM MQ for z/OS” on page 354
- “Detailed migration information” on page 355

Migration paths: IBM MQ for Multiplatforms

Multi

You can migrate from IBM MQ 9.1 or later direct to IBM MQ 10.0 or later. See Note “2” on page 354.

Direct migration from IBM MQ 8.0 or IBM MQ 9.0 to IBM MQ 10.0 is not supported. You must first migrate to IBM MQ 9.1, IBM MQ 9.2, IBM MQ 9.3 or IBM MQ 9.4.

Table 37. Migration paths: IBM MQ for Multiplatforms

Migration from	To IBM MQ 10.0 or later “1” on page 354	To IBM MQ 9.4 “1” on page 354	To IBM MQ 9.3 “1” on page 354	To IBM MQ 9.2 “1” on page 354	To IBM MQ 9.1 “1” on page 354	To IBM MQ 9.0 “1” on page 354	To IBM MQ 8.0
IBM MQ 9.4 or later	Yes	-	-	-	-	-	-
IBM MQ 9.3	Yes	Yes	-	-	-	-	-
IBM MQ 9.2	Yes	Yes	Yes	-	-	-	-
IBM MQ 9.1	Yes “2” on page 354	Yes	Yes	Yes	-	-	-
IBM MQ 9.0	No	Yes	Yes	Yes	Yes	-	-
IBM MQ 8.0	No	No	Yes	Yes	Yes	Yes	-

Notes:

1. For IBM MQ 9.0 and later, the version covers both LTS and CD releases.
2. Windows IBM i Direct migration from IBM MQ 9.1 to IBM MQ 10.0 is not supported on Windows or IBM i because there is no common operating system version that both IBM MQ versions are supported on. Migration needs to be done via a later IBM MQ 9.x release that will permit the operating system to be updated to IBM MQ 10.0 requirements.

For IBM MQ for Multiplatforms, you cannot easily revert to a previous release of the product. However, if a queue manager has not been started, you can uninstall the current version and reinstall a different version of IBM MQ. It does not matter what versions of IBM MQ are installed between when a queue manager was last started and when it is next started.

After you have moved to a CD modification of the product, you must move to a higher version and release level to return to the LTS track. For example, you cannot go from IBM MQ 9.3.1 CD to IBM MQ 9.3.0.n LTS. Your next opportunity to return to the LTS track is at IBM MQ 9.4.0.

Migration paths: IBM MQ for z/OS

z/OS

You can migrate from IBM MQ 9.3 or later direct to IBM MQ for z/OS 10.0 or later.

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.2 or earlier, you must first migrate to IBM MQ 9.3 or IBM MQ 9.4. For more information, see “Migrating from earlier unsupported releases of IBM MQ for z/OS ” on page 463.

Table 38. Migration paths: IBM MQ for z/OS					
Migration from	**To IBM MQ 10.0 or later**"1" on page 355	**To IBM MQ 9.4** "1" on page 355	**To IBM MQ 9.3**"1" on page 355	**To IBM MQ 9.2**"1" on page 355	**To IBM MQ 9.1**"1" on page 355
IBM MQ 9.4 or later	Yes	-	-	-	-
IBM MQ 9.3	Yes	Yes	-	-	-
IBM MQ 9.2	No	Yes	Yes	-	-
IBM MQ 9.1	No	No	Yes	Yes	-
IBM MQ 9.0	No	No	No	Yes	Yes

Note:

1. The version covers both LTS and CD releases.

To revert to a previous version, see "Reverting a queue manager to a previous version on z/OS" on page 472.

Detailed migration information

For detailed information about migrating to the current version, see the following links:

- Windows "Planning to migrate IBM MQ to a later version on Windows" on page 389
- Linux AIX "Planning to migrate IBM MQ to a later version on AIX and Linux" on page 417
- IBM i "Planning to migrate IBM MQ to a later version on IBM i" on page 442
- z/OS "Planning to migrate IBM MQ for z/OS to IBM MQ for z/OS 10.0" on page 464

For migrating to an IBM MQ version other than the current version, see the documentation for the target version:

- Migrating IBM MQ (IBM MQ 9.4)
- Migrating IBM MQ (IBM MQ 9.3)
- Migrating IBM MQ (IBM MQ 9.2)
- Migrating IBM MQ (IBM MQ 9.1)
- Migrating IBM MQ (IBM MQ 9.0)

For out of service IBM MQ versions, where the documentation is no longer available in the online IBM Documentation, you can instead download the documentation for offline use. See Documentation for older versions of IBM MQ.

Related concepts

"Migration concepts and methods" on page 356

An overview of the various concepts and methods for migrating from one release of the product to another.

Migration concepts and methods

An overview of the various concepts and methods for migrating from one release of the product to another.

Objects to consider during migration

It is important to consider four types of object during migration:

Operating environment migration
Upgrading the operating environment, or components in the environment such as installing a new level of JRE; see " IBM MQ operating environment migration" on page 358.

Queue manager migration
Migrating a queue manager following an upgrade of the IBM MQ installation to a new command level; see "Queue manager migration" on page 359.

When migrating queue managers that are members of a cluster, do full repositories before partial repositories. This is because an older repository cannot store newer attributes introduced in a newer release. It tolerates them, but does not store them.

IBM MQ MQI client migration
Migrating a client configuration following installation of a new version or release of the IBM MQ MQI client ; see "IBM MQ MQI client migration" on page 361.

It is better to migrate the clients after the queue managers that they communicate with have been migrated.

Application migration
Relinking, recompiling, or recoding an IBM MQ server or client application; see "Application migration and interoperation" on page 362. Application migration also includes migrating any API or channel exits.

Use the new version of the libraries to build the applications, once the queue managers have been upgraded.

Impact of migration on other queue managers or clients

In addition, you must consider the impact of migrating one queue manager, or IBM MQ MQI client, on other queue managers or clients:

Compatibility, coexistence, and interoperability
See "Coexistence, compatibility, and interoperability" on page 370 for information about the compatibility of IBM MQ applications connected to queue managers and IBM MQ MQI client clients on different command levels. The section also explains the concept of queue manager coexistence, and the interoperability of IBM MQ JMS applications with WebSphere Application Server.

Queue manager clusters
Can a queue manager cluster contain queue managers at different command levels? See "Migrating a queue manager cluster" on page 478 to answer this question, and how to migrate a cluster of queue managers.

z/OS **Queue sharing groups**
Queue sharing groups involve multiple queue managers running on z/OS. How do you migrate queue managers that are part of a queue sharing group to a new command level? See "Queue sharing group migration" on page 465.

High-availability clusters
How do you migrate queue managers that are part of a high-availability cluster to a new command level, and maintain continuous and reliable service? See "Migrating a queue manager in a high-availability configuration" on page 483, which covers both migration of multi-instance queue managers, and the migration of queue managers operating in high-availability clusters.

IBM MQ application migration model

Figure 1 on page 357 shows the various components of the application migration model.

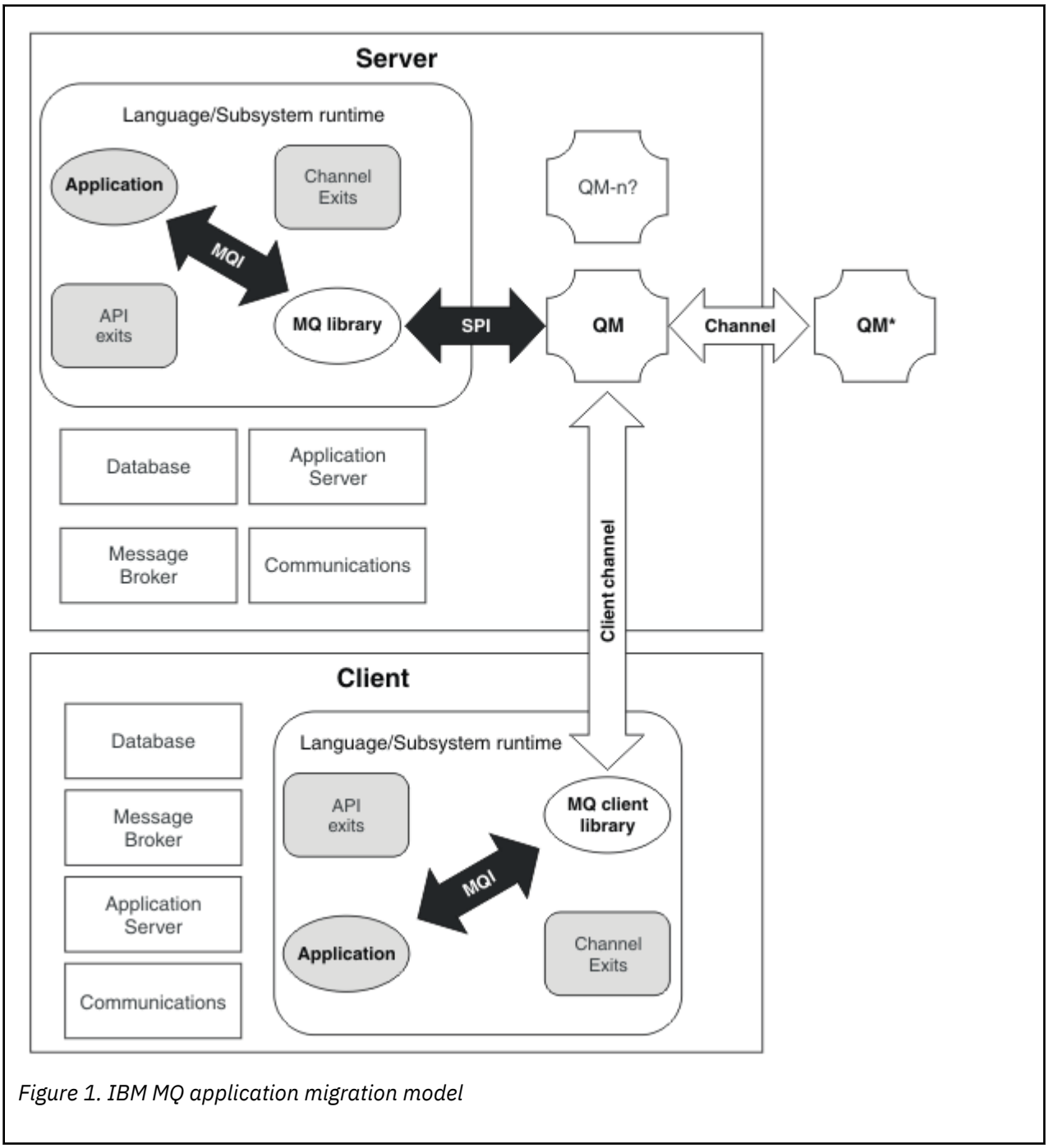


Figure 1. IBM MQ application migration model

This diagram shows two runtime operating system environments, each of which contains a number of software components, such as databases, application servers, and the language or subsystem run time environment. One environment is called `Server`, and contains an IBM MQ server and server application. The other environment is called `Client`, and contains an IBM MQ MQI client application.

The language or subsystem run time environment contains an IBM MQ application, the IBM MQ MQI client or server library, and IBM MQ channel and API exit programs.

The server environment has one or more queue managers, represented in the diagram by `QM`, that are using the installation of IBM MQ installed on the server. The components of the language or subsystem

run time environment are connected to queue manager QM, either locally in the server, or remotely from the client.

The application is linked to the IBM MQ library by the MQI. The libraries are shown linked to the queue manager QM either by an SPI, which describes the connection between the process running the MQI and the queue manager processes, or by an IBM MQ MQI client connection.

The diagram also shows two more queue managers:

- The queue manager labeled QM*, which represents queue managers of various levels installed on other servers.
- The queue manager labeled QM-n?, which represents a number of queue managers that coexist on the same server as queue manager QM, but are running at a different release level. The installations for these different release levels are not shown in the diagram. The question-mark in the queue manager name QM-n? indicates that this capability might not be present in your environment.

Multiple releases of IBM MQ installed in the same operating environment are called *coexistent*. It is not necessary, but it is usual, for coexistent installations to be at different release levels. Queue manager coexistence is important for migration in two respects:

1. It can be used to reduce the risk involved in migrating to a new command level, and reduce the downtime during the migration process.
2. You must consider any configuration implications of running some applications or clusters on the same server with queue managers at different command levels.

For more information, see “Queue manager coexistence” on page 372.

IBM MQ operating environment migration

You might need to perform some migration tasks for IBM MQ as a result of upgrading the operating environment.

To find out what operating environment upgrades you must make before upgrading IBM MQ, compare the requirements for different releases. For more information about system requirements, see System Requirements for IBM MQ. By selecting the appropriate link on the web page, the SPCR tool enables you to go directly to the following information for the specific operating system, or systems, that your enterprise uses.

- Supported operating systems
- Prerequisites
- System requirements
- Optional supported software

For details about operating environment changes in the latest release that directly affect the migration to a new version of IBM MQ, see the following information:

- What's new and changed in IBM MQ 10.0.0
- LTS CD IBM MQ, WebSphere MQ, and MQSeries product readmes

Particular considerations apply when migrating an RDQM configuration, see “Applying OS updates with RDQM” on page 263 and “Migrating replicated data queue managers” on page 487.

For information about what changed in an earlier release of the product, see the *What's new* and *What's changed* sections in IBM Documentation for that version of the product:

- IBM MQ 9.4
  - What's new and changed in IBM MQ 9.4
  - What's new and changed in IBM MQ 9.4 Continuous Delivery
  - What's changed in IBM MQ 9.4 Long Term Support
- IBM MQ 9.3
  - What's new and changed in IBM MQ 9.3.0

  - What's new and changed in IBM MQ 9.3.x Continuous Delivery
  - What's changed in IBM MQ 9.3.0 Long Term Support
- IBM MQ 9.2
  - What's new and changed in IBM MQ 9.2
  - CD What's new and changed in IBM MQ 9.2.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.2.0 Long Term Support
- IBM MQ 9.1
  - What's new and changed in IBM MQ 9.1
  - CD What's new and changed in IBM MQ 9.1.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.1.0 Long Term Support
- IBM MQ 9.0
  - What's new and changed in IBM MQ 9.0.0
  - CD What's new and changed in IBM MQ 9.0.x Continuous Delivery
  - LTS What's changed in IBM MQ 9.0.0.x Long Term Support
- IBM MQ 8.0
  - What's new in IBM MQ 8.0
  - What's changed in IBM MQ 8.0
  - What's changed in IBM MQ 8.0 Fix Packs
- IBM WebSphere MQ 7.5
  - What's new in IBM WebSphere MQ 7.5
  - What's changed in IBM WebSphere MQ 7.5
  - What's changed in IBM WebSphere MQ 7.5 Fix Packs
- For IBM WebSphere MQ 7.1 and earlier, see Documentation for older versions of IBM MQ.

Some changes might affect IBM MQ migration indirectly. For example, the runtime linkage conventions for applications, or the way memory is allocated, might change.

Queue manager migration

After upgrading an installation, queue manager migration might be required. Migration takes place when you start a queue manager. You can remove an upgrade before you have started a queue manager. However, if you remove the upgrade after a queue manager has been started, the queue manager will not work.

Migrating a queue manager to a later release

z/OS On IBM MQ for z/OS, queue manager migration is required after upgrading to a different version, release, or maintenance level of the product. The upgrade changes the command level. The current command, or VRM, level is shown in the z/OS console log.

Multi On IBM MQ for Multiplatforms, queue manager migration is always required for changes in the first two values of the VRMF, the V and the R. Changes in the maintenance and fix level, M and F in the VRMF, never cause automatic queue manager migration. A change in the command level always requires queue manager migration, but if the change is shipped in a maintenance or fix pack, you have the choice of whether to increase the command level, and cause queue manager migration.

Command level always increases with a change in version or release. If you decide to use new function introduced in a maintenance level upgrade, you must change the command level. The converse is not the

case. You do not have to change the command level when the fix level changes. You can decide to install the fix pack, but not use the new function. Whether or not you use the new function, the installation of the fix pack increases the maximum command level supported by the installation. Run the **dspmqver** command to display the current maximum supported command level.

Queue manager migration is the process of converting persistent queue manager data from one version to another. Persistent queue manager data includes log files and data in the queue manager directory. The data records changes to objects such as messages, subscriptions, publications, queue managers, channels, queues, and topics.

Queue manager migration is required and largely automatic.

If an issue is encountered during migration of a queue manager or its objects, a warning message is generated detailing which object and attribute failed to migrate. Common reasons for this are:

- V 10.0.0 A queue manager at an earlier version than IBM MQ 10.0 was migrated and the certificate label could not be converted to multi-certificate label version.

You can reduce the downtime and risk caused by queue manager migration, by verifying the new version first, using a different queue manager. Unless the platform supports queue manager coexistence, you need to perform the verification on a different server, or in a virtualized environment on the same server. If the platform you are upgrading supports queue manager coexistence, you can install the new version of IBM MQ on the same server, verify it, and minimize downtime to the time required to stop, backup, and restart the queue manager.

Note: If you are migrating a queue manager through multiple release levels, one level at a time, you must start the queue manager after each upgrade to migrate it. You must also start all the channels, to ensure they are migrated.

When migrating queue managers that are members of a cluster, migrate full repositories before partial repositories. This is because an older repository cannot store newer attributes introduced in a newer release. It tolerates them, but does not store them.

Restoring a queue manager to an earlier release

Multi For IBM MQ for Multiplatforms, you cannot restore a queue manager to an earlier release level after you have migrated it to a new release. You must back up your system before starting backwards migration. You can either back up queue manager data, or use a backup queue manager; see Backing up and restoring IBM MQ. Before backing up, you must stop the queue manager.

z/OS For IBM MQ for z/OS, an IBM MQ 10.0.0 LTS or IBM MQ 10.0.0 CD queue manager can always be backwards migrated to the release it was previously running at, if the release was one of IBM MQ 9.3.0 LTS, IBM MQ 9.3.0 CD, IBM MQ 9.4.0 LTS, or IBM MQ 9.4.0 CD.

Related concepts

IBM MQ release types and versioning

“Upgrade and migration of IBM MQ on z/OS ” on page 462

You can install new releases of IBM MQ to upgrade IBM MQ to a new version, release or modification (VRM) level. Running a queue manager at a higher level to the one it previously ran on requires migration.

Related tasks

“Migrating a queue manager on AIX and Linux” on page 419

The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

“Migrating a queue manager on Windows” on page 390

The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

“Migrating a queue manager to the latest version on IBM i” on page 444

Follow these instructions to migrate a queue manager on IBM i to the latest MQ version.

Related information

Moving a queue manager to a different operating system

IBM MQ MQI client migration

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

It is better to migrate the clients after the queue managers that they communicate with have been migrated.

Client migration on the client workstation is optional and manual. Client migration on the server is required and automatic. You must upgrade an IBM MQ MQI client before migrating a client workstation to make use of new configuration options. You can make configuration changes to client and server connection channels on the server, but they have no effect on a client workstation, until the client is upgraded.

An example of client migration performed at the client workstation is to manually migrate configuration settings to the `mqclient.ini` configuration file.

An example of combined client and server migration is the deployment of a new client connection definition table (CCDT). To use a new version of the CCDT, generate the table on a queue manager that is at the new code level. Deploy the table to clients that are going to use it. To deploy the table to a client, you first must update the client to at least the same level as the queue manager that created the table.

An IBM MQ MQI client can interoperate with earlier and later versions of IBM MQ. Upgrading the IBM MQ MQI client makes new function available to client applications, and is important to maintain the service level. Migrating an IBM MQ MQI client gives it access to new configuration options.

The IBM MQ MQI client libraries, such as `mqic.dll`, are dynamic, and the application linkages to the libraries do not normally change. You do not relink a client application to pick up new IBM MQ client libraries. The client picks up the new library next time the library is loaded by the client application. Do not move libraries from their installed directory. Linking to libraries in anything other than their installed directory is an unsupported configuration.

Related concepts

“Application compatibility and interoperability with earlier versions of IBM MQ” on page 381

“Application compatibility and interoperability with later versions of IBM MQ” on page 383
IBM MQ applications run against later versions of a queue manager without recoding, recompiling, or relinking. You can connect an application that is built against libraries shipped with an earlier version of IBM MQ to a queue manager running at a later version of IBM MQ.

Related tasks

“Migrating an IBM MQ MQI client to the latest version on IBM i” on page 457
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

“Migrating an IBM MQ MQI client on AIX and Linux” on page 433
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

“Migrating an IBM MQ MQI client on Windows” on page 407
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Related reference

“MQ clients: Client Channel Definition Table (CCDT)” on page 384

You can connect a supported IBM MQ client application to any supported level of queue manager. If a client uses CCDT to connect to a queue manager, the CCDT can be at a version greater than, less than, or equal to that of the client.

"Supported IBM MQ client: Default behavior of client-connection and server-connection channels" on page 386

Application migration and interoperation

IBM MQ supports running applications compiled and linked against previous versions of IBM MQ, with later levels of IBM MQ. Use the new version of the libraries to build the applications, once the queue managers have been upgraded.

To migrate an application to run with a new level of IBM MQ, disconnect an application from the queue manager. Reconnect it when the queue manager is running again. However, it takes only one small difference in the interface between IBM MQ and the application to break an application, or make it behave wrongly. Sometimes a problem does not show up for a long time. For this reason, you must always test your applications against a new version of IBM MQ. The suggested extent of testing varies depending on the extent of the changes in IBM MQ; see "Upgrade and migration of IBM MQ on z/OS " on page 462 or "Characteristics of different types of upgrade" on page 289.

Application migration refers to four kinds of changes.

1. Application changes that are consequent to upgrading the operating environment along with the queue manager. Rarely, linkage conventions change. The most likely reason for a linkage change is switching from 32 bit to a 64 bit environment. If you are using SSL or TLS you might have to relink with a new secure library.
2. Changes that you must make to the application in order to run an application against a new level of queue manager. Changes of this sort are uncommon. However, you must check "Changes that affect migration" on page 352 to see if any changes might affect your applications.
3. Changes that are not required, but that you might want to make in future, perhaps because you have a business reason to modify an application.
4. Changes to applications that are supplied by IBM, or other vendors, that require you to run migration utilities. The utilities convert the applications to running on the new version of IBM MQ.

Do not load IBM MQ libraries from an earlier level. IBM MQ does not support connecting server applications loading libraries from the earlier level to connect to a later level of queue manager. On AIX, Linux, and Windows platforms, the application load path must be set up to the location of the IBM MQ server libraries. You do not have to recompile and relink an application. Applications compiled and linked against an earlier version of IBM MQ can load libraries from a later version.

Multi On Multiplatforms, the product loads the library from the installation the application is connecting to. An application must initially load a library of at least the same level as the application linked to. IBM MQ then loads the correct version of the library from the installation that the queue manager is associated with. If you have two installations of the same version, but at different fix levels, IBM MQ chooses which library to load. The choice is based on the queue manager the application is connected to. If an application is connected to multiple queue managers, it is possible that multiple libraries are loaded.

To help you write applications that can exchange messages with earlier versions of the product, IBM MQ provides data type versioning. Data type versioning assists you in exchanging messages that are compatible with target queue managers. A good programming practice is to set the version number of a data structure explicitly. Do not assume that the default version is the one you require. By setting the version explicitly, you are forced to look up what version to use. The description of the data type version tells you what level of queue manager supports that version.

It is poor practice to set the data type version to the current version. If you recompile your program against a new version of IBM MQ, the data type version might change with unexpected consequences.

Client applications are more likely to connect to different queue managers than applications written for a specific server. Plan carefully when writing an application that is to connect to different versions of a queue manager, and to queue managers on different platforms. The default values of some IBM

MQ constants, such as `MQPMO_SYNCPOINT, MQPMO_NO_SYNCPOINT` differ between platforms. Some functions are not available on all platforms.

You must be aware of, and code to, the capabilities of all the queue managers the application interacts with. It requires planning and design to write an application that works with different versions of a queue manager. There is no API provided with IBM MQ to restrict an application to a function subset common to the set of queue managers it interacts with. To improve interoperability, some developers choose to provide an MQI wrapper layer, or use MQI API exits, to control the functions programs use.

Connection authentication

For a new IBM MQ 8.0, or later, installation, the **CONNAUTH CHCKLOCL** attribute will be set to `OPTIONAL`. This means that user IDs and passwords are not required, but if they are provided they must be a valid pair, or they will be rejected.

When you are migrating between a previous version of IBM MQ and the latest version, the **CONNAUTH CHCKLOCL** attribute on each queue manager is set to `NONE`, ensuring version to version continuity, but switching connection authentication off.

For more information see Connection authentication: Configuration.

Related concepts

“Application compatibility and interoperability with earlier versions of IBM MQ” on page 381

“Application compatibility and interoperability with later versions of IBM MQ” on page 383

IBM MQ applications run against later versions of a queue manager without recoding, recompiling, or relinking. You can connect an application that is built against libraries shipped with an earlier version of IBM MQ to a queue manager running at a later version of IBM MQ.

Related tasks

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436

On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408

On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Multi *Migration methods on IBM MQ for Multiplatforms*

There are three main methods of migrating from one release to another: Single-stage migration (called a slip installation on IBM i), side-by-side migration, and multi-stage migration. Multi-stage migration is not an option for IBM i.

Important:

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.0 or earlier, you must first migrate to an interim version. See Migration paths.

Single-stage migration

Single-stage migration is the term that is used to describe replacing the only installation of IBM MQ on a server, with a later release.

The advantage of single-stage migration is that it changes the configuration of a queue manager on the earlier version as little as possible. Existing applications switch from loading the libraries from the earlier version, to loading the libraries of the later version, automatically. Queue managers are automatically associated with the installation on the later version. Administrative scripts and procedures are affected as little as possible by setting the installation to be the primary installation. If you set the installation of the later version to be the primary installation, commands such as **strmqm** work without providing an explicit path to the command.

Of the three approaches, single-stage migration preserves the greatest number of existing scripts and procedures for running IBM MQ. However, the other migration approaches support a gentler transition to the new version, which can reduce the overall impact on users.

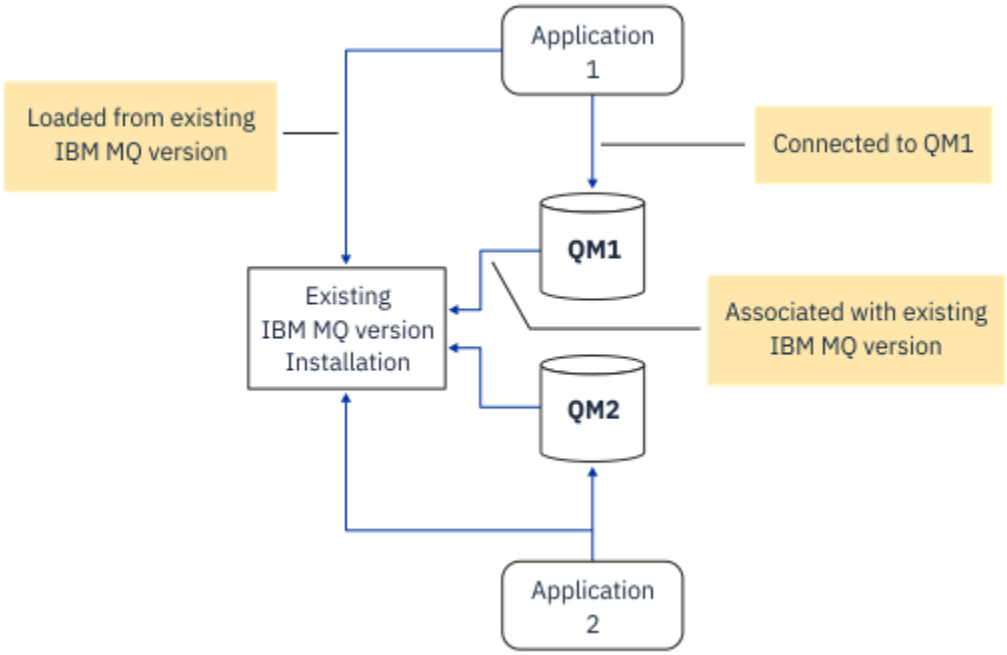


Figure 2. Single_stage migration: earlier version installed with connected queue managers and associated applications

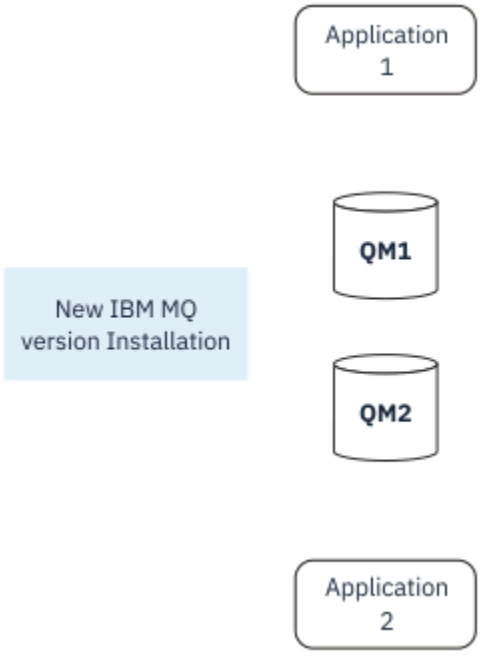


Figure 3. Single_stage migration: later version installed but queue managers not yet connected and applications not yet associated

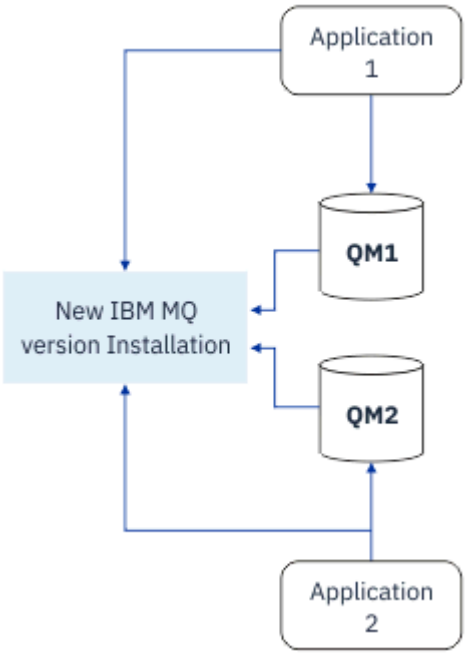


Figure 4. Single_stage migration: migrated queue managers connected to and applications associated with later version

For more information about single-stage migration, see:

- Linux AIX "Migrating on AIX and Linux: single-stage" on page 420
- Windows "Migrating on Windows: single stage" on page 394
- IBM i "Installation methods on IBM i" on page 444 (on IBM i, a single-stage migration is called a slip installation)

Side-by-side migration

On AIX, Linux, and Windows, side-by-side migration is the term that is used to describe installing a later version of IBM MQ alongside an older version on the same server. The side-by-side migration scenario sits half-way between the single-stage and multi-stage migration scenarios and is based on the following premise:

- Install additional IBM MQ code alongside existing installation while queue managers are still running.
- Move queue managers one at a time to the new installation.
- Migrate and test applications one at a time.

During the installation and verification of the later version of IBM MQ, queue managers continue running, and remain associated with the older version of IBM MQ.

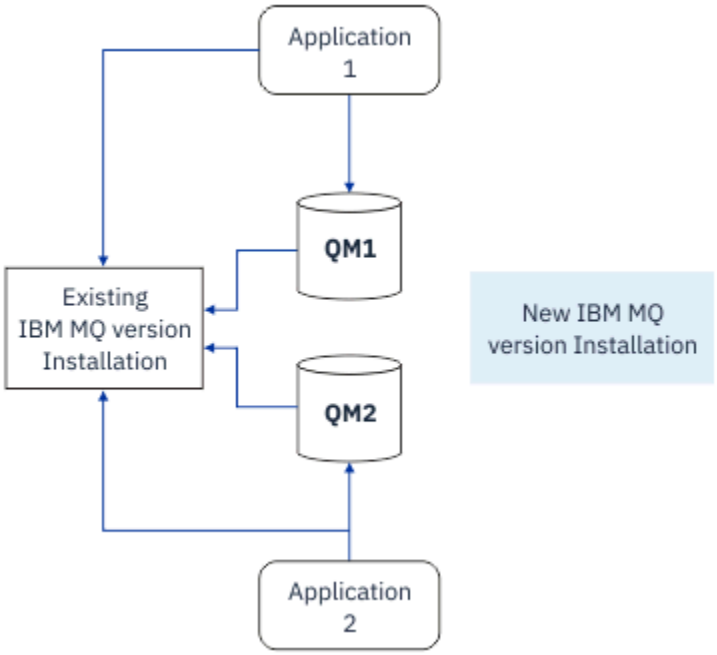


Figure 5. Side-by-side migration: later version installed but queue managers still connected to and applications still associated with earlier version

When you decide to migrate queue managers to the later version of IBM MQ, you stop all queue managers, migrate them all to the later version, and uninstall the earlier version of IBM MQ.

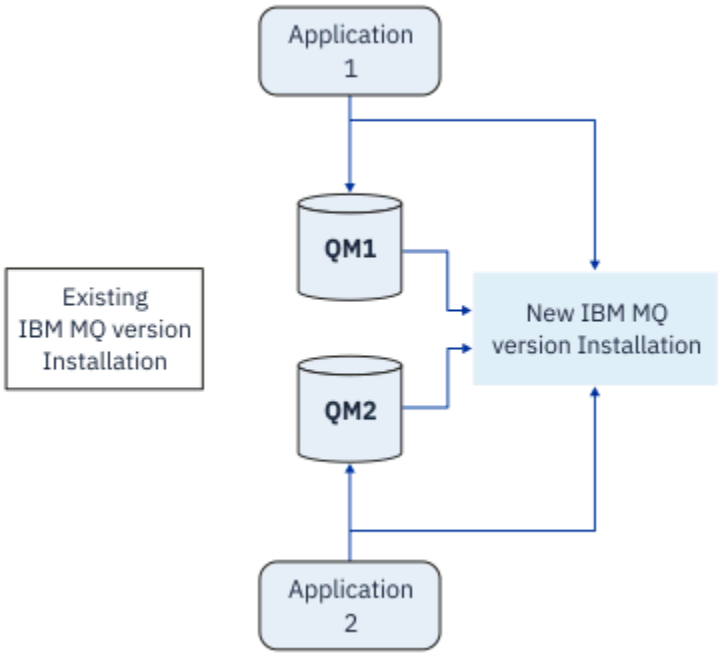


Figure 6. Side-by-side migration: migrated queue managers connected to and applications associated with later version

The advantage that the side-by-side migration has over the single-stage migration is that you can install and verify the later IBM MQ installation on the server before you switch over to it.

Although side-by-side migration is less flexible than multi-stage migration, it does have some advantages over the multi-stage approach. With the side-by-side approach, you can assign a later version of IBM MQ to be the primary installation. With the multistage approach, and one version of IBM MQ set as the primary installation, many applications restart without having to reconfigure their environment, as IBM MQ commands work without providing a local search path.

For more information about side-by-side migration, see:

- Linux AIX "Migrating on AIX and Linux: side-by-side" on page 424
- Windows "Migrating on Windows: side-by-side" on page 398

Note: IBM i Side-by-side migration has a different meaning on IBM i. A side-by-side installation upgrades IBM MQ on a different computer. For more information, see "Installation methods on IBM i" on page 444. Multiple installations are not applicable to IBM i.

Multi-stage migration

ALW

Multi-stage migration is the term that is used to describe running a later version of IBM MQ alongside an older version on the same server. Multi-stage migration is the most flexible approach.

After you install the later version alongside the earlier version, you can create new queue managers to verify the installation of the later version, and develop new applications. At the same time, you can migrate queue managers and their associated applications from the earlier version to the later version. By migrating queue managers and applications one by one, you can reduce the peak workload on your staff who are managing the migration.

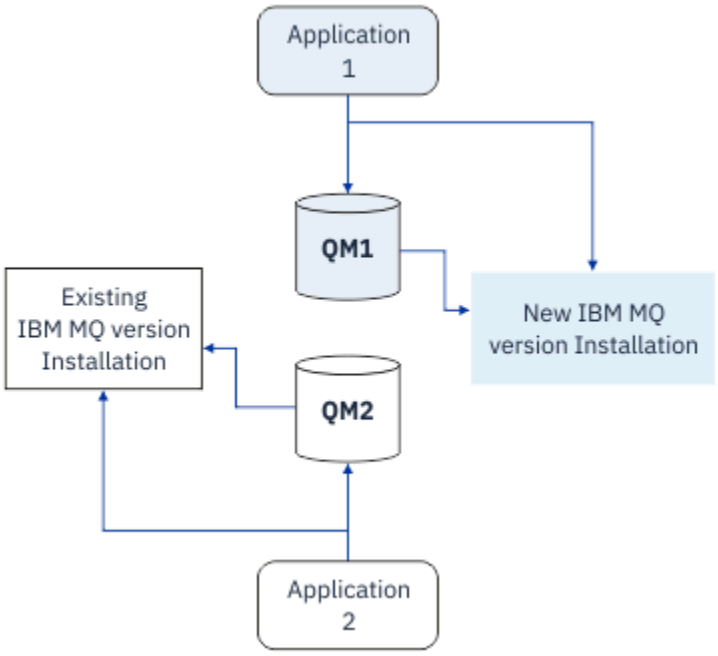


Figure 7. Multi-stage migration: one queue manager and application migrated to later version, and another queue manager and application still at earlier version

For more information about multi-stage migration, see:

- Linux AIX "Migrating on AIX and Linux: multi-stage" on page 427
- Windows "Migrating on Windows: multi-stage" on page 401

Related concepts

"Upgrade and migration of IBM MQ on z/OS " on page 462
You can install new releases of IBM MQ to upgrade IBM MQ to a new version, release or modification (VRM) level. Running a queue manager at a higher level to the one it previously ran on requires migration.

z/OS ALW ***Multiple IBM MQ installations***

Multiple IBM MQ installations are supported on AIX, Linux, and Windows. This gives you the option to install and select between one or more IBM MQ installations.

Overview

You can select between:

- Simplicity of maintaining a single IBM MQ installation.
- Flexibility, by allowing up to a maximum of 128 IBM MQ installations on a system.

You can install multiple copies of the same code level; this is especially convenient for maintenance purposes.

LTS For example, if you want to upgrade IBM MQ 9.0.0.0 to IBM MQ 9.0.0 Fix Pack 1, you can install a second copy of IBM MQ 9.0.0.0, apply the maintenance to bring it to IBM MQ 9.0.0 Fix Pack 1, and then move the queue managers across to the new installation. You still have the original installation, so it is a simple matter to move the queue managers back if you encounter any problems.

Note that you can only move the queue manager to an installation at the same or a higher version. That is, you can move a queue manager in the following ways:

- From an earlier version to a later version, but not back. For example, from IBM MQ 9.0.0 to IBM MQ 9.1.0, but not from IBM MQ 9.1.0 to IBM MQ 9.0.0.

- From one fix pack level to another fix pack level at the same version, and back. For example, from IBM MQ 9.0.0.0 to IBM MQ 9.0.0 Fix Pack 1, and back to IBM MQ 9.0.0.0.

Important considerations for multiple installations

1. Linux On Linux you must ensure that each package installed has a unique name. You can use the **crtmqpkg** command to create a unique set of packages. For more information, see "Installing additional IBM MQ installations on Linux using the rpm command" on page 116.
2. All installations share a data directory; this is where `mqs.ini` is located for example.
3. All installations share the same namespace for queue managers. This means that you cannot create several queue managers of the same name in different installations.
4. IBM MQ installations are fully relocatable. Each installation has a separate installation path. You can choose where to install IBM MQ.
5. IBM MQ resources have installation-scope resource isolation, so operations on one installation do not affect the others. This means that the resources created by one installation are isolated from those created by other installations. It enables actions, such as removing an installation of IBM MQ, while queue managers are running under another installation.
6. Queue managers are associated with an installation. You can move queue managers between installations at the same or higher version of IBM MQ, but you cannot migrate back to earlier releases.

Locating installations on your system

To locate your installations, you can use the following methods:

- Use the platform installation tools to query what is installed and where on the system
- Use the dspmqver command to display IBM MQ version and build information.
- Use the dspmqinst command to display installation entries from `mqinst.ini`.
- Linux AIX On AIX and Linux, use the following command to list the installations:

```
cat /etc/opt/mqm/mqinst.ini
```

- Windows On Windows, use the following command to query the registry:

```
reg.exe query "HKLM\Software\[Wow6432Node\]IBM\WebSphere MQ\Installation" /s
```

Working with multiple installations

To work with a queue manager, you need to use the commands from its installation. If you select the wrong installation, you see:

```
AMQ5691: Queue manager 'MYQM' is associated with a different installation (Inst1)
```

To work with a queue manager, you have to use the control commands from its associated installation. You have a choice of:

- Using the full path to the control commands, for example:

```
$ MQ_INSTALLATION_PATH\bin\strmqm MYQM
```

or

- Setting the environment variables for an installation with one of:

```
$ MQ_INSTALLATION_PATH/bin/setmqenv 's
$ setmqenv -m MYQM
$ setmqenv -n InstallationName
$ setmqenv -p MQ_INSTALLATION_PATH
```

You might consider using a shell script or batch file to set up the environment for each IBM MQ installation. You can use the **setmqenv** or **crtmqenv** commands to help with this.

- setmqenv sets the values of the environment variables, such as PATH, CLASSPATH and LD_LIBRARY_PATH, for use with an IBM MQ installation.
- crtmqenv creates a list of the environment variables and their values for use with a particular IBM MQ installation. You can then use this list to incorporate into a shell script or batch file.

Commands

To run a command, the operating system must find the command in an IBM MQ installation. In general, you must run a command from the installation that is associated with the correct queue manager. IBM MQ does not switch commands to the correct installation. However, there are some exceptions, such as the **setmqinst** command, where you can run the command from any installation that has the latest version of the product installed.

Commands that work across installations

- dspmq (display queue managers)
- dspmqinst (display IBM MQ installation)
- dspmqver (display version information)
- setmqinst (set IBM MQ installation)

Other control commands for multiple installations

- crtmqenv (create IBM MQ environment)
- dspmqinst (display IBM MQ installation)
- setmqenv (set IBM MQ environment)
- setmqinst (set IBM MQ installation)
- setmqm (set queue manager)

If an earlier version of the product is installed, the command that is run is the command for that version, unless the search path is overridden by a local setting. You can override the search path by running **setmqenv**. You must set the correct path to run a command. If you have set a primary installation, the command that is run is the copy in the primary installation, unless you override the selection with a local search path.

Multiple releases on z/OS

z/OS

Multiple releases can exist on z/OS. You use the STEPLIB to control which level of IBM MQ is used. For more information, see “Coexistence” on page 371.

Related concepts

“Multiple installations on AIX, Linux, and Windows” on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

Coexistence, compatibility, and interoperability

The definitions of the IBM MQ terms coexistence, compatibility, and interoperability.

Coexistence
Is being able to install and run two or more versions of the same program on the same server. For IBM MQ, it normally means installing and running multiple versions of IBM MQ on a server.

Compatibility
Is the ability to run applications from one level of queue manager with an earlier, or previous level, of the queue manager.

If you are using a message channel agent (MCA) channel, any version and release of an IBM MQ queue manager can connect, using an MCA channel, to any version and release of another IBM MQ queue manager.

The MCA channel is automatically configured to the latest version of protocol that is supported by both ends of the channel.

Compatibility is also the ability to run client applications with different versions of the IBM MQ MQI client, and different levels of the queue manager.

Interoperability
Is mainly the ability to exchange messages between different versions of IBM MQ. It can also mean the interoperability between others things, such as publish/subscribe brokers, or between components such as the IBM MQ classes for JMS and WebSphere Application Server.

Maintaining the compatibility, coexistence, and interoperability of IBM MQ is important in order to preserve the investment you make in applications and administrative procedures.

Three areas to which this objective does not apply to as rigidly, are:

- GUI interfaces, such as IBM MQ Explorer and IBM MQ Console.
- Information for service, such as FFST files and traces.
- Error messages. The text in an error message might change, to make the wording clearer or more accurate.

Coexistence
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations. In addition to queue managers coexisting on a server, objects, and commands must work correctly with different queue managers running at different command levels.

Multiple queue manager versions in z/OS

There can be several IBM MQ subsystems in a z/OS image, and they can use different versions of IBM MQ, provided that the IBM MQ early code modules are of the latest version being used. These modules are loaded at z/OS IPL time and are shared among all the IBM MQ subsystems in the z/OS image.

This means that you can run one queue manager at the latest version and another in the same image with an earlier version, provided that the early code is that of the latest version.

The coexistence section lists restrictions in the use of objects and commands when they are used with queue managers at multiple command levels. The queue managers might be running on a single server, or in a cluster.

Related concepts
"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

"Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks
"Migrating IBM MQ library loading to a later version on AIX and Linux" on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product

with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

"Migrating IBM MQ library loading to a later version on Windows" on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Queue manager coexistence
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

Single installation queue manager coexistence on all platforms

Single installation queue manager coexistence is useful in development and production environments. In development environments, you can set up different queue manager configurations to support different development activities. You can also work with multiple queue manager configurations on a single server, connected by channels, as if deployed on a network.

In production environments configuring multiple queue managers on a single server is less common. It has no performance or functional advantage over a single queue manager configuration. Sometimes, you must deploy multiple queue managers on server. It might be essential to meet the requirements of a particular software stack, governance, administration, or as a consequence of the consolidation of servers.

Queue manager coexistence in a multi-installation

Multi-installation queue manager coexistence is supported on AIX, Linux, and Windows, and z/OS.[1]

With multi-installation queue manager coexistence on the same server, you can run queue managers at different commands levels on the same server. You can also run multiple queue managers at the same command level, but associate them with different installations.

Multi-installation adds more flexibility to the coexistence of queue managers using a single installation. Any of the reasons behind running multiple queue managers, such as supporting different software stacks, might require different versions of IBM MQ.

The biggest benefit of multi-installation identified by early users, is in upgrading from one version of IBM MQ to another. Multi-installation makes upgrading less risky, less costly, and is more flexible in meeting the migration needs of applications running on a server.

The key to migration flexibility is being able to install a new version alongside an existing installation; see Figure 8 on page 373, which is extracted from "Migrating on AIX and Linux: side-by-side" on page 424 or "Migrating on Windows: side-by-side" on page 398.

[1] Do not confuse multi-installation queue manager coexistence with multi-instance queue managers. They are completely different, though they sound similar in English.

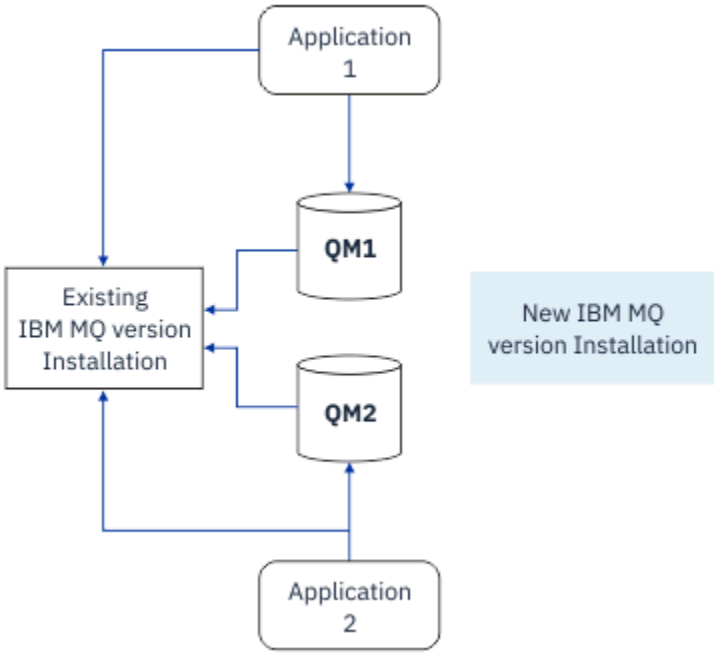


Figure 8. Side-by-side installation - step 2

When the installation is complete, and verified, migrate queue managers and applications to the new installation; see Figure 9 on page 373. When migration is complete, uninstall the old installation.

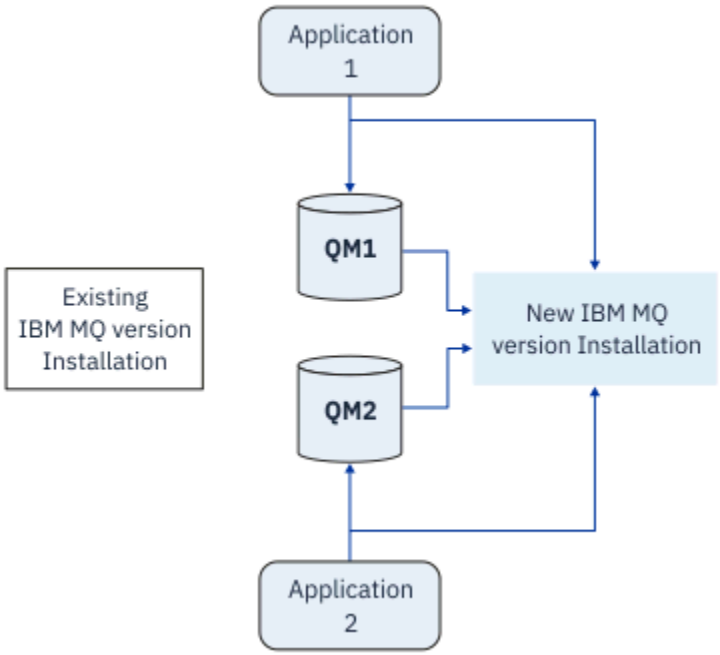


Figure 9. Side-by-side installation - step 4

Think of multi-installation as being the basis for a range of migration strategies. At one end is *single-stage*, in which you only have one installation on a server at a time. At the other end is *multi-stage* migration, in which you continue to run multiple installations at the same time. In the middle is side-by-side migration. Each of the three strategies is explained in the following tasks:

1. “Migrating on AIX and Linux: single-stage” on page 420 or “Migrating on Windows: single stage” on page 394

2. “Migrating on AIX and Linux: side-by-side” on page 424 or “Migrating on Windows: side-by-side” on page 398
3. “Migrating on AIX and Linux: multi-stage” on page 427 or or “Migrating on Windows: multi-stage” on page 401

Updating queue managers to a new maintenance level

LTS

Another similar use of multi-installation is to support the updating of queue managers to a new maintenance level. You maintain two installations, one of which has the latest maintenance level update applied, and the other has the previous maintenance levels. When you have moved all queue managers to the latest maintenance level, you can replace the previous maintenance level update with the next maintenance level update to be released. The configuration allows you to stage the updating of applications and queue managers to the latest maintenance level. You can switch the primary installation designation to the latest maintenance level.

Related concepts

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

“Upgrade and migration of IBM MQ on z/OS ” on page 462
You can install new releases of IBM MQ to upgrade IBM MQ to a new version, release or modification (VRM) level. Running a queue manager at a higher level to the one it previously ran on requires migration.

Related tasks

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Staging maintenance level updates on AIX” on page 300
On AIX, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Staging maintenance level updates on Linux” on page 309
On Linux, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Staging maintenance level updates on Windows” on page 326
On Windows systems, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

ALW *Multi-installation queue manager coexistence on AIX, Linux, and Windows*
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is

particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Note: Linux On Linux, a multi-installation can only be created when using the RPM installation media. Multi-installation is not supported on Ubuntu.

When you plan a multi-installation, you need only consider the major IBM MQ version number (for example, IBM MQ 10.0). CD releases and fix pack levels are not a significant additional factor.

Figure 10 on page 375 shows two IBM MQ installations at different versions (for example, versions 10.0 and 9.4), two queue managers, and three applications. In this diagram, note that application 3 is configured to load libraries from the `Inst1` (IBM MQ 10.0) installation, even though it is connected to queue manager `QM2` (IBM MQ 9.4).

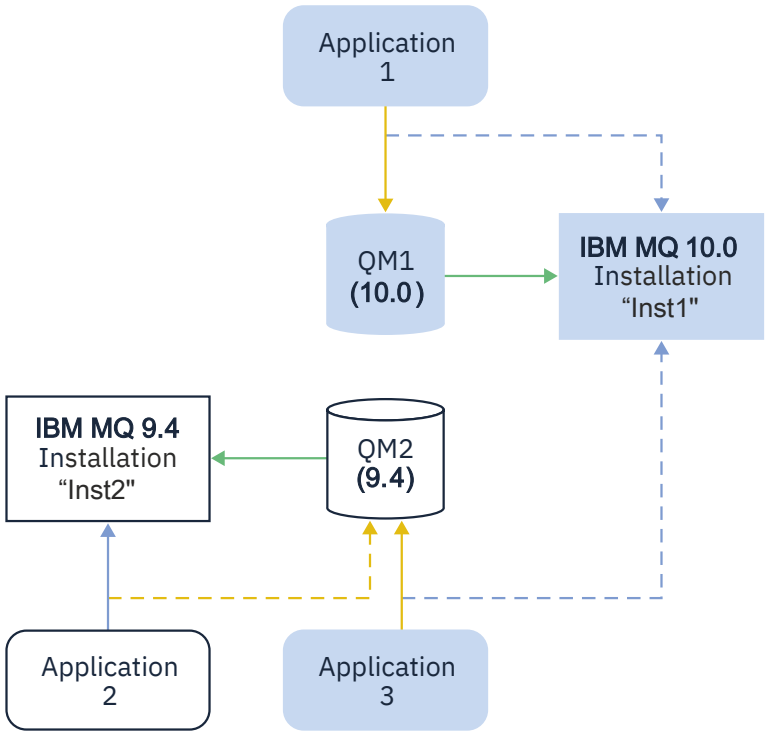


Figure 10. Coexistence of two queue managers running at different IBM MQ versions

If you run multiple installations of IBM MQ on a server you must consider three questions:

1. Which installation is a queue manager associated with? See "Queue manager association" on page 375.
2. Which installation does an application load? See "Loading IBM MQ libraries" on page 376.
3. Which installation is an IBM MQ command run from? See "Command association" on page 377.

Queue manager association

A queue manager is permanently associated with an installation, until you choose to change the association with the **setmqm** command. You cannot associate a queue manager with an installation at a lower command level than the current command level of the queue manager.

In Figure 10 on page 375, `QM1` is associated with `Inst1`. The association is made by running `setmqm -m QM1 -n Inst1`. When `QM1` is first started, after running **setmqm**, if `QM1` is running IBM MQ 9.4 it is migrated to the later version. `QM2` is associated with IBM MQ 9.4 because the association has not been changed.

Loading IBM MQ libraries

The application connections to the queue managers are established by calling MQCONN or MQCONNX in the normal way.

Which IBM MQ library an application loads depends on the configuration of the operating system loader, and on the IBM MQ installation the queue manager is associated with. In Figure 10 on page 375, the operating system loads the IBM MQ library from the Inst1 installation for applications 1 and 3. It loads the IBM MQ 9.1 library for application 2. The operating system has loaded the wrong library for application 3. Application 3 requires the IBM MQ 9.1 libraries.

Figure 11 on page 376 shows what happens to application 3. Application 3 is connecting to QM2, and QM2 is associated with the IBM MQ 9.4 installation. IBM MQ detects that the operating system has loaded the wrong library to process calls from application 3 to QM2. IBM MQ loads the correct library from the IBM MQ 9.4 installation. It transfers the MQCONN or MQCONNX call to the IBM MQ 9.4 library. Subsequent MQI calls that use the connection handle returned by MQCONN or MQCONNX, call entry points in the IBM MQ 9.4 library.

If you attempt a connection to QM1 with application 2, IBM MQ returns an error; see 2059 (080B) (RC2059): MQRC_Q_MGR_NOT_AVAILABLE.

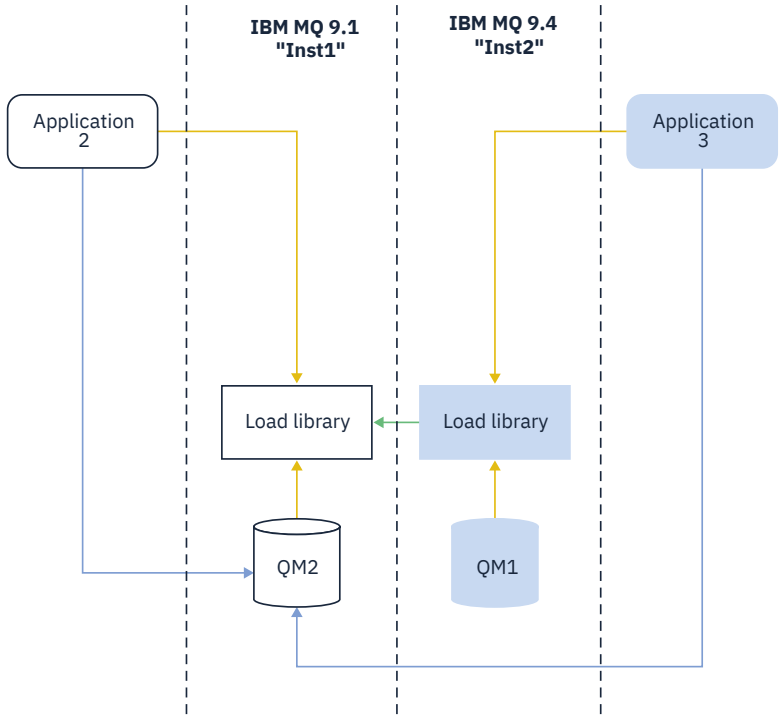


Figure 11. Loading calls in a different library

IBM MQ libraries include a routing capability that is based on the installation a queue manager is associated with. The operating system can load a library from any IBM MQ installation, and IBM MQ transfers MQI calls to the correct library.

The loading capability of IBM MQ libraries does not relax the restriction that an application compiled and linked at a later release level must not directly load an IBM MQ library at an earlier release level. In practice, as long as the operating system loads a library at the same or later level than the library the application was compiled and linked with, IBM MQ can call any other level of IBM MQ on the same server.

For example, suppose you recompile and link an application that is to connect to an IBM MQ 9.4 queue manager using the libraries shipped with IBM MQ 9.4. At run time the operating system must load the IBM MQ 10.0 libraries for the application, even though the application connects to an IBM MQ 9.4 queue manager. IBM MQ 10.0 detects the inconsistency and loads the IBM MQ 9.4 library for the application. The same applies to any future release. If the application is recompiled and linked against a later release,

then the application must load an IBM MQ library that matches the later release, even if it continues to connect to an earlier queue manager.

Your application might not be linked to an IBM MQ library, but instead call the operating system directly to load an IBM MQ library. IBM MQ checks the library is from the installation that is associated with the queue manager. If it is not, IBM MQ loads the correct library.

Special migration considerations involving loading IBM MQ libraries

You might have modified the installation of an early IBM MQ release to satisfy the requirements of a build environment, or the IT standards in your organization. If you copied IBM MQ libraries to other directories, or created symbolic links, you ended up with an unsupported configuration. A common IT standard or build environment requirement is to include IBM MQ libraries in the default load path on AIX and Linux systems. You can install IBM MQ into a directory of your own choosing, and IBM MQ can create symbolic links in `/usr` and its subdirectories. If you make an IBM MQ installation primary by using the **setmqinst** command, IBM MQ inserts symbolic links to the IBM MQ libraries into `/usr/lib`. As a result, the operating system finds the IBM MQ libraries in the default load path, if that includes `/usr/lib`.

For more information, see Connecting applications in a multiple installation environment.

Command association

Examples of commands are **dspmqver**, **setmqinst**, **runmqsc**, and **strmqm**. The operating system must find a command in an IBM MQ installation. Many commands also require a queue manager as an argument, and assume the default queue manager if a queue manager name is not provided as a parameter.

Unlike loading libraries, if a command includes a queue manager as a parameter, the command is not switched to the installation that is associated with the queue manager. You must use the **setmqenv** command to set up your environment correctly, so that any commands that you issue are run from the correct installation. You can provide a queue manager as a parameter to **setmqenv**, to set up the command environment for that queue manager. For more information, see Running **setmqenv**.

On Windows, the **setmqinst** command sets global environment variables, and **setmqenv** local environment variables, including the PATH variable to find commands.

On AIX and Linux, the **setmqinst** command copies symbolic links for a subset of the commands into `/usr/bin`. For more information, see “External library and control command links to primary installation on AIX and Linux” on page 25. The **setmqenv** command sets up local environment variables, including the search path to the binary folder in the installation directory.

The following code shows two examples of running **setmqenv** to set up the command environment for the copy of IBM MQ that is associated with queue manager `QM1`.

- Windows On Windows

```
"%MQ_INSTALLATION_PATH%\bin\setmqenv" -m QM1
```

- Linux AIX On AIX and Linux

```
. $MQ_INSTALLATION_PATH/bin/setmqenv -m QM1
```

Related concepts

Connecting applications in a multiple installation environment

“External library and control command links to primary installation on AIX and Linux” on page 25

On AIX and Linux platforms the primary installation is the one to which links from the `/usr` file system are made. However, only a subset of those links created with previous releases are now made.

“Features that can be used only with the primary installation on Windows” on page 27

Some Windows operating-system features can be used only with the primary installation. This restriction is due to the central registration of interface libraries, which might conflict as a result of multiple versions of IBM MQ being installed.

Installation configuration file, mqinst.ini

Related tasks

“Migrating on AIX and Linux: single-stage” on page 420
Single-stage migration is the term that is used to describe replacing the only installation of IBM MQ on a server with a later release. Single stage migration is also known as *upgrading in place* or *in place upgrade*. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect that queue manager migration has on users.

“Migrating on Windows: single stage” on page 394
Single-stage migration is the term used to describe replacing the only installation of IBM MQ on a server, with a later version of the product. Single stage migration is also known as *upgrading in place* or *in place upgrade*. Single-stage migration preserves existing scripts and procedures for running IBM MQ the most. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect queue manager migration has on users.

Changing the primary installation

“Staging maintenance level updates on AIX” on page 300
On AIX, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Staging maintenance level updates on Linux” on page 309
On Linux, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Staging maintenance level updates on Windows” on page 326
On Windows systems, you can use multiple installations of IBM MQ on the same server to control the release of maintenance level updates.

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

“Coexistence” on page 371
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations. In addition to queue managers coexisting on a server, objects, and commands must work correctly with different queue managers running at different command levels.

setmqenv

setmqinst

setmqm

strmqm -e CMDLEVEL

Related information

Dynamic-Link Library Search Order

ALW *Multiple installations and application programs*

When a local application connects to a queue manager, the application needs to load the libraries from the installation associated with the queue manager. Multiple installations introduce some complexity.

Using the `setmqm` command

When you use setmqm to change the installation associated with a queue manager, the libraries that need to be loaded change.

When an application connects to multiple queue managers owned by different installations, multiple sets of libraries need to be loaded.

Note: If you link your applications to IBM MQ libraries, the applications automatically load the appropriate libraries when the application connects to a queue manager.

Loading IBM MQ libraries in a multi-version environment

How libraries are located depends upon your environment.

If IBM MQ is installed in the default location, existing applications continue to work as before. Otherwise, you might need to rebuild the application or change your configuration.

The order in which libraries are searched, depends upon the platform you are using:

- Windows
  - The application's directory
  - The current directory
  - The global and your PATH variables
- Other platforms
  - LD_LIBRARY_PATH (or LIBPATH/SHLIB_PATH)
  - An embedded search path (RPath)
  - The default library path

Table 39. Options for loading libraries

Platform	Option	Benefits	Drawbacks
AIX and Linux	Set/change the embedded runtime search path (RPath)	The path is explicit in the way the application is built	You need to recompile and link If you move IBM MQ, you must change RPath
AIX and Linux	Set LD_LIBRARY_PATH or equivalent using setmqenv	Overrides RPath No changes to existing applications Easy to change if you move IBM MQ	Depends on environment variables Possible impacts on other applications
Windows	Set PATH using setmqenv	No changes to existing applications Easy to change if you move IBM MQ	Depends on environment variables Possible impacts on other applications

Table 39. Options for loading libraries (continued)			
Platform	**Option**	**Benefits**	**Drawbacks**
All	Set the primary installation to IBM WebSphere MQ 7.1 or later	No changes to existing applications Easy to change the primary installation Similar behavior to previous versions of IBM MQ	AIX and Linux: Relies on `/usr/lib` in the default search path

Related concepts

"Multiple installations on AIX, Linux, and Windows" on page 19
On AIX, Linux, and Windows, it is possible to have more than one copy of IBM MQ on a system.

Mixed version cluster coexistence

A cluster can contain queue managers running at IBM MQ 10.0, and any currently supported earlier level of the product. However new features cannot be exploited from queue managers at an earlier level.

'New features' includes any functionality enabled by setting new attributes on clustered object definitions (for example, attributes that would be seen on a `DIS QCLUSTER`, `DIS CLUSQMGR`, or `DIS TCLUSTER` MQSC query) or any cluster-level behaviors (for example, publish subscribe topologies, Uniform Cluster load balancing).

To find out the version of each queue manager in the cluster, specify the VERSION parameter with the DISPLAY CLUSQMGR command. See also "How mixed version cluster repositories are updated" on page 479.

z/OS *ISPF operations and control panels on z/OS*

When using the operations and control panels, the IBM MQ libraries you use in ISPF must be compatible with the queue manager you are working with.

Compatibility of queue manager versions with operations and control panel versions on z/OS shows which versions of the operations and controls panels you use in ISPF are compatible with which levels of queue manager.

Table 40. Compatibility of queue manager versions with operations and control panel versions on z/OS				
Version	**Queue sharing group containing a mixture of IBM MQ for z/OS 9.3, IBM MQ for z/OS 9.4, and IBM MQ for z/OS 10.0 queue managers.**	**IBM MQ for z/OS 10.0 queue manager**	**IBM MQ for z/OS 9.4 queue manager**	**IBM MQ for z/OS 9.3 queue manager**
IBM MQ for z/OS 10.0 panel	Compatible	Compatible	Compatible	Compatible
IBM MQ for z/OS 9.4 panel	Not compatible	Not compatible	Compatible	Compatible
IBM MQ for z/OS 9.3 panel	Not compatible	Not compatible	Not compatible	Compatible

z/OS *Queue sharing group coexistence on z/OS*

Queue managers running on IBM MQ for z/OS 10.0, or any of the IBM MQ for z/OS 10.0.x Continuous Delivery (CD) releases, can be part of a QSG with queue managers running on IBM MQ for z/OS 9.3.0 or

later. This applies to any combination of CD and Long Term Support (LTS) releases from IBM MQ for z/OS 9.3.0.

Queue managers check to see if the QSG contains any incompatible queue managers. If there are incompatibilities in the QSG, the queue manager fails to start up, issuing message CSQ5005E followed by an X'6C6' abend with reason code X'F50029'.

Compatibility with a QSG can be determined in various ways:

- From IBM MQ for z/OS 9.3, the easier way is to use the CSQ5PQSG VERIFY function and check for message CSQU599I.

  This indicates whether your queue manager can be added to an existing QSG. Note that it is always better to run this utility before attempting to add a queue manager to a QSG or migrating an existing queue manager in the QSG.
- Alternatively, you can query the Db2 tables to see all the queue manager levels in a QSG. For example, use the Db2 SPUFI command.

  See Executing SQL by using SPUFI for more information. In addition, CSQ45STB in SCSQPROC has sample JCL that you can customize to do the Db2 SELECT commands.

  Running this command shows in the following example that you have an IBM MQ for z/OS 9.2 queue manager in the QSG and that therefore you cannot run IBM MQ for z/OS 10.0 in the QSG.

```
SELECT QMGRNAME,ACTSTATE,CMDLEVEL FROM CSQ.ADMIN_B_QMGR WHERE QSGNAME = 'QSG1';
---------+---------+---------+---------+---------+---------+---------+---------+---------
+---------+---
QMGRNAME                                                        ACTSTATE
CMDLEVEL
---------+---------+---------+---------+---------+---------+---------+---------+---------
+---------+---
MQ01                                                              N         945
MQ02                                                              N         920
MQ03                                                              N         930
```

Properties of objects in a queue sharing group with queue managers at different versions on z/OS

Attributes that did not exist in earlier versions can be created and altered on queue managers of a later version in a mixed queue sharing group. The attributes are not available to queue managers in the group that are at an earlier level.

MQSC commands in a queue sharing group with queue managers at different versions on z/OS

Existing **MQSC** commands using new keywords and attribute values can be entered for routing to a migrated queue manager. You can enter the commands on any queue manager. Route the commands using **CMDSCOPE**. Commands with new keywords and attribute values, or new commands, routed to a previous version of queue manager, fail.

Application compatibility and interoperability with earlier versions of IBM MQ

Connecting an application that is built against libraries shipped with a later version of IBM MQ to an earlier version IBM MQ is not supported. Avoid building applications against a later version, and redeploying them to a queue manager running at an earlier version, although some applications do work in practice.

IBM MQ applications do interoperate with applications running on earlier versions of IBM MQ, as long as they use no new function. IBM MQ clients can connect to queue managers running at an earlier version than the client, as long as the client uses no new functions.

An IBM MQ application that uses only functions provided by an earlier version of a queue manager can continue to send messages to the earlier version. It does not matter what version of IBM MQ an

application is built on and connected to. It can exchange messages with an application connected to an earlier version of IBM MQ, as long as it does not use new function.

Consider these four cases; the first two cases are not supported though they might work in practice, the last two cases are supported. The first two cases require compatibility with an earlier version of IBM MQ. The last two cases rely on the interoperability between all versions of IBM MQ

1. Running an IBM MQ server application, built with a later version of IBM MQ, connecting to a queue manager running on a server with an earlier version of IBM MQ installed.
2. Running an IBM MQ client application, built with a later version of IBM MQ, on a client platform with an earlier client installation, connecting to a queue manager running on a server with a later version of IBM MQ installed.
3. Running an IBM MQ client application, built with a later version of IBM MQ, on a client platform with the later client installation, connecting to a queue manager running on a server with an earlier version of IBM MQ installed.
4. Exchanging messages between an IBM MQ client or server application, connected to a queue manager running on a server with a later version of IBM MQ installed, with applications connected to a queue manager running on a server with an earlier version of IBM MQ installed.

Plan to avoid the first two cases, as they are not guaranteed to work all the time. If you are running an incompatible configuration and you encounter a problem, you must rebuild your applications with the correct level of IBM MQ. You can then continue with problem diagnosis.

Multi-installation and application loading

The loading capability of IBM MQ libraries does not relax the restriction that an application compiled and linked at a later release level must not directly load an IBM MQ library at an earlier release level. In practice, as long as the operating system loads a library at the same or later level than the library the application was compiled and linked with, IBM MQ can call any other level of IBM MQ on the same server.

For example, suppose you recompile and link an application that is to connect to an IBM MQ 9.4 queue manager using the libraries shipped with IBM MQ 9.4. At run time the operating system must load the IBM MQ 10.0 libraries for the application, even though the application connects to an IBM MQ 9.4 queue manager. IBM MQ 10.0 detects the inconsistency and loads the IBM MQ 9.4 library for the application. The same applies to any future release. If the application is recompiled and linked against a later release, then the application must load an IBM MQ library that matches the later release, even if it continues to connect to an earlier queue manager.

Examples

1. You decide to rebuild a client application. Can you deploy it to your production environment that contains some earlier versions of client and server platforms?

   The answer is no, you must upgrade all the client workstations you deploy to, at least to the version of the client you have built. The queue managers running on earlier versions of IBM MQ do not have to be upgraded. In practice all the clients are likely to work, but for maintainability you must avoid running incompatible levels of an application and the IBM MQ client.
2. You deploy some IBM MQ queue managers at a new version level. You have an existing IBM MQ application that you use to send messages between the servers. Do you rebuild the application to deploy it onto the new servers? Can you deploy the old version onto the new servers?

   The answer is, either. You can continue to deploy the existing version of the application onto all your servers, or you can deploy the rebuilt application onto the new servers. Either configuration works. IBM MQ supports running the existing application on later servers and sending messages from later application versions to earlier ones. What you must not do is to rebuild the application on the later version and redeploy it onto both the earlier and newer servers. IBM MQ does not support compatibility with earlier versions.

z/OS application stubs

z/OS

The stub modules that are listed are link-edited with applications and exits.

- CSQASTUB
- CSQBRSSI
- CSQBRSTB
- CSQBSTUB
- CSQCSTUB
- CSQQSTUB
- CSQXSTUB

Application compatibility and interoperability with later versions of IBM MQ

IBM MQ applications run against later versions of a queue manager without recoding, recompiling, or relinking. You can connect an application that is built against libraries shipped with an earlier version of IBM MQ to a queue manager running at a later version of IBM MQ.

If you upgrade a queue manager to a later version, existing applications built against its earlier version work without change. Exceptions are noted in "Changes that affect migration" on page 352. Likewise applications connected to the IBM MQ Client, run against later versions of the client without recoding, recompiling, or relinking. You can deploy client applications built against earlier versions of the IBM MQ Client libraries to connect using later versions of the libraries.

Consider these four cases; the first two cases are not supported though they might work in practice, the last two cases are supported. The first two cases rely on the compatibility of a later version of IBM MQ with applications built against earlier versions. The last two cases rely on the interoperability between all versions of IBM MQ.

1. Running an IBM MQ server application, built with a later version of IBM MQ, connecting to a queue manager running on a server with an earlier version of IBM MQ installed.
2. Running an IBM MQ client application, built with a later version of IBM MQ, on a client platform with an earlier client installation, connecting to a queue manager running on a server with a later version of IBM MQ installed.
3. Running an IBM MQ client application, built with a later version of IBM MQ, on a client platform with the later client installation, connecting to a queue manager running on a server with an earlier version of IBM MQ installed.
4. Exchanging messages between an IBM MQ client or server application, connected to a queue manager running on a server with a later version of IBM MQ installed, with applications connected to a queue manager running on a server with an earlier version of IBM MQ installed.

You might change the operating environment as a prerequisite of migrating to a new level of queue manager. The operating environment changes, rather than changes in IBM MQ itself, might require application change, recompilation, or relinking. Sometime the operating environment change affects only the development environment, and the operating environment supports applications built at an earlier level. In which case, you might be able to run existing applications built at the older level of the operating environment. You might not be able to build any new applications until the operating environment is upgraded.

In the future, after you have migrated queue managers and clients to the latest release level, consider changing your applications to take advantage of new capabilities.

z/OS application stubs

z/OS

The stub modules that are listed are link-edited with applications and exits.

- CSQASTUB
- CSQBRSSI
- CSQBRSTB
- CSQBSTUB
- CSQCSTUB
- CSQQSTUB
- CSQXSTUB

Compatibility between different versions of an IBM MQ client and a queue manager

Any supported version and release of an IBM MQ client can connect to any supported version and release of an IBM MQ queue manager. Supported IBM MQ clients are all clients included with the main MQ product. This includes IBM MQ Internet Pass-Thru (MQIPT). The MQI channel is automatically configured to the latest version that both the client and server support. If the client and server are different versions, the client application must use only the functions in the earlier version.

The compatibility between clients and queue managers applies only to the version and release (`V.R`) of the product. The statement of compatibility does not necessarily apply to the modification and fix pack level (`M.F`) of the product.

If there are known problems at a specific `V.R.M.F` of the product, upgrade to a more recent fix pack for the same `Version.Release`.

When you upgrade a queue manager to a different version, you automatically upgrade IBM MQ libraries. The libraries are used by IBM MQ client and server applications running on the same server as the queue manager. To access new functions from remote clients, you must also upgrade the IBM MQ client installation on remote workstations. The IBM MQ client includes the IBM MQ client libraries.

Remote clients that have not been upgraded continue to work with an upgraded queue manager. In rare cases, the behavior of the client application might change. See “Changes that affect migration” on page 352.

Remote clients that are connected to upgraded queue managers can use the new functions in the release. If an upgraded remote client is connected to a queue manager that has not been upgraded, it must not use new functions. In rare cases, the behavior of the client might change. See “Changes that affect migration” on page 352.

You can generally assume that upgrading the IBM MQ client does not require you to recompile or relink the client application. You can also continue to use the same connection to the queue manager. If changes are required, they are identified in “Migrating a queue manager on Windows” on page 390, for the particular migration path and platform you are concerned with.

The Client Channel Definition Table (CCDT) is an interface to customize the connection between an IBM MQ client and a queue manager. Entries in the tables are client connections, which are defined using a queue manager. The version of a CCDT is the version of the queue manager used to define the client connections. If an IBM MQ client uses CCDT to connect to a queue manager, the CCDT can be at a version greater than, less than, or equal to that of the client.

You can connect to a queue manager with an earlier IBM MQ client or an earlier CCDT. If you are using a CCDT, and you plan to use new client channel configuration options, such as shared conversations, you must upgrade the CCDT, and therefore the IBM MQ client installation, to the new version.

MQ clients: Client Channel Definition Table (CCDT)

You can connect a supported IBM MQ client application to any supported level of queue manager. If a client uses CCDT to connect to a queue manager, the CCDT can be at a version greater than, less than, or equal to that of the client.

When a client uses a CCDT file that was generated using a newer version of IBM MQ, only channel attributes within the CCDT that were available at the client's IBM MQ version are considered during negotiation with the queue manager. Channel attributes present in the CCDT that were added in newer versions of IBM MQ will be ignored by older clients.

Version of originating queue manager for a CCDT

Before IBM MQ 9.0, clients can use a CCDT built by the same or earlier version queue manager, but there was previously a restriction on clients using a CCDT built by a later version queue manager. However, this restriction is removed in IBM MQ 9.0.

From IBM MQ 9.0, if a client uses a CCDT, it can use a CCDT built by a later version queue manager, as well as a CCDT built by the same, or earlier version of queue manager.

The same restriction on the use of CCDTs originating from later version queue managers is also removed in IBM MQ 8.0, and earlier versions, by APARs IT10863 and IT11547. for more information, see the technote MQ 7.x, MQ 8.0, MQ 9.0, MQ 9.1, MQ9.2, and MQ9.3 compatibility with previous versions - including usage of CCDT files, JMS .bindings, SSL/TLS.

Common migration scenarios

If, for example, you upgrade a queue manager from an earlier release to a later release, and you do not create new CCDTs for its clients, the clients connect to the later release queue manager without any changes being required. Client behavior might change as a result of changes to the queue manager.

Another common migration scenario is to update some queue managers and some clients to a later release, leaving other queue managers and clients at the earlier release. In this scenario, you want to update the CCDT for the IBM MQ clients to the same release as the queue managers to which they connect, so that those clients can fully use the function in the later release. The new clients can also connect to the earlier release queue managers. Existing clients connect to queue managers in both releases. In order that the clients in the later release can use the new function in that release, you must deploy a CCDT that has been generated by a queue manager in that new release. Clients in the earlier release can continue to use the CCDT for that earlier release. Both sets of clients can connect to both sets of queue managers, regardless of the CCDT they are using.

Related concepts

Client channel definition table

Web addressable access to the client channel definition table

Related tasks

Accessing client-connection channel definitions

MQ clients: Client configuration stanzas moved into a different configuration file

Client configuration information is moved from existing configuration stanzas into a new configuration file, `mqclient.ini`.

Moving client configuration information affects existing settings. For example:

- Set the TCP `KeepAlive` attribute for client connections in `mqclient.ini`. For example:

  ```
  TCP:
  KeepAlive = Yes
  ```

  An existing setting in `qm.ini` is ignored.
- Set `ClientExitPath` in `mqclient.ini`. For example:

  ```
  ClientExitPath:
  ExitsDefaultPath=/var/mqm/exits
  ExitsDefaultPath64=/var/mqm/exits64
  ```

  An existing setting in `mqs.ini` is moved to the client configuration file when you upgrade the client. If you add values to `mqs.ini`, they are ignored.
- Set `JavaExitsClasspath` in `mqclient.ini`.

  Deprecated Do not continue to use the Java system property `com.ibm.mq.exitClasspath`. Existing settings continue to work, but they are deprecated. The setting in `mqclient.ini` has precedence over the Java system property.

See Location of the client configuration file for information on the possible locations of this file.

Related tasks

Assigning channel exits for IBM MQ classes for JMS

IBM MQ MQI client configuration file, `mqclient.ini`

Related reference

The IBM MQ classes for JMS configuration file

Supported IBM MQ client: Default behavior of client-connection and server-connection channels
The default for client and server connections is to share an MQI channel. You use the **SHARECNV** (share conversations) parameter to specify the maximum number of conversations that can be shared over a particular TCP/IP client channel instance.

The possible values are as follows:

SHARECNV(2) to SHARECNV(999999999)
Each of these values specifies the number of shared conversations. If the client-connection **SHARECNV** value does not match the server-connection **SHARECNV** value, then the lowest value is used. The default value is `SHARECNV(10)`, which specifies 10 threads to run up to 10 client conversations per channel instance. However, on distributed servers there are performance issues with SHARECNV channels that can be eased by using `SHARECNV(1)`. See Tuning client and server connection channels.

SHARECNV(1)
This value specifies no sharing of conversations over a TCP/IP socket. Performance on distributed servers is similar to that for a value of `0`. Client heartbeating (whether in an MQGET call or not) and read ahead are available, and channel quiescing is more controllable.

SHARECNV(0)
This value specifies no sharing of conversations over a TCP/IP socket. Only use a value of `0` if you have existing client applications that do not run correctly when you set **SHARECNV** to 1 or greater.

For all **SHARECNV** values of 1 or greater, the channel supports the following features:

- Bi-directional heartbeats
- Administrator stop-quiesce
- Read-ahead
- Asynchronous-consume by client applications

Heartbeats

Heartbeats can flow across the channel at any time in either direction. If you use `SHARECNV(0)`, heartbeats flow only when an `MQGET` call is waiting.

Channel exits

The behavior of a client or server connection channel exit changes when the channel is sharing conversations (that is, when you set **SHARECNV** to a value greater than 1). It is unlikely, but possible, that the change affects the behavior of existing exits. The change is as follows:

- Send or receive exits can alter the `MQCD` structure on an `MQXR_INIT` call. The effect of these exits differs, depending on whether the conversation is shared with other conversations on the same channel:
  - If the `MQCXP SharingConversations` field passed to the exit instance is set to `FALSE`, this exit instance is the first, or only, conversation on the channel instance. No other exit can be changing the `MQCD` at the same time, and changes that are made to the `MQCD` can affect the way that the channel runs.
  - If the `MQCXP SharingConversations` field passed to the exit instance is set to `TRUE`, this exit instance is a subsequent conversation. It is sharing the channel instance with other conversations.

Changes made to the MQCD in the exit instance are retained in the MQCD but do not affect the way the channel runs.

- Send, receive, and security exit instances can alter the MQCD, when the MQCXP SharingConversations field is set to TRUE. Exit instances on other conversations might be changing the MQCD at the same time. Updates written by one exit instance can be overwritten by another instance. It might be necessary to serialize access to the MQCD across these different exit instances to maintain the consistency of fields in MQCD.

Updating MQCD when the SharingConversations field is set to TRUE does not affect the way the channel runs. Only alterations made when the MQCXP SharingConversations field is set to FALSE, on an MQXR_INIT call, change channel behavior.

Related concepts

Channel-exit programs for MQI channels

Related tasks

Using sharing conversations

Using read ahead

Stopping MQI channels

Tuning client and server connection channels

Related reference

HeartbeatInterval (MQLONG)

SharingConversations (MQLONG)

ALTER CHANNEL

The Asynchronous consume sample program

CD Migrating from one Continuous Delivery release to another

An overview of how you migrate from one Continuous Delivery (CD) release to another.

Before you begin

If you want to migrate replicated data queue managers, follow the instructions in "Migrating replicated data queue managers" on page 487.

1. Back up your existing IBM MQ environment. This is required in case you need to revert to your current CD release of IBM MQ.

   Important: Once the new installation is started, all of the existing IBM MQ objects will be migrated to the new modification level. If you do not back up your system, you cannot revert the objects to their previous level without completely uninstalling, and restoring a backup you made before you carried out the migration.

   Windows Copy the qm.ini file and the registry entries.

   For more information about backing up your system, see Backing up and restoring IBM MQ queue manager data.
2. Use the **dmpmqcfg** command to save the current configuration details to a text file.

Procedure

1. Stop all of the IBM MQ processes for the installation being migrated.
2. Upgrade the existing CD installation by using one of the following methods:
   - Windows AIX On Windows and AIX, upgrade IBM MQ by installing the new CD installation in the same location as the existing installation.

     For more information about upgrading your CD installation on Windows, see "Upgrading an IBM MQ installation on Windows" on page 347.

For more information about upgrading your CD installation on AIX, see “Installing IBM MQ server on AIX” on page 45.

- Linux On Linux, if your existing CD installation is at IBM MQ 9.2.1 or later, you can upgrade IBM MQ by installing the new CD installation in the same location as the existing installation.

  For more information about upgrading your CD installation on Linux, see “Upgrading an IBM MQ installation on Linux” on page 335.
- Uninstall the existing CD installation and then install the new CD modification level onto the same system.

  Note that uninstalling the existing installation does not remove the object definitions from the system. The object definitions remain in place.

3. Start the queue manager.

   ```
   strmqm QmgrName
   ```

   When you first start a queue manager after migration to the new CD level:

   - Any new attributes for existing objects are set to their default values.
   - Any new default objects are created.
   - Queue manager objects are migrated to the new modification level.

   Note: If you have saved your current configuration details in a text file, that file can be used to duplicate these objects in the newly created queue manager after it has been created, if you installed the new version onto a different system.

   See the **runmqsc** command for instructions on how you can do this.

Related concepts

IBM MQ release types and versioning

Windows Migrating IBM MQ on Windows

IBM MQ migration tasks associated with Windows platforms are grouped in this section.

Before you begin

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.0 or earlier, you must first migrate to an interim version. See Migration paths.

Important: From IBM MQ 9.4.0, AMQP channels no longer support CMS key repository files. Instead, you need to use PKCS #12 key repositories and protect the key repository passwords by using the IBM MQ password protection system. You set the password in the queue manager's **KEYRPWD** attribute.

If you are migrating a queue manager with an AMQP configuration to IBM MQ 10.0 or later, and your queue manager is currently configured with a CMS keystore, you must convert it to PKCS12 format before proceeding with the migration. For more information on how to perform this conversion, see SSL/TLS support in Securing AMQP Clients.

About this task

This topic lists the various steps you need to take to migrate to, or migrate from, the latest version of the IBM MQ product.

See also “Migrating from one Continuous Delivery release to another” on page 387, if you are migrating a Continuous Delivery release of the product.

Procedure

- For information about creating a migration plan, see “Planning to migrate IBM MQ to a later version on Windows” on page 389.

- For information about migrating a queue manager from an earlier version to the latest version, see “Migrating a queue manager to a later version on Windows” on page 391.
- For information about reverting a queue manager to an earlier version, see “Reverting a queue manager to an earlier version on Windows” on page 405.
- For information about migrating an IBM MQ MQI client to the latest version, see “Migrating an IBM MQ MQI client to a later version on Windows” on page 407.
- For information about converting a single instance queue manager to a multi-instance queue manager, see Converting a single instance to a multi-instance queue manager on Windows.
- For information about reverting a multi-instance queue manager to a single instance queue manager, see Reverting to a single-instance queue manager on Windows.
- For information about migrating IBM MQ library loading to the latest version, see “Migrating IBM MQ library loading to a later version on Windows” on page 408.
- For information about migrating IBM MQ Telemetry to the latest version, see “Migrating IBM MQ Telemetry on Windows” on page 412.
- For information about migrating an MSCS configuration to the latest version, see “Migrating an MSCS configuration on Windows” on page 413.
- For information about Migrating logs to an Advanced Format disk, see “Migrating logs to an Advanced Format disk on Windows” on page 415.

Related concepts

“Migration concepts and methods” on page 356
An overview of the various concepts and methods for migrating from one release of the product to another.

Related tasks

“Migrating IBM MQ on AIX and Linux” on page 416
Migration tasks associated with AIX and Linux platforms are grouped in this section.

“Migrating IBM MQ on IBM i” on page 441
IBM MQ migration tasks associated with IBM i are grouped in this section.

“Migrating IBM MQ on z/OS” on page 462
Migration tasks associated with z/OS are grouped in this section.

Related reference

“Changes that affect migration” on page 352

Windows *Planning to migrate IBM MQ to a later version on Windows*

Before migrating IBM MQ to a later version on Windows, review the system requirements information, and the information about any changes that might affect migration, then create a migration plan.

Before you begin

If there are concepts about migration you do not understand, see “Migration concepts and methods” on page 356.

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.1 or earlier, you must first migrate to an interim version. See Migration paths.

For help with migration to an interim version, see the documentation for that version:

- IBM MQ 9.2 Migrating IBM MQ on Windows
- IBM MQ 9.3 Migrating IBM MQ on Windows
- IBM MQ 9.4 Migrating IBM MQ on Windows

About this task

Use the following steps as a guide to creating a migration plan.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.
2. Decide whether to run the earlier version and the later version of the product on the same server, and also which migration method you want to use.

   Choices are single-stage migration, side-by-side migration, or multi-stage migration. See “Migration methods on IBM MQ for Multiplatforms” on page 363.
3. Review all the changes in IBM MQ that affect you.

   See “Changes that affect migration” on page 352.
4. Review performance changes.

   See MQ Performance documents.
5. Review the readme file for the later version of IBM MQ.

   See IBM MQ, WebSphere MQ, and MQSeries product readmes.
6. Plan the sequence and timing of queue manager migrations.
   - If the queue manager is part of a queue manager cluster, you must migrate the queue managers that are full repositories first.
   - If the queue manager is part of a high availability cluster, plan the migration to minimize downtime and maximize availability; see “Migrating a queue manager in a high-availability configuration” on page 483.
7. Plan to migrate your queue manager to the later version.

   See “Migrating a queue manager to a later version on Windows” on page 391.

   Backing up queue manager data is part of the queue manager migration task. An alternative approach is to install and configure a new server, then test the later version with a new queue manager on the new server. When you are ready to go into production on the later version, copy the queue manager configuration and data to the new server.
8. Plan to update any manual or automated procedures you have written with changes to messages and codes.

   A suffix letter, indicating the severity of a message (I, W, E, S or T) is appended to IBM MQ diagnostic (AMQ) messages. Existing scripts looking for error codes without the severity will fail. For example, existing scripts looking for error matching to AMQ7468 will fail. You must update the scripts to look for error codes with the severity suffix added (for example, AMQ7468I). For more information, see IBM MQ messages on Multiplatforms.
9. Decide on what regression tests to perform before putting the queue manager into production on the later version. Include in your regression tests the procedures and applications you identified in previous steps.
10. Plan to migrate your IBM MQ MQI client installations to the later version.
11. Plan to migrate your client and server applications to use new functions in the later version.
12. Decide which downloadable images you require for the migration.

    For more information, see “Where to find downloadable installation images” on page 12.

Windows *Migrating a queue manager on Windows*

The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

Related tasks

“Migrating a queue manager on AIX and Linux” on page 419

The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

"Migrating a queue manager to the latest version on IBM i" on page 444
Follow these instructions to migrate a queue manager on IBM i to the latest MQ version.

"Migrating IBM MQ on z/OS" on page 462
Migration tasks associated with z/OS are grouped in this section.

Migrating a queue manager to a later version on Windows

On Windows platforms, follow these instructions to migrate a queue manager from an earlier version to a later version of IBM MQ.

Before you begin

If you have installed early support program code on the server, you must delete all the queue managers created with the installation. Uninstall the code before proceeding with installing the production level code.

1. Create a migration plan; see "Planning to migrate IBM MQ to a later version on Windows" on page 389.
2. Review the IBM MQ system requirements for the latest version, including information about the versions of Windows that IBM MQ supports. See System Requirements for IBM MQ.
3. Back up your system before you install a later version of IBM MQ over an earlier version. Once you have started a queue manager you cannot revert to the previous version. If you must restore the system, you cannot recover any work, such as changes to messages and objects, performed by the later version of IBM MQ. For more information about backing up your system, see Backing up and restoring IBM MQ queue manager data.
4. Review any other installed SupportPacs for their applicability to the later version.
5. If you are running on a server with multiple IBM MQ installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.

About this task

To run a command, the operating system must find the command in an IBM MQ installation. For some commands, you must run the command from the installation that is associated with the correct queue manager. IBM MQ does not switch commands to the correct installation. For other commands, such as **setmqinst**, you can run the command from any installation that has the later version of the product installed.

If an earlier version of the product is installed, the command that is run is the command for that version, unless the search path is overridden by a local setting. You can override the search path by running **setmqenv**. You must set the correct path to run a command. If you have set a primary installation, the command that is run is the copy in the primary installation, unless you override the selection with a local search path.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

Run either of the following commands from the installation that you are updating:

```
dspmq -o installation -o status
dspmq -a
```

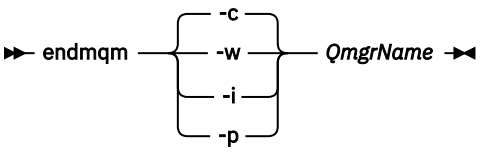
dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

dspmq -a displays the status of active queue managers associated with the installation from which the command is run.

b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

```
echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
```

c) Run the **endmqm** command to stop each running queue manager associated with this installation.



The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

Note: “Applying maintenance level updates to multi-instance queue managers on Windows” on page 329 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

d) Stop any listeners associated with the queue managers, using the command:

```
endmqlsr -m QMgrName
```

4. Back up the queue manager.

   Take copies of all the queue manager's data and log file directories, including all subdirectories, and also the `qm.ini` file and the registry entries. For more information, see Backing up and restoring IBM MQ queue manager data.

5. Stop the IBM MQ Service and exit the Service icon application.

6. Optional: If you are doing a single stage migration, optionally uninstall the current version of the product.

   Note, that you carry out this step only if you are doing a single stage migration; see “Migrating on Windows: single stage” on page 394.

7. Install the later version of IBM MQ.

   On Windows, you can do this either by using the Installation Launchpad or by using the **msiexec** command. For more information, see:

   - “Modifying a server installation using the Installation Launchpad” on page 199

- “Modifying a server installation silently using msiexec” on page 200

8. Reenter domain, user ID, and password information

   When the installation of the latest version completes, the Prepare IBM MQ Wizard starts automatically.

   Where UAC is enabled: If you rerun the Prepare IBM MQ Wizard, ensure that the wizard is run with Administrator privilege, otherwise the wizard might fail.

9. Start the queue manager.

   ```
   strmqm QmgrName
   ```

   When you first start a queue manager after migration:

   - Any new attributes for existing objects are set to their default values.
   - Any new default objects are created.
   - Queue manager data is migrated.

   Important: Do not use the -c option to start the queue manager, unless you explicitly want to reset or re-create the default system objects.

   You must start IBM MQ before you start any listeners.

What to do next

Complete the tasks in your migration plan, such as verifying the new code level and deploying new functions such as automatically restarting client connections.

If you are using publish/subscribe, you must migrate the publish/subscribe broker.

If the queue manager is a member of a queue manager cluster, migrate the other members of the cluster.

Important: You must migrate the publish/subscribe broker state before you migrate your IBM MQ system to IBM MQ 8.0 or later, because broker publish/subscribe migration is not supported in IBM MQ 8.0, or later.

Related concepts

“Where to find downloadable installation images” on page 12
You download installation images for IBM MQ from Passport Advantage, Fix Central, or (for z/OSsystems) the ShopZ website. A number of IBM MQ components including fix packs, CSUs, clients, and the resource adapter are also available for downloading from Fix Central and elsewhere.

“Queue manager migration” on page 359
After upgrading an installation, queue manager migration might be required. Migration takes place when you start a queue manager. You can remove an upgrade before you have started a queue manager. However, if you remove the upgrade after a queue manager has been started, the queue manager will not work.

Related tasks

“Configuring IBM MQ with the Prepare IBM MQ Wizard” on page 192
The Prepare IBM MQ Wizard helps you to configure IBM MQ with a user account for your network. You must run the wizard to configure the IBM MQ Service before you can start any queue managers.

“Migrating a queue manager in a high-availability configuration” on page 483
High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

“Migrating a queue manager cluster” on page 478
You can migrate queue managers in a cluster all at once, or one at a time, which is called a staged migration. Migrate full repository queue managers in a cluster before partial repository queue managers.

You must consider what the effect is of migrating some queue managers in a cluster, before all the queue managers are migrated.

"Maintaining and migrating IBM MQ" on page 287
Maintenance, upgrade, and migration have three distinct meanings for IBM MQ. The definitions are described here. The following sections describe the various concepts associated with migration, followed by the various tasks needed; these tasks are platform-specific where needed.

"Migrating IBM MQ" on page 351
Migration is the conversion of programs and data to work with a new code level of IBM MQ. Some types of migration are required, and some are optional. Queue manager migration is never required after applying a maintenance level update, that does not change the command level. Some types of migration are automatic, and some are manual. Queue manager migration is typically automatic and required after releases and manual and optional after a maintenance level upgrade that introduces a new function. Application migration is typically manual and optional.

"Upgrading IBM MQ" on page 334
Upgrading is the process of taking an existing IBM MQ installation and upgrading to a new level of code.

Related information

IBM MQ - SupportPacs by Product

Windows *Migrating on Windows: single stage*

Single-stage migration is the term used to describe replacing the only installation of IBM MQ on a server, with a later version of the product. Single stage migration is also known as *upgrading in place* or *in place upgrade*. Single-stage migration preserves existing scripts and procedures for running IBM MQ the most. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect queue manager migration has on users.

Before you begin

These topics guide you in deciding what other tasks you must perform to migrate queue managers and applications to the later version. For the precise sequence of commands to upgrade a queue manager to the later version, do the migration task for the platform you are interested in. All the tasks are listed by platform in the links at the end of this topic. As part of the queue manager migration task, back up your existing queue manager data. Even on a multi-installation server, queue managers cannot be restored to a previous command level after migration.

Attention: From IBM MQ 9.0, the `ccsid_part2.tbl` file replaces the existing `ccsid.tbl` file, used in previous versions of the product, to supply additional CCSID information.

The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

- Allows you to add or modify CCSID entries
- Specify default data conversion
- Specify data for different command levels

The `ccsid_part2.tbl` is applicable to the following platforms only:

- Linux Linux - all versions
- Windows Windows

If you have added any of your own CCSID information into your existing `ccsid.tbl` file, you should copy this information into the new `ccsid_part2.tbl` file, if you want to take advantage of the new formats in your customizations

You should copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

About this task

In the single-stage migration scenario, the installation of the later version of the product replaces an earlier version in the same installation location.

The advantage of single-stage migration is that it changes the configuration of a queue manager on the earlier version as little as possible. Existing applications switch from loading the libraries from the earlier version, to loading the libraries of the later version, automatically. Queue managers are automatically associated with the installation on the later version. Administrative scripts and procedures are affected as little as possible by setting the installation to be the primary installation. If you set the installation of the later version to be the primary installation, commands such as **strmqm** work without providing an explicit path to the command.

When you upgrade the earlier version to the later version, all the objects that you previously created are maintained. The components that were previously installed are preselected in the feature options when you install the new level. If you leave these components selected, you can keep them or reinstall them. If you clear any of these components, the installation process uninstalls them. By default, a typical migration installs only the same features that were installed in the previous version installation.

For example, if IBM MQ Explorer was not installed in an earlier installation, it is not stored in a later installation. If you want IBM MQ Explorer, select a custom installation, and select the IBM MQ Explorer feature on the **Features** panel. If you do not want IBM MQ Explorer, uninstall the IBM MQ Explorer feature by selecting a custom installation. Then clear the IBM MQ Explorer feature on the **Features** panel. For more information about how to uninstall features, see “Modifying a server installation using the Installation Launchpad” on page 199.

You can also migrate a queue manager to a later version of the product on a system where an earlier version has been uninstalled. In this case, the queue manager data must have been retained, or restored from a backup.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

      Run either of the following commands from the installation that you are updating:

      ```
      dspmq -o installation -o status
      dspmq -a
      ```

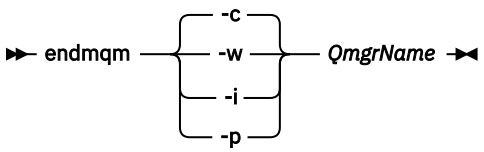
      dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

      dspmq -a displays the status of active queue managers associated with the installation from which the command is run.

   b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```

   c) Run the **endmqm** command to stop each running queue manager associated with this installation.



The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

Note: “Applying maintenance level updates to multi-instance queue managers on Windows” on page 329 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

d) Stop any listeners associated with the queue managers, using the command:

```
endmqlsr -m QMgrName
```

4. Back up the queue manager.

   Take copies of all the queue manager's data and log file directories, including all subdirectories, and also the `qm.ini` file and the registry entries. For more information, see Backing up and restoring IBM MQ queue manager data.

5. Stop the IBM MQ Service and exit the Service icon application.
6. Optional: Optionally uninstall the current version of the product.
7. Upgrade the earlier version of the product to the later version in the same installation directory.

   A reason for installing into the same location is to simplify application migration. If you change the installation location, you might remove IBM MQ libraries from an application search path. To migrate an application search path you must modify the application environment, or more rarely, the application itself.

   a) Decide on an installation naming convention. Give the installation a name of your choosing, or accept the default installation name.

   For the first installation, the default name is *Installation1*. For the second installation, the name is *Installation2*, and so on.

   b) Upgrade the earlier version of the product to the later version in place, or uninstall the earlier version, without deleting any queue managers, and install the later version in the same default location.

   On Windows, you can do this either by using the Installation Launchpad or by using the **msiexec** command. For more information, see:

   - “Upgrading an IBM MQ server installation using the Launchpad” on page 347
   - “Upgrading an IBM MQ server installation using msiexec” on page 348

   On Windows, uninstalling the previous version of the product before you install the later version is optional.

8. Reenter domain, user ID, and password information

When the installation of the latest version completes, the Prepare IBM MQ Wizard starts automatically.

Where UAC is enabled: If you rerun the Prepare IBM MQ Wizard, ensure that the wizard is run with Administrator privilege, otherwise the wizard might fail.

9. Optional: Make the later version of the installation the primary installation.
   a) Run the **setmqinst** command

   ```
   "Inst_1_INSTALLATION_PATH\bin\setmqinst" -i -n Inst_1
   ```

   Make the installation primary to avoid specifying a search path to run IBM MQ commands
10. Start the queue managers and applications.
    a) Run the **setmqm** command to associate the queue managers with `Inst_1`.

    ```
    setmqm -m QM1 -n Inst_1
    setmqm -m QM2 -n Inst_1
    ```

    If you are migrating between any releases of the product, you must use **setmqm** to associate the queue managers with the new installation manually.

    b) Run the **strmqm** command to start the queue managers and migrate them to the later version of the product.

    ```
    strmqm QM1
    strmqm QM2
    ```

    You must start IBM MQ before you start any listeners.

    When you first start a queue manager after migration:

    - Any new attributes for existing objects are set to their default values.
    - Any new default objects are created.
    - Queue manager data is migrated.

    At this point, when the queue manager data is migrated, you cannot revert to a previous release.

    Important: Do not use the `-c` option to start the queue manager, unless you explicitly want to reset or re-create the default system objects.

- When an application connects to a queue manager, the operating system searches its load path to load the IBM MQ library [2]An IBM MQ library contains code that checks that the queue manager is associated with an installation. If a queue manager is associated with a different installation, IBM MQ loads the correct IBM MQ library for the installation the queue manager is associated with.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Related concepts

“Migrating a queue manager to a later version on AIX and Linux” on page 419
On AIX and Linux, you can migrate a queue manager from an earlier version to a later version of IBM MQ in one of three ways: single-stage, side-by-side, or multi-stage.

“Installation name on AIX, Linux, and Windows” on page 16

[2] On Windows, the IBM MQ library is a DLL. A DLL is sometimes called a load library or a shared library. The entry points to a DLL are defined in a link library, with the file extension `.lib32` or `.lib`. The `.lib` library is linked at build-time and the DLL loaded at runtime.

Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Windows Migrating on Windows: side-by-side

Windows Migrating on Windows: multi-stage

“Planning to migrate IBM MQ to a later version on Windows” on page 389

“Migrating a queue manager to a later version on Windows” on page 391
On Windows platforms, follow these instructions to migrate a queue manager from an earlier version to a later version of IBM MQ.

“Configuring IBM MQ with the Prepare IBM MQ Wizard” on page 192
The Prepare IBM MQ Wizard helps you to configure IBM MQ with a user account for your network. You must run the wizard to configure the IBM MQ Service before you can start any queue managers.

“Installing IBM MQ server on Windows” on page 174
On Windows, IBM MQ is installed by using the Microsoft Installer (MSI). You can either use the Installation Launchpad to invoke MSI or alternatively, you can invoke MSI directly.

Associating a queue manager with an installation

Changing the primary installation

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

setmqenv

setmqinst

setmqm

Windows *Migrating on Windows: side-by-side*

Side-by-side migration is the term used to describe installing a later version of IBM MQ alongside an earlier version on the same server. Queue managers remain running during the installation and verification of the later version of IBM MQ. They remain associated with the earlier version of IBM MQ. When you decide to migrate queue managers to the later version of IBM MQ, you stop all queue managers, uninstall the earlier version, and migrate them all to the new version of IBM MQ.

Before you begin

From IBM MQ 9.0, the `ccsid_part2.tbl` file replaces the existing `ccsid.tbl` file, used in previous versions of the product, to supply additional CCSID information.

Attention:

The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

- Allows you to add or modify CCSID entries
- Specify default data conversion
- Specify data for different command levels

The `ccsid_part2.tbl` is applicable to the following platforms only:

- Linux - all versions
- Windows

If you added any of your own CCSID information into your existing `ccsid.tbl` file, copy this information into the new `ccsid_part2.tbl` file to take advantage of the new formats in your customizations

Copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

About this task

In the side-by-side migration scenario, you install the later version of IBM MQ alongside queue managers that continue to be associated with the installation of the earlier version of the product.

When you are ready to migrate the queue managers, and applications, to the later version:

1. Stop all the queue managers.
2. Uninstall the earlier version of the product.
3. Migrate all the queue managers and applications to the later version.

Procedure

1. Install the later version in a different installation directory from the earlier version.
   a) Decide on an installation naming convention. Give the installation a name of your choosing, or accept the default installation name.

      For the first installation, the default name is *Installation1*. For the second installation, the name is *Installation2*, and so on.

   b) Verify the installation.

      Run the installation verification procedures and your own tests.
2. Uninstall the earlier version of the product.

   When uninstalling the earlier product, you must stop all queue managers and applications that have loaded an IBM MQ library on the server. For this reason, you might choose to postpone uninstalling the earlier version of the product until a convenient maintenance window. When an earlier version of the product is not installed on a server, it is sufficient to stop the queue managers and applications that have loaded libraries from the installation that you are uninstalling or updating. It is not necessary to stop applications and queue managers associated with other installations.

   a) Stop all applications that have loaded IBM MQ libraries on the server.

   b) Stop the queue managers and listeners on the server.

   c) Uninstall the earlier version of the product.

      - Stop all local IBM MQ applications

- You do not need to stop all the queue managers at this point.

3. Make the later version of the installation the primary installation.

   a) Run the **setmqinst** command

   ```
   "Inst_1_INSTALLATION_PATH\bin\setmqinst" -i -n Inst_1
   ```

   Make the installation primary to avoid specifying a search path to run IBM MQ commands

   Use the dspmqinst command to discover the *Installation name*, or use the default value `Installation 1`.

   Doing this means that you do not have to specify a search path on IBM MQ commands.

4. Start the queue managers and applications.

   - When an application connects to a queue manager, the operating system searches its load path to load the IBM MQ library [3] . An IBM WebSphere MQ 7.1, or later, library contains code that checks that the queue manager is associated with an installation. If a queue manager is associated with a different installation, IBM MQ loads the correct IBM MQ library for the installation the queue manager is associated with.

   During this process you continue to use queue manager QM2 while you upgrade queue manager QM1 and you use queue manager QM1 while you upgrade QM2.

   Note that each queue manager needs to be stopped in order to be associated with the new installation.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Related tasks

Windows Migrating on Windows: single stage

Single-stage migration is the term used to describe replacing the only installation of IBM MQ on a server, with a later version of the product. Single stage migration is also known as *upgrading in place* or *in place upgrade*. Single-stage migration preserves existing scripts and procedures for running IBM MQ the most. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect queue manager migration has on users.

Windows Migrating on Windows: multi-stage

"Planning to migrate IBM MQ to a later version on Windows" on page 389

"Uninstalling IBM MQ on Windows" on page 224

You can uninstall the IBM MQ MQI clients and servers on Windows systems by using the control panel, the command line (**msiexec**), **MQParms**, or by using the installation media, in which case you can optionally remove queue managers as well.

"Installing IBM MQ server on Windows" on page 174

On Windows, IBM MQ is installed by using the Microsoft Installer (MSI). You can either use the Installation Launchpad to invoke MSI or alternatively, you can invoke MSI directly.

Associating a queue manager with an installation

Changing the primary installation

"Installation name on AIX, Linux, and Windows" on page 16

Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

"Queue manager coexistence" on page 372

[3] On Windows, the IBM MQ library is a DLL. A DLL is sometimes called a load library or a shared library. The entry points to a DLL are defined in a link library, with the file extension `.lib32` or `.lib`. The `.lib` library is linked at build-time and the DLL loaded at runtime.

Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

"Migrating IBM MQ library loading to a later version on AIX and Linux" on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

"Migrating IBM MQ library loading to a later version on Windows" on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

"Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

setmqenv
setmqinst
setmqm

Windows *Migrating on Windows: multi-stage*
Multi-stage migration is the term used to describe running a later version of IBM MQ alongside an earlier version on the same server. After installing the later version alongside the earlier version, you can create new queue managers to verify the later installation, and develop new applications. At the same time, you can migrate queue managers and their associated applications from the earlier version to the later version. By migrating queue managers and applications one-by-one, you can reduce the peak workload on staff managing the migration.

Before you begin

Attention:

The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

- Allows you to add or modify CCSID entries
- Specify default data conversion
- Specify data for different command levels

The `ccsid_part2.tbl` is applicable to the following platforms only:

- Linux Linux - all versions
- Windows Windows

If you added any of your own CCSID information into your existing `ccsid.tbl` file, copy this information into the new `ccsid_part2.tbl` file to take advantage of the new formats in your customizations

Copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

Note: If you are running the IBM MQ.NET monitor in transactional mode, the queue manager it connects to must be the primary installation.

About this task

In the multi-stage migration scenario, you install the later version of the product alongside running queue managers that continue to be associated with the earlier version. You can create queue managers and run new applications using the later version installation. When you are ready to start migrating queue managers and applications from the earlier, you can do so, one-by-one. When migration to the later version is complete, you can uninstall the earlier version, and make the later version installation the primary installation.

With the multi-stage approach, until you uninstall the earlier version , you must configure an environment to run applications that connect to a queue manager to the later version. You must also provide a path to run IBM MQ commands. Both these tasks are accomplished with the **setmqenv** command.

Note: When you have uninstalled the earlier version, and set the later version as a primary installation, in most circumstances it is not necessary to run the **setmqenv** command to run applications. It is still necessary to run **setmqenv** to set the environment for commands that connect to a queue manager associated with an installation that is not primary.

Procedure

1. Install the later version in a different installation directory from the earlier version and verify the installation.
   a) Decide on an installation naming convention. Give the installation a name of your choosing, or accept the default installation name.

      For the first installation, the default name is *Installation1*. For the second installation, the name is *Installation2*, and so on.

   b) Verify the installation.

      Run the installation verification procedures and your own tests.

   - You might create new queue managers running the later version, and start to develop new applications before migrating applications from the earlier version.
2. Configure the operating system so that applications load the libraries for the later version of the product.
   a) Migrate queue managers one at a time.

      The first set of applications to load the libraries for the later version of the product are the applications that connect to the first queue manager you are going to migrate.

      It does not matter if those applications also connect to other queue managers on the server. If the applications load the later version libraries, IBM MQ automatically loads the libraries for the earlier version for those applications that connect to that version.

      You can either migrate the operating system environment of all applications, or just the applications that connect to the first queue manager you are going to migrate.

   b) Migrate IBM MQ MQI client applications

      Some of the applications might be running as IBM MQ MQI client applications on another workstation. When you migrate a queue manager, clients connected to it continue to run without loading a client library for the later version.

      You can migrate these clients later, when you need to do so.

      Important: If any IBM MQ MQI client applications are using the library for the earlier version on the server, you must eventually migrate the clients to use the later version of the product before you uninstall the earlier version.
3. Migrate an application to load the new library for the later version:

- Run **setmqenv** to modify the local path that is searched for IBM MQ libraries.
- Relink applications with an additional runtime load path.

Consult operating system documentation about how to modify the global search path, or include a fixed runtime load path in the application load module.

To run **setmqenv** using the -s option:

```
"Inst_1_INSTALLATION_PATH\bin\setmqenv" -s
```

The -s option sets up the environment for the installation that runs the **setmqenv** command.

4. Restart the queue manager and the applications that connect to it.
   a) Set up the local environment to the installation Inst_1.

   ```
   "Inst_1_INSTALLATION_PATH\bin\setmqenv" -s
   ```

   The -s option sets up the environment for the installation that runs the **setmqenv** command.

   b) Run the **setmqm** command to associate QM1 with Inst_1.

   ```
   setmqm -m QM1 -n Inst_1
   setmqm -m QM2 -n Inst_1
   ```

   c) Run the **strmqm** command to start QM1 and migrate it to the later version.

   ```
   strmqm QM1
   strmqm QM2
   ```

   d) Restart application 1

   The application loads the later version library and connects to QM1, which is associated with the later version of the product.

5. Migrate all queue managers and applications to the later version.

   Repeat steps “2” on page 402 and “4” on page 403, when required, until all the queue managers and applications are migrated to the later version of the product.

6. Uninstall the earlier version of the product.

   When uninstalling the earlier product, you must stop all queue managers and applications that have loaded an IBM MQ library on the server. For this reason, you might choose to postpone uninstalling the earlier version of the product until a convenient maintenance window. When an earlier version of the product is not installed on a server, it is sufficient to stop the queue managers and applications that have loaded libraries from the installation that you are uninstalling or updating. It is not necessary to stop applications and queue managers associated with other installations.

   a) Log in as a user in group mqm.

   b) Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.

   c) Stop the mqweb server that is associated with the IBM MQ installation by entering the following command:

   ```
   endmqweb
   ```

   d) List the state of all the queue managers on the system by using the **dspmq** command:

   ```
   dspmq -a
   ```

e) List the status of listeners associated with a queue manager by using the **DISPLAY LSSTATUS** MQSC command:

```
echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
```

f) Stop any listeners associated with the queue managers, using the **endmqlsr** command:

```
endmqlsr -m QMgrName
```

g) Stop each running queue manager that is associated with this installation by using the **endmqm** command:

```
endmqm QMgrName
```

h) Uninstall the earlier version of the product. For more information, see "Uninstalling or modifying IBM MQ on Linux" on page 149

7. Make `Inst_1` the primary installation.

a) Run the **setmqinst** command

```
"Inst_1_INSTALLATION_PATH\bin\setmqinst" -i -n Inst_1
```

Note: Use the dspmqinst command to discover the *Installation name*, or use the default value `Installation 1`.

You do not have to set up a search path to run IBM MQ commands from the primary installation.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Now that you have uninstalled the earlier version of the product, and made the later installation primary, you can review how the application runtime environment is set. It is no longer necessary to run **setmqenv** to set up the search path to load libraries for the later version. If you have only one installation of the later version of the product installed, it is not necessary to run **setmqenv** to run commands.

Related concepts

"Installation name on AIX, Linux, and Windows" on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

"Queue manager coexistence" on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

"Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Windows Migrating on Windows: single stage
Single-stage migration is the term used to describe replacing the only installation of IBM MQ on a server, with a later version of the product. Single stage migration is also known as *upgrading in place* or *in place upgrade*. Single-stage migration preserves existing scripts and procedures for running IBM MQ the most. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect queue manager migration has on users.

Windows Migrating on Windows: side-by-side

"Planning to migrate IBM MQ to a later version on Windows" on page 389

"Installing IBM MQ server on Windows" on page 174
On Windows, IBM MQ is installed by using the Microsoft Installer (MSI). You can either use the Installation Launchpad to invoke MSI or alternatively, you can invoke MSI directly.

Associating a queue manager with an installation

Changing the primary installation

"Migrating IBM MQ library loading to a later version on AIX and Linux" on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

"Migrating IBM MQ library loading to a later version on Windows" on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

setmqenv

setmqinst

setmqm

Reverting a queue manager to an earlier version on Windows

On Windows platforms, you can revert a queue manager to an earlier version of the product from a later version, if you have made a backup of the system or queue manager. If you have started the queue manager and processed any messages, or changed the configuration, the task cannot give you any guidance on reverting the current state of the queue manager.

Before you begin

1. You must have made a backup of the system or queue manager before you upgraded to the later version. For more information, see Backing up and restoring IBM MQ queue manager data.
2. If any messages were processed after starting the queue manager, you cannot easily undo the effects of processing the messages. You cannot revert the queue manager to the earlier version of the product in its current state. The task cannot give you any guidance how to deal with subsequent changes that have occurred. For example, messages that were indoubt in a channel, or in a transmission queue on another queue manager, might have been processed. If the queue manager is part of a cluster, then configuration messages and application messages might have been exchanged.
3. If you are running on a server with multiple IBM MQ installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.
4. When restoring a backup of a queue manager in a cluster, see Recovering a cluster queue manager and Clustering: Availability, multi-instance, and disaster recovery for more information.

About this task

When you revert to a earlier version of a queue manager, you revert the queue manager to its earlier code level. Queue manager data is reverted to the state it was in when the queue manager was backed up.

Important: If the queue manager is a member of one or more IBM MQ clusters, you should also refer to Clustering: Availability, multi-instance, and disaster recovery for more information and review and follow the steps described in Recovering a cluster queue manager.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

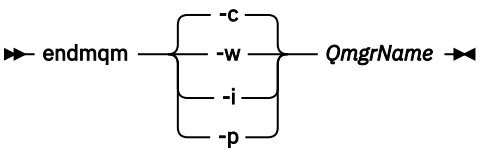
      Run either of the following commands from the installation that you are updating:

      ```
      dspmq -o installation -o status
      dspmq -a
      ```

      dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

      dspmq -a displays the status of active queue managers associated with the installation from which the command is run.
   b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```
   c) Run the **endmqm** command to stop each running queue manager associated with this installation.

      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

      You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

      Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

      Note: “Applying maintenance level updates to multi-instance queue managers on Windows” on page 329 describes how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.
   d) Stop any listeners associated with the queue managers, using the command:

      ```
      endmqlsr -m QMgrName
      ```
4. Restore the system, or IBM MQ and the queue manager.

   If your backup procedure was to save the queue manager data, you must reinstall IBM MQ:

   a) Uninstall the earlier installation.

b) Reinstall the product from a manufacturing refresh.

c) Apply the fix pack and interim fixes that restore IBM MQ to its previous level.

d) Restore the queue manager data from the backup taken before installing the later version.

5. Restart the earlier version queue manager.

What to do next

You might be reverting to a earlier version on a server with multiple IBM MQ installations. If one of the installations is primary, after reverting the earlier version that installation, by default, becomes the primary installation.

You must review how applications connect to an installation. After reverting to the earlier version, some applications might connect to the wrong installation.

Related concepts

Backing up and restoring a queue manager

Related reference

Avoiding BFGSS0023E errors when removing fix packs

Windows *Migrating an IBM MQ MQI client on Windows*

Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Related concepts

“IBM MQ MQI client migration” on page 361

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

Related tasks

“Migrating an IBM MQ MQI client to the latest version on IBM i” on page 457

Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

“Migrating an IBM MQ MQI client on AIX and Linux” on page 433

Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Windows *Migrating an IBM MQ MQI client to a later version on Windows*

Before migrating an IBM MQ MQI client on Windows platforms, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Before you begin

Before starting to migrate a client, create a migration plan. For guidance on what to include in the plan, see “Planning to migrate IBM MQ to a later version on Windows” on page 389.

About this task

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration is reversible. It is optional and manual on a client workstation and is required and automatic on the IBM MQ server.

You must upgrade an IBM MQ MQI client before migrating a client workstation to make use of new configuration options. You can make configuration changes to client and server connection channels on the server, but they have no effect on a client workstation until the client is upgraded.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.See "IBM MQ components and features" on page 6 and "Where to find downloadable installation images" on page 12.
2. Review all the changes in IBM MQ that affect you.

   See "Changes that affect migration" on page 352.
3. End all IBM MQ activity on the workstation.
4. Upgrade the client.

   Select the appropriate option for your enterprise.

   - For a client installation on a workstation, see "Installing an IBM MQ client on Windows" on page 200.
   - For a client installation on an IBM MQ server, see Installing IBM MQ clients and servers on the same system.

What to do next

After upgrading the IBM MQ MQI client, you must check the client channel configuration, and verify that your IBM MQ MQI client applications work correctly with the later version of the product.

Related concepts

"IBM MQ MQI client migration" on page 361
IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

Related tasks

"Planning to migrate IBM MQ to a later version on Windows" on page 389

Windows *Restoring an IBM MQ MQI client to an earlier version on Windows*

If you revert an IBM MQ MQI client from a later version of the product to an earlier version of the product, you must undo the configuration changes manually.

About this task

It is unusual to revert earlier IBM MQ MQI client libraries to a workstation. The principal tasks are listed in the following steps.

Procedure

1. End all IBM MQ activity on the workstation.
2. Uninstall the later version of the IBM MQ MQI client code.
3. Follow the client installation procedure for the platform to install the earlier version of the IBM MQ MQI client code.
4. If you configured a Client Connection Definition Table (CCDT) for a queue manager on a later version of the product, revert to using a table created by a queue manager on the earlier version.

   The CCDT must always be created by a queue manager on the same, or earlier, release to the client.

Windows ***Migrating IBM MQ library loading to a later version on Windows***

On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of

multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Before you begin

To migrate applications from an earlier version of the product to the later version, you must know how the operating system loads an IBM MQ library for an application. Is the load path fixed by the application, and can you set the path in an environment variable? It is not essential to know the name of the IBM MQ library that the application loads. The library name does not change from an earlier version of the product to the later version, although the contents of the library do.

Read "Multi-installation queue manager coexistence on AIX, Linux, and Windows" on page 374 before starting this task.

Plan and install the later version of IBM MQ, and remember the installation name and whether the installation was set to primary.

About this task

To migrate an application from an earlier version of the product to the later version, you do not have to recompile or relink the application, because the IBM MQ libraries are compatible with later versions; see "Application compatibility and interoperability with later versions of IBM MQ" on page 383.

Windows searches numerous directories for load libraries, called DLLs; see Dynamic-Link Library Search Order. The build procedure for applications places the IBM MQ libraries to load before any other product libraries in the **cl** command. The IBM MQ `.lib` libraries must be in the PATH environment variable that you have specified at build time, and the DLL libraries at run time. The PATH variable is used by the application process to find the libraries it must load.

If you have followed this build procedure in the earlier release, then the effect of installing the later version of the product on the libraries that are loaded depends on which migration scenario that you are following:

Single-stage scenario
If you are replacing an earlier version of the product with the later version, based on the single stage scenario described in "Migrating on Windows: single stage" on page 394, you do not, in most cases, need to make any changes to the way IBM MQ libraries are loaded. The possible exception to this is if you changed the location of the libraries from the earlier version, or created symbolic links to the libraries.

Side-by-side and Multi-stage scenarios
If you have chosen a multi-installation approach to installing the later version of the product, based either on the side-by-side scenario described in "Migrating on Windows: side-by-side" on page 398, or the multi-stage migration scenario described in "Migrating on Windows: multi-stage" on page 401, you must investigate whether applications connecting to the later version of the product are linked to, and load libraries from, the correct installation and then modify the environment for the operating system to resolve IBM MQ dependencies for an application as appropriate. Typically, you can modify the runtime environment, rather than relink the application. You can use the following two commands to assist you in configuring the runtime environment:

- **setmqinst** sets the primary installation; see setmqinst.
- **setmqenv** initializes the command environment by setting environment variables; see setmqenv.

Table 41 on page 410 summarizes the actions needed for each of these scenarios.

Table 41. Windows configurations

Action	Scenario	Latest version replaces earlier version in the same location Single-stage	Latest version replaces earlier version in a different location Side-by-side	Latest version alongside earlier version Multi-stage
setmqinst		**setmqinst** makes the later version installation primary. The global PATH is changed to point to the later version library and all Windows features work with the later version.		No. The later version installation can be primary, because an earlier version is installed.
No other configuration actions		Library loading works correctly. The global PATH contains the location of the later version libraries. Even if the later version installation is not primary, library loading works correctly. The later version libraries are in the same location as the earlier version libraries were.	Library loading probably works correctly. The library loading might not work, if the application process locally modified the PATH to reference the location of the earlier version libraries. A local setting of PATH might override the global PATH that is set by **setmqinst**.	The library loading continues to work with the earlier version correctly, nothing works with the later version.
setmqenv		Library loading works correctly. **setmqenv** sets the local PATH correctly.		Library loading works correctly, both for the earlier version and the later version. **setmqenv** sets the local PATH correctly for the later version. But the Windows features that depend on the global path do not work correctly with the later version . The correct earlier version is loaded, because the later version library loads the earlier version library for queue managers that have not been migrated from the earlier version.

Procedure

1. Consider which of the following questions apply to your configuration.
   - Did you follow the build procedure documented in the product documentation for the earlier version of the product? You might be following a different build procedure tailored to your development environment, or adapted from a development tool such as Microsoft Visual Studio.
   - How did you specify the load path for the earlier version?
   - Is the application is loaded by another environment, such as Eclipse, or an application server? You must modify the parameters that govern how the parent environment loads applications, not the way the parent environment is loaded.

- Do the functions performed by an application require that the queue manager it connects to is associated with the primary installation?
- What constraints and requirements do you have on how the load path is specified in the later version? Security rules might restrict the use of `LD_LIBRARY_PATH`.
- Is the later version of the product installed alongside the earlier version?

2. Identify the installation of the later version of the product, from which the operating system is going to load IBM MQ libraries:
   - If you have a multiple installations of the later versions to load from a server, IBM MQ checks that the installation the library was loaded from is the installation that is associated with any queue manager the application calls. IBM MQ loads the correct library if the wrong library is loaded. It is necessary to configure only one runtime environment for all IBM MQ applications.
   - A typical choice is set the primary installation. Setting an installation to be primary places its library path in the global PATH variable.
   - If you upgraded an earlier version installation to the later version, a link path to the earlier version installation now points to an installation containing the later version. Applications that have a fixed linkage path to the earlier version installation now load the libraries for the later installation. They are then switched to the installation that is associated with any queue manager they connect to.
   - If you rebuild an application, it must link to an installation of the later version.
   - If you are running the IBM MQ.NET monitor in transactional mode, the queue manager it connects to must be the primary installation.

What to do next

If you add further installations of the later version of the product, you must decide which installation to make primary, if you have chosen to make any primary. As long as applications load IBM MQ libraries from one of the later version installations, such as the primary installation, they can connect to queue managers associated with any other later version installation.

On Windows, you might build applications with different development tools. You must identify the property of the development tool that sets the PATH of the application that is being built, and not the properties of the tool itself. For example, if you are debugging with Microsoft Visual Studio, you can insert a call to **setmqenv** in the **Environment** property of the debugging section of the **Configuration** properties of a project.

A Windows application might call `LoadLibrary` and specify an explicit load path. You might build a side-by-side assembly and configure an explicit load path. If an application uses either of these mechanisms, and the later version IBM MQ library is not on the same path as the earlier release, you must recompile, or configure and relink your application to load the later version libraries.

Related concepts

“Features that can be used only with the primary installation on Windows” on page 27
Some Windows operating-system features can be used only with the primary installation. This restriction is due to the central registration of interface libraries, which might conflict as a result of multiple versions of IBM MQ being installed.

Related tasks

Changing the primary installation

Connecting applications in a multiple installation environment

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

"Coexistence" on page 371
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations. In addition to queue managers coexisting on a server, objects, and commands must work correctly with different queue managers running at different command levels.

setmqenv
setmqinst
setmqm

Windows *Migrating IBM MQ Telemetry on Windows*

Follow these instructions to migrate your existing installation of IBM MQ Telemetry to a later version of the product on Windows.

Before you begin

Before proceeding with this task, ensure that you back up your existing IBM MQ installation. You must stop the IBM MQ Telemetry service `SYSTEM.MQXR.SERVICE` before migrating.

About this task

The telemetry server is included in the product as an optional installation.

The Client Software Development Kit is no longer supplied as part of the product. Similar sample applications continue to be freely available from Eclipse Paho and MQTT.org. See MQ Telemetry Transport sample programs.

Because IBM MQ Telemetry is a component of IBM MQ, IBM MQ Telemetry can either be installed with the main product, or installed after the main product has been installed.

After the successful upgrade, Windows systems retain the telemetry data in the installation directory of the product, for example: `C:\Program Files (x86)\IBM\WebSphere MQ`. Telemetry data is migrated to the later version of the product when the queue manager is started again.

Procedure

1. Create a migration plan.

   See "Planning to migrate IBM MQ to a later version on Windows" on page 389.
2. Migrate your queue managers to the later release.
3. "Installation considerations for IBM MQ Telemetry" on page 248.
4. Verify that the IBM MQ Telemetry installation was successful. See "Verifying the installation of IBM MQ Telemetry" on page 249.
5. If the passphrases for your MQTT TLS channels are stored in plain text, you should encrypt the passphrases.

   Before IBM MQ 9.3.0, passphrases for MQTT TLS channels were stored in plain text. From IBM MQ 9.3.0, support for the encryption of passphrases for MQTT TLS channels is provided.

   Existing plain text passphrase are not changed to an encrypted form automatically. You must update your plain text passphrases to an encrypted form. For more information on how to encrypt your passphrases, see Encryption of passphrases for MQTT TLS channels.

Results

Message AMQ4616 indicates completion of the task. The existing MQTT channels and previous subscriptions are still present.

Related concepts

"IBM MQ installation overview" on page 6
An overview of concepts and considerations for installing IBM MQ, with links to instructions on how to install, verify, and uninstall IBM MQ on each of the supported platforms.

"Installation considerations for IBM MQ Telemetry" on page 248
IBM MQ Telemetry is a component of the main IBM MQ product. You can choose to install IBM MQ Telemetry when you first install IBM MQ, or when you modify an existing IBM MQ installation.

Related tasks

"Verifying the installation of IBM MQ Telemetry" on page 249
There are three ways to verify the installation of IBM MQ Telemetry. Any can be used, regardless of whether IBM MQ Telemetry was installed as a custom installation of IBM MQ, or added to an existing installation of IBM MQ.

"Verifying the installation of IBM MQ Telemetry by using IBM MQ Explorer" on page 249
Use the Define sample configuration wizard and the MQTT client utility in IBM MQ Explorer to verify that the IBM MQ Telemetry components have installed. Also check that publish/subscribe works correctly.

Windows *Migrating an MSCS configuration on Windows*

Migrate queue managers in a Microsoft Cluster Service (MSCS) configuration one node at a time, following these instructions.

About this task

These steps are required for a rolling upgrade with a minimum amount of downtime. You must always upgrade an offline node with no online IBM MQ resources. In an Active/Passive configuration, if the node is Passive, you must ensure it cannot be switched to Active during the upgrade process.

The example, "Migrating a four-node MSCS cluster from an earlier version of the product to the latest version" on page 413, shows this procedure applied to a four-node cluster.

Procedure

1. Modify the possible owners of the IBM MQ resource to encompass only the Active node or nodes. With no owners assigned to Passive nodes, the IBM MQ resource that is being migrated cannot be activated.
2. Ensure that the group containing the IBM MQ resource is currently on one of the nodes defined as a possible owner. The group must include any applications connecting to the queue manager resource.
3. Stop the cluster service on the node being migrated. The MSCS cache is cleared of any IBM MQ DLLs that have been registered.
4. Migrate the selected node by following the standard instructions in "Migrating a queue manager to a later version on Windows" on page 391. Apply the required maintenance level.
5. Start the cluster service on the selected node.
6. On the next node to be migrated, ensure that the IBM MQ resources are offline.
7. Remove this node from the list of possible owners. For clusters with more than two nodes, see the Additional considerations later in this topic.
8. Move the group containing the IBM MQ resource to one of the possible owners and bring it online.
9. Repeat steps 3-8 as necessary for any remaining nodes.

Migrating a four-node MSCS cluster from an earlier version of the product to the latest version

The example in Table 42 on page 414 illustrates the steps involved in migrating a four-node MSCS cluster.

In the example IBM MQ resources include queue managers, applications, and dependant MSCS resources, such as an IP address defined an as MSCS resource. In each step, the changes are italicized.

Step 1
Select the node to migrate and prepare it for upgrading from an earlier version of the product to the latest version.

1. Select node 1 to be migrated and convert it into a Passive node with no running IBM MQ resources.
2. Modify the possible owners of the group containing the IBM MQ resources, to encompass only the required online nodes. Failover does not attempt to switch IBM MQ resources to the node that is not a possible owner. It is safe to migrate that node.
3. Move the group containing the IBM MQ resource to one of the nodes that is a possible owner, and bring it online.
4. Stop the cluster service on the node being migrated. Stopping the service clears the MSCS cache of any IBM MQ libraries that have been registered for MSCS. The node goes offline.

Step 2
Migrate IBM MQ from an earlier version of the product to the latest version

Step 3
Start the cluster service on the selected node. The node becomes online, but it is not a possible owner, so no work is switched to it.

Step 4
Repeat steps 1 - 3 for node 2. Nodes 1 and 2 are now online, and you have migrated them to the latest version. They are still doing no work, as they are not possible owners of any of the IBM MQ resource groups.

Step 5
Migrate the cluster from running an earlier version of the product to the latest version. The number of migrated nodes is now greater or equal to the number of unmigrated nodes.

1. Change the set of possible owners from `3,4` to `1,2`.
2. Move the IBM MQ resource groups from nodes 3 and 4 to nodes 1 and 2 and bring online.
3. From this point onward, the list of possible owners must include migrated nodes only. The IBM MQ resource must never failover to a node running a back level version of the product.

Note: If you must revert IBM MQ to an earlier version, the IBM MQ resources must be removed from MSCS control, before performing an uninstallation of IBM MQ

Step 6
Migrate node 3 to the latest version.

1. Follow steps 1 - 3 for node 3.
2. Add node 3 to the list of possible owners.
3. Move the QMC resource group back from node 1 to node 3 and bring online again.

Step 7
Repeat step 6 for node 4.

Table 42. Migrating a four-node MSCS cluster

Steps		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Node 1	State	Online	*Offline*	Offline	*Online*	Online	Online	Online	Online
	Version	Earlier version	Earlier version	*Latest version*	Latest version	Latest version	Latest version	Latest version	Latest version
	Groups	QMA					*QMC, QMA*	*QMA*	QMA

Table 42. Migrating a four-node MSCS cluster (continued)									
Steps		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Node 2	State	Online	Online	Online	Online	Online	Online	Online	Online
	Version	Earlier version	Earlier version	Earlier version	Earlier version	*Latest version*	Latest version	Latest version	Latest version
	Groups	QMB	QMB	QMB	QMB		*QMD, QMB*	QMD, QMB	*QMB*
Node 3	State	Online	Online	Online	Online	Online	Online	Online	Online
	Version	Earlier version	Earlier version	Earlier version	Earlier version	Earlier version	Earlier version	*Latest version*	Latest version
	Groups	QMC	QMC, QMA	QMC, QMA	QMC, QMA	QMC, QMA		*QMC*	QMC
Node 4	State	Online	Online	Online	Online	Online	Online	Online	Online
	Version	Earlier version	Earlier version	Earlier version	Earlier version	Earlier version	Earlier version	Earlier version	*Latest version*
	Groups	QMD	QMD	QMD	QMD	QMD, QMB			*QMD*
Possible Owners		1,2,3,4	*2,3,4*	2,3,4	2,3,4	*3,4*	*1,2*	*1,2,3*	*1,2,3,4*
Task			Update 1			Update 2	Transfer	Update 3	Update 4

What to do next

Additional considerations in an MSCS setup with more than 2 nodes: A cluster might contain enough nodes for you to form a group of migrated queue managers and a group of unmigrated nodes. Switch to the migrated group when it contains half the number of queue managers. Before you have reached the half way point, the unmigrated group are possible owners. When you reach the half way point, switch the possible owners to the migrated group.

Related concepts

Windows: MSCS restriction with multiple installations

Related tasks

"Migrating a queue manager in a high-availability configuration" on page 483

High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

Windows *Migrating logs to an Advanced Format disk on Windows*

An Advanced Format disk is one that has 4096 bytes per sector. The following is applicable only to the Windows platform as Advanced Format disks can be used on other platforms without carrying out a migration procedure.

Attention: On Windows, prior to IBM MQ 9.1.0, (or prior to IBM MQ 9.0.4 if you are a Continuous Delivery user), IBM MQ does not support Advanced Format disks

Note the following:

- A migrated log can be used on any disk whether or not it is Advanced Format.
- If you are not using an Advanced Format disk, you do not need to migrate the log of your queue manager.

- Queue managers that are created at IBM MQ 9.1.0 (or at IBM MQ 9.0.4 or later if you are a Continuous Delivery user) can be used on an Advanced Format disk without being migrated.
- If you use a queue manager that was created before IBM MQ 9.1.0 (or before IBM MQ 9.0.4 if you are a Continuous Delivery user) on a native Advanced Format disk, without migrating the queue manager first, the queue manager will not start
- It is possible to start a queue manager on an Advanced Format disk in emulation mode without migration. However IBM MQ log writes will not be on 4k boundaries and so the queue manager will not have data integrity. Once the logs have been migrated, an Advanced Format disk in emulation mode is reliable.
- If you are not sure whether your disk is Advanced Format or not, use the Windows utility **fsutil** to find out.
- The Advanced Format disks that require you to migrate your log, include 4k native disks and 512-byte Emulation disks.
- Using **migmqlog** to change from linear logging to circular logging, or from circular logging to linear logging, also migrates the log so that the log can be used on an Advanced Format disk.

Related information

Changing your queue manager log from linear to circular
Changing your queue manager log from circular to linear

Linux AIX Migrating IBM MQ on AIX and Linux

Migration tasks associated with AIX and Linux platforms are grouped in this section.

Before you begin

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.0 or earlier, you must first migrate to an interim version. See Migration paths.

Important:

- Deprecated The IBM MQ Bridge to Salesforce is deprecated across all releases from November 22 2022 (see US Announcement letter 222-341).
- Removed The IBM MQ Bridge to Salesforce is removed from the product at IBM MQ 9.4.0. Salesforce connectivity can be achieved with IBM App Connect Enterprise. Salesforce Input and Salesforce Request nodes can be used to interact with Salesforce applications. For more information, see Using Salesforce with IBM App Connect Enterprise.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to Salesforce is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- Removed For Continuous Delivery, the IBM MQ Bridge to blockchain is removed from the product at IBM MQ 9.3.2.

  Removed For Long Term Support, IBM MQ Bridge to blockchain is removed at IBM MQ 9.3.0 Fix Pack 15.

  Blockchain connectivity can be achieved with IBM App Connect or through App Connect capabilities available with IBM Cloud Pak for Integration.

  On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Bridge to blockchain is present, you must remove it before you upgrade to IBM MQ 10.0.0 or later.
- From IBM MQ 9.3.0, IBM MQ Explorer has been removed from the IBM MQ installation package. It remains available as a separate download, and can be installed from the stand-alone IBM MQ Explorer download available from Fix Central. On Linux for x86-64 only, if you are migrating from an installation where the IBM MQ Explorer is present as part of the IBM MQ installation, you must remove it before you upgrade to IBM MQ 10.0.0 or later.

- Linux AIX From IBM MQ 10.0, the Russian language translation support is removed on AIX and Linux. If you are upgrading from an earlier version that includes this component on the AIX or Linux platform, you must manually uninstall it before proceeding with the upgrade. Failure to do so might result in the following error during the upgrade process:

```
MQSeriesRuntime = 10.x.x-0 is needed by (installed) MQSeriesMsg_ru-10.x.x-0.x86_64
```

Important: From IBM MQ 9.4.0, AMQP channels no longer support CMS key repository files. Instead, you need to use PKCS #12 key repositories and protect the key repository passwords by using the IBM MQ password protection system. You set the password in the queue manager's **KEYRPWD** attribute.

If you are migrating a queue manager with an AMQP configuration to IBM MQ 10.0.0 or later, and your queue manager is currently configured with a CMS keystore, you must convert it to PKCS12 format before proceeding with the migration. For more information on how to perform this conversion, see SSL/TLS support in Securing AMQP Clients.

About this task

This topic lists the various steps you need to take to migrate to, or migrate from, the latest version of the IBM MQ product.

If you are migrating a Continuous Delivery release of the product, see also “Migrating from one Continuous Delivery release to another” on page 387.

If you want to migrate replicated data queue managers, follow the instructions in “Migrating replicated data queue managers” on page 487.

Related concepts

“Migration concepts and methods” on page 356
An overview of the various concepts and methods for migrating from one release of the product to another.

Related tasks

“Migrating IBM MQ on IBM i” on page 441
IBM MQ migration tasks associated with IBM i are grouped in this section.

“Migrating IBM MQ on Windows” on page 388
IBM MQ migration tasks associated with Windows platforms are grouped in this section.

“Migrating IBM MQ on z/OS” on page 462
Migration tasks associated with z/OS are grouped in this section.

Related reference

“Changes that affect migration” on page 352

Linux AIX *Planning to migrate IBM MQ to a later version on AIX and Linux*

Before migrating IBM MQ to a later version on AIX and Linux, review the system requirements information, and the information about any changes that might affect migration, then create a migration plan.

Before you begin

If there are concepts about migration you do not understand, see “Migration concepts and methods” on page 356.

If you are migrating to IBM MQ 10.0 or later from IBM MQ 9.0 or earlier, you must first migrate to an interim version. See Migration paths.

For help with migration to an interim version, see the documentation for that version:

- IBM MQ 9.1 Migrating IBM MQ on UNIX and Linux
- IBM MQ 9.2 Migrating IBM MQ on AIX and Linux

- IBM MQ 9.3 Migrating IBM MQ on AIX and Linux
- IBM MQ 9.4 Migrating IBM MQ on AIX and Linux

About this task

Use the following steps as a guide to creating a migration plan.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.
2. Decide whether to run the earlier version and the later version of the product on the same server, and also which migration method you want to use.

   Choices are single-stage migration, side-by-side migration, or multi-stage migration. See “Migration methods on IBM MQ for Multiplatforms” on page 363.
3. Review all the changes in IBM MQ that affect you.

   See “Changes that affect migration” on page 352.
4. Review performance changes.

   See MQ Performance documents.
5. Review the readme file for the later version of IBM MQ.

   See IBM MQ, WebSphere MQ, and MQSeries product readmes.
6. Plan the sequence and timing of queue manager migrations.
   - If the queue manager is part of a queue manager cluster, you must migrate the queue managers that are full repositories first.
   - If the queue manager is part of a high availability cluster, plan the migration to minimize downtime and maximize availability; see “Migrating a queue manager in a high-availability configuration” on page 483.
7. Plan to migrate your queue manager to the later version.

   See “Migrating a queue manager to a later version on AIX and Linux” on page 419.

   Backing up queue manager data is part of the queue manager migration task. An alternative approach is to install and configure a new server, then test the later version with a new queue manager on the new server. When you are ready to go into production on the later version, copy the queue manager configuration and data to the new server.
8. Plan to update any manual or automated procedures you have written with changes to messages and codes.

   A suffix letter, indicating the severity of a message (I, W, E, S or T) is appended to IBM MQ diagnostic (AMQ) messages. Existing scripts looking for error codes without the severity will fail. For example, existing scripts looking for error matching to AMQ7468 will fail. You must update the scripts to look for error codes with the severity suffix added (for example, AMQ7468I). For more information, see IBM MQ messages on Multiplatforms.
9. Decide on what regression tests to perform before putting the queue manager into production on the later version. Include in your regression tests the procedures and applications you identified in previous steps.
10. Plan to migrate your IBM MQ MQI client installations to the later version.
11. Plan to migrate your client and server applications to use new functions in the later version.
12. Decide which downloadable images you require for the migration.

    For more information, see “Where to find downloadable installation images” on page 12.

Linux AIX *Migrating a queue manager on AIX and Linux*

The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

Related tasks

“Migrating a queue manager to the latest version on IBM i” on page 444
Follow these instructions to migrate a queue manager on IBM i to the latest MQ version.

“Migrating a queue manager on Windows” on page 390
The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

“Migrating IBM MQ on z/OS” on page 462
Migration tasks associated with z/OS are grouped in this section.

Linux AIX *Migrating a queue manager to a later version on AIX and Linux*

On AIX and Linux, you can migrate a queue manager from an earlier version to a later version of IBM MQ in one of three ways: single-stage, side-by-side, or multi-stage.

If you have installed early support program code on the server, you must delete all the queue managers created with the installation. Uninstall the code before proceeding with installing the production level code.

Single-stage migration

Single-stage migration is the term used to describe replacing the only installation of IBM MQ on a server, with a later release. Single stage migration is also known as *upgrading in place* or *in place upgrade*. Single-stage migration preserves existing scripts and procedures for running IBM MQ the most. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect queue manager migration has on users.

The advantage of single-stage migration is that it changes the configuration of a queue manager on the earlier version as little as possible. Existing applications automatically switch from loading the libraries from the earlier version to loading the libraries of the later version. Queue managers are automatically associated with the installation on the later version. Administrative scripts and procedures are affected as little as possible by setting the installation to be the primary installation. If you set the installation of the later version to be the primary installation, commands such as **strmqm** work without providing an explicit path to the command.

For more information about performing a single-stage migration, see “Migrating on AIX and Linux: single-stage” on page 420.

Side-by-side migration

Side-by-side migration is the term used to describe installing a later version of IBM MQ alongside an earlier version on the same server. Queue managers remain running during the installation and verification of the later version of IBM MQ. They remain associated with the earlier version of IBM MQ. When you decide to migrate queue managers to the later version of IBM MQ, you stop all queue managers, uninstall the earlier version, and migrate them all to the later version of IBM MQ.

The advantage the side-by-side scenario has over the single-stage scenario is that you can install and verify the installation of the later version of the product on the server before switching over to it.

The side-by-side migration scenario is less flexible than multi-stage migration, and might not seem to have any advantages over it. However, side-by-side migration does have advantages over the multi-stage and single-stage approaches. With the side-by-side approach, because you uninstall the earlier version before starting any queue managers, you can assign an installation on the later version to be the primary installation. In the multi-stage approach, you cannot set an installation of the later version to be the primary installation while you continue to run the earlier version. With the later version having the primary installation, many applications restart without reconfiguring their environment, making the migration process simpler.

For more information about performing a side-by-side migration, see “Migrating on AIX and Linux: side-by-side” on page 424.

Multi-stage migration

Multi-stage migration is the term used to describe running a later version of IBM MQ alongside an earlier version on the same server. After installing the later version alongside the earlier version, you can create new queue managers to verify the installation of the later version, and develop new applications. At the same time, you can migrate queue managers and their associated applications from the earlier version to the later version. By migrating queue managers and applications one-by-one, you can reduce the peak workload on staff managing the migration. When migration to the later version is complete, you can uninstall the earlier version, and make the later version installation the primary installation.

For more information about performing a multi-stage migration, see “Migrating on AIX and Linux: multi-stage” on page 427.

Backing up and restoring a queue manager

IBM MQ release types and versioning

Migrating on AIX and Linux: single-stage

Single-stage migration is the term that is used to describe replacing the only installation of IBM MQ on a server with a later release. Single stage migration is also known as *upgrading in place* or *in place upgrade*. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect that queue manager migration has on users.

Before you begin

1. The upgrade from the earlier version to the latest version of the product requires a full migration of queue managers. Create a migration plan. Use the planning task “Planning to migrate IBM MQ to a later version on AIX and Linux” on page 417, as a guide.
2. Review the IBM MQ system requirements for the later version; see System Requirements for IBM MQ.
3. Back up your system before you install a later version of IBM MQ over an earlier version. After you start a queue manager, you cannot revert to the previous version. If you must restore the system, you cannot recover any work, such as changes to messages and objects, performed by the later version of IBM MQ. For more information about backing up your system, see Backing up and restoring IBM MQ queue manager data.
4. Review any other installed SupportPacs for their applicability to the later version.
5. If you are running on a server with multiple installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.
6. From IBM MQ 9.0, the `ccsid_part2.tbl` file replaces the existing `ccsid.tbl` file that is used in previous versions of the product to supply extra CCSID information.

   Attention:

   The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

   - Allows you to add or modify CCSID entries
   - Specify default data conversion
   - Specify data for different command levels

   The `ccsid_part2.tbl` is applicable to the following platforms only:

   - Linux - all versions
   - Windows

   If you added any of your own CCSID information into your existing `ccsid.tbl` file, copy this information into the new `ccsid_part2.tbl` file to take advantage of the new formats in your customizations

Copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

About this task

In the single-stage migration scenario, the installation of the later version of the product replaces an earlier version in the same installation location.

You can also migrate a queue manager to a later version of the product on a system where an earlier version was uninstalled. In this case, the queue manager data must have been retained, or restored from a backup.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications that are using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. Stop the mqweb server that is associated with the IBM MQ installation by entering the following command:

   ```
   endmqweb
   ```
4. End all the activity of queue managers associated with the IBM MQ installation.
   a) List the state of all the queue managers on the system by using the **dspmq** command:

      ```
      dspmq -a
      ```
   b) List the status of listeners that are associated with a queue manager by using the **DISPLAY LSSTATUS** MQSC command:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```
   c) Stop any listeners associated with the queue managers, by using the **endmqlsr** command:

      ```
      endmqlsr -m QMgrName
      ```
   d) Stop each running queue manager that is associated with this installation by using the **endmqm** command:

      ```
      endmqm QMgrName
      ```

      The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

      For the migration to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries that they loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

      Also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

      Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you upgrading IBM MQ. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.
5. Back up the queue manager.

Take copies of all the queue manager's data and log file directories, including all subdirectories, and also the `qm.ini` file. For more information, see Backing up and restoring IBM MQ queue manager data.

6. Linux Before you upgrade the version of IBM MQ, you must prepare the fix packs on your system:
   - On AIX, any uncommitted fix packs must be rejected or committed before you upgrade.
   - On Linux, if you are migrating to IBM MQ 9.4, you must uninstall any fix pack packages that are installed on the earlier IBM MQ version before you upgrade your installation.

     On RPM based distributions, fix pack packages are identified as installed packages with a name that includes a `Uvrmf` segment. For example, `MQSeriesRuntime-U93015-9.3.0-15`. A base package does not include this segment. For example, `MQSeriesRuntime-9.3.0-25`.
7. Upgrade the earlier version of the product to the later version in the same installation directory.
   - On AIX, upgrade to the later version in place. For more information, see "Installing IBM MQ server on AIX" on page 45.
   - On Linux, ensure that your base package level contains APAR IT46908 https://www.ibm.com/support/pages/apar/IT46908. This APAR is included in IBM MQ 9.2.0.30, IBM MQ 9.3.0.25, and later releases. Then, upgrade to the later version in place. For more information, see "Upgrading an IBM MQ installation on Linux" on page 335.
8. Optional: Set the primary installation to avoid specifying a search path to run IBM MQ commands by using the **setmqinst** command:

   ```
   INSTALLATION_PATH/bin/setmqinst -i -n installationName
   ```

   Use the dspmqinst command to discover the *InstallationName*.

   If there is a primary installation, AIX and Linux applications that expect to find the IBM MQ library in `/usr/lib`, find a symbolic link to the library in `/usr/lib/32` [4]. `/usr/lib/32` is normally in the default search path. It is also specified as a load path in the IBM MQ build scripts for AIX and Linux.

   It is sufficient to link applications only to `/usr/lib`. With a primary installation of the later version of the product defined on the server, an application can connect to any queue manager associated with any installation on the server. IBM MQ loads the correct library for the application.
9. Optional: Associate the queue managers with the installation by using the **setmqm** command:

   ```
   setmqm -m qmgrName -n installationName
   ```
10. Start the queue managers and migrate them to the later version of the product by using the **strmqm** command:

    ```
    strmqm qmgrName
    ```

    When you first start a queue manager after migration:
    - Any new attributes for existing objects are set to their default values.
    - Any new default objects are created.
    - Queue manager data is migrated.

    At this point, queue manager data is migrated and you cannot revert to a previous release.

    Important: Do not use the `-c` option to start the queue manager, unless you explicitly want to reset or re-create the default system objects.

    You must start IBM MQ before you start any listeners.
11. Start your applications.

[4] `/usr/lib` for 64 bit applications.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Related concepts

“Migrating a queue manager to a later version on AIX and Linux” on page 419
On AIX and Linux, you can migrate a queue manager from an earlier version to a later version of IBM MQ in one of three ways: single-stage, side-by-side, or multi-stage.

“Installation name on AIX, Linux, and Windows” on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Linux AIX Migrating on AIX and Linux: side-by-side

Linux AIX Migrating on AIX and Linux: multi-stage

“Planning to migrate IBM MQ to a later version on Windows” on page 389

“Migrating a queue manager to a later version on Windows” on page 391
On Windows platforms, follow these instructions to migrate a queue manager from an earlier version to a later version of IBM MQ.

“Installing IBM MQ server on AIX” on page 45
You can install an IBM MQ server on AIX either interactively or silently.

“Installing the first IBM MQ installation on Linux using the rpm command” on page 112
You can install an IBM MQ server on a 64-bit Linux system using rpm. The instructions in this topic are for the first installation of IBM MQ on a Linux system.

Associating a queue manager with an installation

Changing the primary installation

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

setmqenv

setmqinst
setmqm

Migrating on AIX and Linux: side-by-side

Side-by-side migration is the term used to describe installing a later version of IBM MQ alongside an earlier version on the same server. Queue managers remain running during the installation and verification of the later version of IBM MQ. They remain associated with the earlier version of IBM MQ. When you decide to migrate queue managers to the later version of IBM MQ, you stop all queue managers, uninstall the earlier version, and migrate them all to the later version of IBM MQ.

Before you begin

1. The upgrade from the earlier version to the latest version of the product requires a full migration of queue managers. Create a migration plan. Use the planning task "Planning to migrate IBM MQ to a later version on AIX and Linux" on page 417, as a guide.
2. Review the IBM MQ system requirements for the later version; see System Requirements for IBM MQ.
3. Back up your system before you install a later version of IBM MQ over an earlier version. After you start a queue manager, you cannot revert to the previous version. If you must restore the system, you cannot recover any work, such as changes to messages and objects, performed by the later version of IBM MQ. For more information about backing up your system, see Backing up and restoring IBM MQ queue manager data.
4. Review any other installed SupportPacs for their applicability to the later version.
5. If you are running on a server with multiple installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.
6. From IBM MQ 9.0, the `ccsid_part2.tbl` file replaces the existing `ccsid.tbl` file that is used in previous versions of the product to supply extra CCSID information.

   Attention:

   The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

   - Allows you to add or modify CCSID entries
   - Specify default data conversion
   - Specify data for different command levels

   The `ccsid_part2.tbl` is applicable to the following platforms only:

   - Linux - all versions
   - Windows

   If you added any of your own CCSID information into your existing `ccsid.tbl` file, copy this information into the new `ccsid_part2.tbl` file to take advantage of the new formats in your customizations

   Copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

About this task

In the side-by-side migration scenario, you install the later version of IBM MQ alongside queue managers that continue to be associated with the installation of the earlier version of the product. When you are ready to migrate the queue managers, and applications, to the later version:

1. Stop all the queue managers.
2. Uninstall the earlier version of the product.
3. Migrate all the queue managers and applications to the later version.

Procedure

1. Install the later version in a different installation directory from the earlier version.
   a) Decide on an installation naming convention. Give the installation a name of your choosing, or accept the default installation name.

      For the first installation, the default name is *Installation1*. For the second installation, the name is *Installation2*, and so on.

      On AIX there is no option to set the installation name, *Installation1* is set by default.

   b) Install the later version. For more information see, "Installing IBM MQ server on AIX" on page 45 or "Installing additional IBM MQ installations on Linux using the rpm command" on page 116.

   c) Verify the installation.

      Run the installation verification procedures and your own tests.

2. Uninstall the earlier version of the product.

   When uninstalling the earlier product, you must stop all queue managers and applications that have loaded an IBM MQ library on the server. For this reason, you might choose to postpone uninstalling the earlier version of the product until a convenient maintenance window. When an earlier version of the product is not installed on a server, it is sufficient to stop the queue managers and applications that have loaded libraries from the installation that you are uninstalling or updating. It is not necessary to stop applications and queue managers associated with other installations.

   a) Log in as a user in `group mqm`.

   b) Stop all applications using the IBM MQ installation.

      If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.

   c) Stop the mqweb server that is associated with the IBM MQ installation by entering the following command:

      ```
      endmqweb
      ```

   d) List the state of all the queue managers on the system by using the **dspmq** command:

      ```
      dspmq -a
      ```

   e) List the status of listeners associated with a queue manager by using the **DISPLAY LSSTATUS** MQSC command:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```

   f) Stop any listeners associated with the queue managers, using the **endmqlsr** command:

      ```
      endmqlsr -m QMgrName
      ```

   g) Stop each running queue manager that is associated with this installation by using the **endmqm** command:

      ```
      endmqm QMgrName
      ```

   h) Uninstall the earlier version of the product. For more information, see "Uninstalling or modifying IBM MQ on Linux" on page 149

3. Set the primary installation to avoid specifying a search path to run IBM MQ commands by using the **setmqinst** command:

   ```
   INSTALLATION_PATH/bin/setmqinst -i -n installationName
   ```

   Use the dspmqinst command to discover the *InstallationName*.

If there is a primary installation, AIX and Linux applications that expect to find the IBM MQ library in `/usr/lib`, find a symbolic link to the library in `/usr/lib/32` [5]. `/usr/lib/32` is normally in the default search path. It is also specified as a load path in the IBM MQ build scripts for AIX and Linux.

It is sufficient to link applications only to `/usr/lib`. With a primary installation of the later version of the product defined on the server, an application can connect to any queue manager associated with any installation on the server. IBM MQ loads the correct library for the application.

4. Optional: Associate the queue managers with the installation by using the **setmqm** command:

```
setmqm -m qmgrName -n installationName
```

5. Start the queue managers and migrate them to the later version of the product by using the **strmqm** command:

```
strmqm qmgrName
```

When you first start a queue manager after migration:

- Any new attributes for existing objects are set to their default values.
- Any new default objects are created.
- Queue manager data is migrated.

At this point, queue manager data is migrated and you cannot revert to a previous release.

Important: Do not use the `-c` option to start the queue manager, unless you explicitly want to reset or re-create the default system objects.

You must start IBM MQ before you start any listeners.

6. Start your applications.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Related tasks

Linux AIX Migrating on AIX and Linux: single-stage

Single-stage migration is the term that is used to describe replacing the only installation of IBM MQ on a server with a later release. Single stage migration is also known as *upgrading in place* or *in place upgrade*. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect that queue manager migration has on users.

Linux AIX Migrating on AIX and Linux: multi-stage

“Planning to migrate IBM MQ to a later version on Windows” on page 389

“Installing IBM MQ server on AIX” on page 45

You can install an IBM MQ server on AIX either interactively or silently.

“Uninstalling or modifying IBM MQ on AIX” on page 62

On AIX, you can uninstall the IBM MQ server or client using the System Management Interface Tool (SMIT) or the **installp** command. You can also modify an installation by uninstalling a subset of the file sets.

“Installing the first IBM MQ installation on Linux using the rpm command” on page 112

You can install an IBM MQ server on a 64-bit Linux system using rpm. The instructions in this topic are for the first installation of IBM MQ on a Linux system.

“Uninstalling or modifying IBM MQ on Linux using rpm” on page 149

[5] `/usr/lib` for 64 bit applications.

On Linux, you can uninstall the IBM MQ server or client by using the **rpm** command. You can also modify an installation by removing selected packages (components) currently installed on your system.

Associating a queue manager with an installation

Changing the primary installation

“Installation name on AIX, Linux, and Windows” on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

setmqenv

setmqinst

setmqm

Linux AIX *Migrating on AIX and Linux: multi-stage*

Multi-stage migration is the term used to describe running a later version of IBM MQ alongside an earlier version on the same server. After installing the later version alongside the earlier version, you can create new queue managers to verify the installation of the later version, and develop new applications. At the same time, you can migrate queue managers and their associated applications from the earlier version to the later version. By migrating queue managers and applications one-by-one, you can reduce the peak workload on staff managing the migration. When migration to the later version is complete, you can uninstall the earlier version, and make the later version installation the primary installation.

Before you begin

1. The upgrade from the earlier version to the latest version of the product requires a full migration of queue managers. Create a migration plan. Use the planning task “Planning to migrate IBM MQ to a later version on AIX and Linux” on page 417, as a guide.
2. Review the IBM MQ system requirements for the later version; see System Requirements for IBM MQ.
3. Back up your system before you install a later version of IBM MQ over an earlier version. After you start a queue manager, you cannot revert to the previous version. If you must restore the system, you cannot recover any work, such as changes to messages and objects, performed by the later version of

IBM MQ. For more information about backing up your system, see Backing up and restoring IBM MQ queue manager data.

4. Review any other installed SupportPacs for their applicability to the later version.
5. If you are running on a server with multiple installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.
6. From IBM MQ 9.0, the `ccsid_part2.tbl` file replaces the existing `ccsid.tbl` file that is used in previous versions of the product to supply extra CCSID information.

   Attention:

   The `ccsid_part2.tbl` file takes precedence over the `ccsid.tbl` file and:

   - Allows you to add or modify CCSID entries
   - Specify default data conversion
   - Specify data for different command levels

   The `ccsid_part2.tbl` is applicable to the following platforms only:

   - Linux - all versions
   - Windows

   If you added any of your own CCSID information into your existing `ccsid.tbl` file, copy this information into the new `ccsid_part2.tbl` file to take advantage of the new formats in your customizations

   Copy the required information, rather than move the information, so that your existing version of IBM MQ continues to work.

Note: If you are running the IBM MQ.NET monitor in transactional mode, the queue manager it connects to must be the primary installation.

About this task

With the multi-stage approach, until you uninstall the earlier version , you must configure an environment to run applications that connect to a queue manager to the later version. You must also provide a path to run IBM MQ commands. Both these tasks are accomplished with the **setmqenv** command.

Note: When you have uninstalled the earlier version, and set the later version as a primary installation, in most circumstances it is not necessary to run the **setmqenv** command to run applications. It is still necessary to run **setmqenv** to set the environment for commands that connect to a queue manager associated with an installation that is not primary.

Procedure

1. Install the later version in a different installation directory from the earlier version and verify the installation.
   a) Decide on an installation naming convention. Give the installation a name of your choosing, or accept the default installation name.

      For the first installation, the default name is *Installation1*. For the second installation, the name is *Installation2*, and so on.

      AIX On AIX there is no option to set the installation name, *Installation1* is set by default.

   b) Install the later version. For more information see, “Installing IBM MQ server on AIX” on page 45 or “Installing additional IBM MQ installations on Linux using the rpm command” on page 116.

   c) Verify the installation.

      Run the installation verification procedures and your own tests.

2. Configure the operating system so that applications load the libraries for the later version of the product.
   a) Migrate queue managers one at a time.

      The first set of applications to load the libraries for the later version of the product are the applications that connect to the first queue manager you are going to migrate.

      It does not matter if those applications also connect to other queue managers on the server. If the applications load the later version libraries, IBM MQ automatically loads the libraries for the earlier version for those applications that connect to that version.

      You can either migrate the operating system environment of all applications, or just the applications that connect to the first queue manager you are going to migrate.

   b) Migrate IBM MQ MQI client applications

      Some of the applications might be running as IBM MQ MQI client applications on another workstation. When you migrate a queue manager, clients connected to it continue to run without loading a client library for the later version.

      You can migrate these clients later, when you need to do so.

      Important: If any IBM MQ MQI client applications are using the library for the earlier version on the server, you must eventually migrate the clients to use the later version of the product before you uninstall the earlier version.
3. Migrate an application to load the new library for the later version:
   - Run **setmqenv** to modify the local path that is searched for IBM MQ libraries.
   - Modify the global search path that is searched for IBM MQ libraries.
   - Relink applications with an additional runtime load path.

     Consult operating system documentation about how to modify the global search path, or include a fixed runtime load path in the application load module.

   To run **setmqenv** using the `-s` option:

   ```
   .Inst_1_INSTALLATION_PATH/bin/setmqenv -s -k
   ```

   The `-s` option sets up the environment for the installation that runs the **setmqenv** command.

   The `-k` option inserts the path to the IBM MQ load libraries at the start of the `LD_LIBRARY_PATH` environment variable, and adds the variable to the local environment; see “Loading IBM MQ libraries” on page 376.

   Note: On AIX the leading "`.` " is critical. The dot followed by a space instructs the command shell run **setmqenv** in the same command shell and inherit the environment set by **setmqenv**.
4. Restart the queue manager and the applications that connect to it.
   a) Set up the local environment to the installation `Inst_1`.

      ```
      .Inst_1_INSTALLATION_PATH/bin/setmqenv -s
      ```

      The `-s` option sets up the environment for the installation that runs the **setmqenv** command.

   b) Run the **setmqm** command to associate `QM1` with `Inst_1`.

      ```
      setmqm -m QM1 -n Inst_1
      setmqm -m QM2 -n Inst_1
      ```

   c) Run the **strmqm** command to start `QM1` and migrate it to the later version.

      ```
      strmqm QM1
      strmqm QM2
      ```

   d) Restart application 1

The application loads the later version library and connects to QM1, which is associated with the later version of the product.

5. Migrate all queue managers and applications to the later version.

   Repeat steps "2" on page 429 and "4" on page 429, when required, until all the queue managers and applications are migrated to the later version of the product.

6. Uninstall the earlier version of the product.

   When uninstalling the earlier product, you must stop all queue managers and applications that have loaded an IBM MQ library on the server. For this reason, you might choose to postpone uninstalling the earlier version of the product until a convenient maintenance window. When an earlier version of the product is not installed on a server, it is sufficient to stop the queue managers and applications that have loaded libraries from the installation that you are uninstalling or updating. It is not necessary to stop applications and queue managers associated with other installations.

   a) Log in as a user in `group mqm`.

   b) Stop all applications using the IBM MQ installation.

      If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.

   c) Stop the mqweb server that is associated with the IBM MQ installation by entering the following command:

      ```
      endmqweb
      ```

   d) List the state of all the queue managers on the system by using the **dspmq** command:

      ```
      dspmq -a
      ```

   e) List the status of listeners associated with a queue manager by using the **DISPLAY LSSTATUS** MQSC command:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```

   f) Stop any listeners associated with the queue managers, using the **endmqlsr** command:

      ```
      endmqlsr -m QMgrName
      ```

   g) Stop each running queue manager that is associated with this installation by using the **endmqm** command:

      ```
      endmqm QMgrName
      ```

   h) Uninstall the earlier version of the product. For more information, see "Uninstalling or modifying IBM MQ on Linux" on page 149

7. Set the primary installation to avoid specifying a search path to run IBM MQ commands by using the **setmqinst** command:

   ```
   INSTALLATION_PATH/bin/setmqinst -i -n installationName
   ```

   If you set an installation of the later version of the product as primary on AIX and Linux, you do not have to set up LD_LIBRARY_PATH in most cases. You can remove calls to **setmqenv** to set LD_LIBRARY_PATH.

What to do next

You cannot reinstall an earlier version of the product on a system that has the latest, or any other, version of IBM MQ installed.

Now that you have uninstalled the earlier version of the product, and made the later installation primary, you can review how the application runtime environment is set. It is no longer necessary to run **setmqenv** to set up the search path to load libraries for the later version. If you have only one installation of the later version of the product installed, it is not necessary to run **setmqenv** to run commands.

Related concepts

“Installation name on AIX, Linux, and Windows” on page 16
Each installation of IBM MQ on AIX, Linux, and Windows, has a unique identifier known as an installation name. The installation name is used to associate things such as queue managers and configuration files with an installation.

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374
You can install multiple copies of IBM MQ for AIX, Linux, and Windows on the same server. These IBM MQ copies can be at the same or different version levels. This is called a multi-installation. Multi-installation is particularly useful when you upgrade from one IBM MQ version to a later version, because it allows you to run the earlier version alongside the later version.

Related tasks

Linux AIX Migrating on AIX and Linux: single-stage
Single-stage migration is the term that is used to describe replacing the only installation of IBM MQ on a server with a later release. Single stage migration is also known as *upgrading in place* or *in place upgrade*. With other migration scenarios you might change some scripts and procedures, but you can reduce the effect that queue manager migration has on users.

Linux AIX Migrating on AIX and Linux: side-by-side

“Planning to migrate IBM MQ to a later version on Windows” on page 389

“Installing IBM MQ server on AIX” on page 45
You can install an IBM MQ server on AIX either interactively or silently.

“Installing the first IBM MQ installation on Linux using the rpm command” on page 112
You can install an IBM MQ server on a 64-bit Linux system using rpm. The instructions in this topic are for the first installation of IBM MQ on a Linux system.

Associating a queue manager with an installation

Changing the primary installation

“Migrating IBM MQ library loading to a later version on AIX and Linux” on page 436
On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

“Migrating IBM MQ library loading to a later version on Windows” on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

setmqenv

setmqinst

setmqm

Linux AIX *Reverting a queue manager to an earlier version on AIX and Linux*

On AIX and Linux, you can revert a queue manager to an earlier version of the product from a later version, if you have made a backup of the system or queue manager. If you have started the queue manager and processed any messages, or changed the configuration, the task cannot give you any guidance on reverting the current state of the queue manager.

Before you begin

1. You must have made a backup of the system or queue manager before you upgraded to the later version. For more information, see Backing up and restoring IBM MQ queue manager data.
2. If any messages were processed after starting the queue manager, you cannot easily undo the effects of processing the messages. You cannot revert the queue manager to the earlier version of the product in its current state. The task cannot give you any guidance how to deal with subsequent changes that have occurred. For example, messages that were indoubt in a channel, or in a transmission queue on another queue manager, might have been processed. If the queue manager is part of a cluster, then configuration messages and application messages might have been exchanged.
3. If you are running on a server with multiple IBM MQ installations, you must identify the installation. Make sure that the commands you enter run against the correct installation; see **setmqenv**.
4. When restoring a backup of a queue manager in a cluster, see Recovering a cluster queue manager and Clustering: Availability, multi-instance, and disaster recovery for more information.

About this task

When you revert to a earlier version of a queue manager, you revert the queue manager to its earlier code level. Queue manager data is reverted to the state it was in when the queue manager was backed up.

Important: If the queue manager is a member of one or more IBM MQ clusters, you should also refer to Clustering: Availability, multi-instance, and disaster recovery for more information and review and follow the steps described in Recovering a cluster queue manager.

Procedure

1. Log in as a user in `group mqm`.
2. Stop all applications using the IBM MQ installation.

   If you use the Managed File Transfer (MFT) component, ensure that any MFT agents have finished all of the file transfers that they were engaged in. There should be no incomplete transfers associated with the agents, and their SYSTEM.FTE.STATE queues should contain no messages.
3. End all the activity of queue managers associated with the IBM MQ installation.
   a) Run the **dspmq** command to list the state of all the queue managers on the system.

      Run either of the following commands from the installation that you are updating:

      ```
      dspmq -o installation -o status
      dspmq -a
      ```

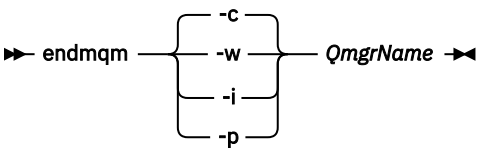
      dspmq -o installation -o status displays the installation name and status of queue managers associated with all installations of IBM MQ.

      dspmq -a displays the status of active queue managers associated with the installation from which the command is run.

   b) Use the MQSC command **DISPLAY LSSTATUS** to list the status of listeners associated with a queue manager, as shown in the following example:

      ```
      echo "DISPLAY LSSTATUS(*) STATUS" | runmqsc QmgrName
      ```

   c) Run the **endmqm** command to stop each running queue manager associated with this installation.



The **endmqm** command informs an application that the queue manager it is connected to is stopping; see Stopping a queue manager.

For the maintenance to proceed, applications must respond to an **endmqm** command by disconnecting from the queue manager and releasing any IBM MQ libraries they have loaded. If they do not, you must find another way to force applications to release IBM MQ resources, such as by stopping the applications.

You must also stop applications that are using the client libraries that are part of the installation. Client applications might be connected to a different queue manager, running a different installation of IBM MQ. The application is not informed about queue managers in the current installation being shut down.

Any applications that continue to have IBM MQ shared libraries from the installation loaded prevent you applying IBM MQ maintenance. An application might disconnect from a queue manager, or be forcibly disconnected, but keep an IBM MQ shared library loaded.

Note: "Applying maintenance level updates to multi-instance queue managers on AIX" on page 302 and "Applying maintenance level updates to multi-instance queue managers on Linux" on page 311 describe how to apply maintenance to a multi-instance queue manager. A multi-instance queue manager can continue to run on one server, while maintenance is applied to another server.

d) Stop any listeners associated with the queue managers, using the command:

```
endmqlsr -m QMgrName
```

4. Restore the system, or IBM MQ and the queue manager.

   If your backup procedure was to save the queue manager data, you must reinstall IBM MQ:

   a) Uninstall the earlier installation.

   b) Reinstall the product from a manufacturing refresh.

   c) Apply the fix pack and interim fixes that restore IBM MQ to its previous level.

   d) Restore the queue manager data from the backup taken before installing the later version.

5. Restart the earlier version queue manager.

What to do next

You might be reverting to a earlier version on a server with multiple IBM MQ installations. If one of the installations is primary, after reverting the earlier version that installation, by default, becomes the primary installation.

You must review how applications connect to an installation. After reverting to the earlier version, some applications might connect to the wrong installation.

Related concepts

Backing up and restoring a queue manager

Related reference

Avoiding BFGSS0023E errors when removing fix packs

Linux AIX *Migrating an IBM MQ MQI client on AIX and Linux*

Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Related concepts

“IBM MQ MQI client migration” on page 361
IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

Related tasks

“Migrating an IBM MQ MQI client to the latest version on IBM i” on page 457
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

“Migrating an IBM MQ MQI client on Windows” on page 407
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Migrating an IBM MQ MQI client to a later version on AIX and Linux

To upgrade a client to a later version of the product on AIX and Linux, you must first stop all IBM MQ activity on the workstation, then uninstall the earlier version and install the later version. After you have upgraded the client, you can then make any essential configuration and application changes.

Before you begin

Before migrating an IBM MQ MQI client on AIX and Linux, first create a migration plan. For guidance on what to include in the plan, see “Planning to migrate IBM MQ to a later version on AIX and Linux” on page 417, as a guide.

About this task

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration is reversible. It is optional and manual on a client workstation and is required and automatic on the IBM MQ server.

You must upgrade an IBM MQ MQI client before migrating a client workstation to make use of new configuration options. You can make configuration changes to client and server connection channels on the server, but they have no effect on a client workstation until the client is upgraded.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.
2. Review all the changes in IBM MQ that affect you.

   See “Changes that affect migration” on page 352.
3. End all IBM MQ activity on the workstation.

   You are now ready to upgrade the client. Follow the instructions for the appropriate platform that your enterprise uses.
4.

   To upgrade the client on AIX:

   a) Uninstall your existing IBM MQ client installation.

      For more information, see “Uninstalling or modifying IBM MQ on AIX” on page 62.

   b) Follow the client installation procedure to install the upgraded version of the IBM MQ client:

      - For a client installation on a workstation, see “Installing an IBM MQ client on AIX” on page 49

- For a client installation on an IBM MQ server, see Installing IBM MQ clients and servers on the same system.

5. Linux

   To upgrade the client on Linux:

   a) Uninstall your existing IBM MQ client installation.

      For more information, see “Uninstalling or modifying IBM MQ on Linux” on page 149.

   b) Follow the client installation procedure to install the upgraded version of the IBM MQ client:

      - For a client installation on a workstation, see “Installing an IBM MQ client on Linux using rpm” on page 120.
      - For a client installation on an IBM MQ server, see Installing IBM MQ clients and servers on the same system.

What to do next

After upgrading the IBM MQ MQI client, you must check the client channel configuration, and verify that your IBM MQ MQI client applications work correctly with the later version of the product.

Related concepts

“IBM MQ MQI client migration” on page 361

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

Related tasks

“Planning to migrate IBM MQ to a later version on AIX and Linux” on page 417

Linux AIX *Restoring an IBM MQ MQI client to an earlier version on AIX and Linux*

To revert a client to an earlier version of the product on AIX and Linux, you must uninstall the later version, and then install the earlier version.

About this task

If you revert an IBM MQ MQI client and client connection to an earlier code level, you must undo the configuration changes manually.

It is unusual to revert earlier IBM MQ MQI client libraries to a workstation.

Procedure

1. End all IBM MQ activity on the workstation.

   You are now ready to restore the client to the earlier version. Follow the instructions for the appropriate platform that your enterprise uses.

2. AIX

   To revert the client to the earlier version on AIX:

   a) Uninstall the IBM MQ MQI client code for the later version.

      For more information, see “Uninstalling or modifying IBM MQ on AIX” on page 62.

   b) Follow the client installation procedure to install the IBM MQ MQI client for the earlier version.

      For more information, see the client installation procedure for the earlier version that you want to install.

3. Linux

   To revert the client to the earlier version on Linux:

   a) Uninstall the IBM MQ MQI client code for the later version.

      For more information, see “Uninstalling or modifying IBM MQ on Linux” on page 149.

b) Follow the client installation procedure to install the IBM MQ MQI client for the earlier version:

   For more information, see the client installation procedure for the earlier version that you want to install.

4. If you configured a Client Connection Definition Table (CCDT) for a queue manager using the later version, revert to using a table created by a queue manager for the earlier version.

   If a client uses CCDT to connect to a queue manager, the CCDT can be at a version greater than, less than, or equal to that of the client. For more information, see MQI client: Client Channel Definition Table (CCDT).

Linux AIX *Migrating IBM MQ library loading to a later version on AIX and Linux*

On AIX and Linux, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to a later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Before you begin

To migrate applications from an earlier version of the product to the later version, you must know how the operating system loads an IBM MQ library for an application. Is the load path fixed by the application, and can you set the path in an environment variable? It is not essential to know the name of the IBM MQ library that the application loads. The library name does not change from an earlier version of the product to the later version, although the contents of the library do.

Read “Multi-installation queue manager coexistence on AIX, Linux, and Windows” on page 374 before starting this task.

Plan and install the later version of IBM MQ, and remember the installation name and whether the installation was set to primary.

About this task

To migrate an application from an earlier version of the product to the later version, you do not have to recompile or relink the application, because the IBM MQ libraries are compatible with later versions; see “Application compatibility and interoperability with later versions of IBM MQ” on page 383.

The build procedure for IBM MQ applications is to include an explicit library path to the location of the IBM MQ libraries, and to `/usr/lib`, in the link step of the compiler, as shown in Figure 12 on page 436. The build procedure is the same for the later version of the product.

```
gcc -m32 -o amqsput_32_r amqsput0.c -I/opt/mqm/inc -L/opt/mqm/lib
-Wl,-rpath=/opt/mqm/lib -Wl,-rpath=/usr/lib -lmqm_r -lpthread
```

Figure 12. Linux C server application, 32 bit, threaded compile and link

The example shown in Figure 12 on page 436 is for Linux, but the build step for AIX is similar.

If you have followed this build procedure in the earlier release, then the effect of installing the later version of the product on the libraries that are loaded depends on which migration scenario that you are following:

Single-stage scenario
: If you are replacing an earlier version of the product with the later version, based on the single stage scenario described in “Migrating on AIX and Linux: single-stage” on page 420, you do not, in most cases, need to make any changes to the way IBM MQ libraries are loaded. The possible exception to

this is if you changed the location of the libraries from the earlier version, or created symbolic links to the libraries.

Side-by-side and Multi-stage scenarios

If you have chosen a multi-installation approach to installing the later version of the product, based either on the side-by-side scenario described in "Migrating on AIX and Linux: side-by-side" on page 424, or the multi-stage migration scenario described in "Migrating on AIX and Linux: multi-stage" on page 427, you must investigate whether applications connecting to the later version of the product are linked to, and load libraries from, the correct installation and then modify the environment for the operating system to resolve IBM MQ dependencies for an application as appropriate. Typically, you can modify the runtime environment, rather than relink the application. You can use the following two commands to assist you in configuring the runtime environment:

- **setmqinst** sets the primary installation; see setmqinst.
- **setmqenv** initializes the command environment by setting environment variables; see setmqenv.

Table 43 on page 437 summarizes the actions needed for each of these scenarios. The examples in Table 43 on page 437 are all based on Linux, but the actions for AIX are similar.

Table 43. AIX and Linux configurations

Action / Scenario	Latest version replaces earlier version in the same location Single-stage	Latest version replaces earlier version in a different location Side-by-side	Latest version alongside earlier version Multi-stage
setmqinst	**setmqinst** makes the later version installation primary. Symbolic links to the IBM MQ link libraries are inserted into /usr/lib.		No. The later version installation can be primary, because an earlier version is installed.
No other configuration actions	Library loading works correctly. Library loading works, even without the later version installation being made primary, because the libraries are installed in /opt/mqm/lib and the application was built with the link option, -rpath=/opt/mqm/lib	Library loading works correctly. Library loading works, because the installation is primary, and the application was built with the link option, -rpath=/usr/lib.	The library loading continues to work with the earlier version correctly, nothing works with the later version.
setmqenv, without setting the -k or -l options.	Library loading works correctly. **setmqenv** is unnecessary. Library loading works, because the libraries are installed in /opt/mqm/lib and the application was built with the link option, -rpath=/opt/mqm/lib.	Library loading works correctly. **setmqenv** is unnecessary. Library loading works, because the installation is primary, and the application was built with the link option, -rpath=/usr/lib.	The library loading continues to work with the earlier version correctly, nothing works with the later version.

Table 43. AIX and Linux configurations (continued)

Action	Scenario	Latest version replaces earlier version in the same location **Single-stage**	Latest version replaces earlier version in a different location **Side-by-side**	Latest version alongside earlier version **Multi-stage**
setmqenv, with the -k or -1 options set.		Library loading works correctly.		Library loading works correctly, both for the earlier version and the later version. The correct earlier version is loaded, because the later version library loads the earlier version library for queue managers that have not been migrated from the earlier version.
		The operating system finds the IBM MQ library location set by **setmqenv**. **setmqenv** adds the location to LD_LIBRARY_PATH. AIX This is LIBPATH on AIX.		

Procedure

1. Consider which of the following questions apply to your configuration.
   - Did you follow the build procedure documented in the product documentation for the earlier version of the product? You might be following a different build procedure tailored to your development environment, or adapted from a development tool.
   - How did you specify the load path for the earlier version?
   - Is the application is loaded by another environment, such as Eclipse, or an application server? You must modify the parameters that govern how the parent environment loads applications, not the way the parent environment is loaded.
   - What constraints and requirements do you have on how the load path is specified in the later version? Security rules might restrict the use of LD_LIBRARY_PATH.
   - Is the later version of the product installed alongside the earlier version?
2. Identify the installation of the later version of the product, from which the operating system is going to load IBM MQ libraries:
   - If you have a multiple installations of the later versions to load from a server, IBM MQ checks that the installation the library was loaded from is the installation that is associated with any queue manager the application calls. IBM MQ loads the correct library if the wrong library is loaded. It is necessary to configure only one runtime environment for all IBM MQ applications.
   - A typical choice is to set the primary installation. Setting an installation to be primary places symbolic links to the IBM MQ libraries in /usr/lib. Applications built have an explicit link to /usr/lib,and /usr/lib is also normally in the default library search path.
   - If you upgraded an earlier version installation to the later version, a link path to the earlier version installation now points to an installation containing the later version. Applications that have a fixed linkage path to the earlier version installation now load the libraries for the later installation. They are then switched to the installation that is associated with any queue manager they connect to.
   - If you rebuild an application, it must link to an installation of the later version.

- AIX If you set LD_LIBRARY_PATH, or LIBPATH on AIX, you must check that the application is able to use LD_LIBRARY_PATH. `setuid` or `setgid`, applications, or applications built in other ways, might ignore LD_LIBRARY_PATH for security reasons.

What to do next

If you add further installations of the later version of the product, you must decide which installation to make primary, if you have chosen to make any primary. As long as applications load IBM MQ libraries from one of the later version installations, such as the primary installation, they can connect to queue managers associated with any other later version installation.

Related concepts

"External library and control command links to primary installation on AIX and Linux" on page 25
On AIX and Linux platforms the primary installation is the one to which links from the `/usr` file system are made. However, only a subset of those links created with previous releases are now made.

Related tasks

Connecting applications in a multiple installation environment

Changing the primary installation

Loading IBM MQ libraries

"Migrating IBM MQ library loading to a later version on Windows" on page 408
On Windows, no change in the way IBM MQ libraries are loaded is normally required if you upgrade from an earlier version of the product to the later version by replacing an earlier version of the product with the later version, based on the single stage scenario. However, if you choose to take advantage of multi-installation in the later version of the product, based on the side-by-side or multi-stage migration scenarios, you might have to configure the runtime environment differently, for the operating system to load the later version of the IBM MQ library.

Related reference

"Coexistence" on page 371
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations. In addition to queue managers coexisting on a server, objects, and commands must work correctly with different queue managers running at different command levels.

setmqenv

setmqinst

setmqm

Linux *Rebuilding a C++ application on Linux*

C++ IBM MQ MQI client and server applications on Linux must be recompiled using GNU Compiler Collection (GCC) 4.1.2, or later. Compilers older than GCC 4.1.2 are no longer supported. The C++ GCC 4.1.2 run time libraries, or later, must be installed in `/usr/lib` or `/usr/lib64`

If you are using one of the supported Linux distributions, the libraries are correctly installed; see System Requirements for IBM MQ.

The GCC 4.1.2 libraries support SSL and TLS connections from an IBM MQ MQI client. SSL and TLS use IBM Global Security Kit (GSKit) version 8, which depends on `libstdc++.so.6`. `libstdc++.so.6` is included in GCC 4.1.2.

Before you begin

1. Check the required level of GCC for your distribution of Linux; see System Requirements for IBM MQ.
2. If you are using SSL or TLS, also check the required level of `libstdc++.so`.

3. Check whether the application requires rebuilding. Run the following command to display what version of `libstdc++.so` the application depends upon. If the result is less than `libstdc++.so.6`, you must rebuild your application.

```
ldd ApplicationPath
```

About this task

The task describes the steps required to rebuild a Linux C++ IBM MQ application. For more detailed instructions about building Linux applications for IBM MQ ; see Building your procedural application on Linux

Procedure

1. Check that the required GCC library is installed correctly.

   Run one of the following commands:

   - Check the 32 bit library on an x86 Linux system:

     ```
     ls -l /usr/lib/libstdc++.so.6
     ```

   - Check the 64 bit library on any other Linux system.

     ```
     ls -l /usr/lib64/libstdc++.so.6
     ```

2. Check that the GCC compiler is at least at version 4.1.2

   Run the following command to display the version of GCC.

   ```
   gcc -v
   ```

3. Rebuild the application

   The commands to compile and link Linux C++ applications are described in Building 32-bit applications and Building 64-bit applications

What to do next

When you deploy your Linux C++ application, ensure that the same GCC runtime library is correctly installed on the run time system.

Linux *Migrating IBM MQ Telemetry on Linux*

Follow these instructions to migrate your existing installation of IBM MQ Telemetry on Linux to the latest version of the product.

Before you begin

Before proceeding with this task, ensure that you back up your existing IBM MQ installation. You must stop the IBM MQ Telemetry service `SYSTEM.MQXR.SERVICE` before migrating.

About this task

The telemetry server is included in the product as an optional installation.

For IBM WebSphere MQ 7.5, the Client Software Development Kit (the telemetry clients) is also included in the optional installation. From IBM MQ 8.0 onwards, the Client Software Development Kit is no longer supplied as part of the product. Similar sample applications continue to be freely available from Eclipse Paho and MQTT.org. See MQ Telemetry Transport sample programs.

Because IBM MQ Telemetry is a component of IBM MQ, IBM MQ Telemetry can either be installed with the main product, or installed after the main product has been installed. When you upgrade from a

previous version of the product, you must download and use the latest version of the Client Software Development Kit.

After the successful upgrade, Linux systems retain all telemetry data kept in `/var/mqm`. Telemetry data is migrated to the later version of the product when the queue manager is started again.

Procedure

1. Create a migration plan.

   See “Planning to migrate IBM MQ to a later version on AIX and Linux” on page 417.
2. Migrate your queue managers to the latest release.
3. “Installation considerations for IBM MQ Telemetry” on page 248.
4. Verify that the IBM MQ Telemetry installation was successful. See “Verifying the installation of IBM MQ Telemetry” on page 249.
5. If the passphrases for your MQTT TLS channels are stored in plain text, you should encrypt the passphrases.

   Before IBM MQ 9.3.0, passphrases for MQTT TLS channels were stored in plain text. From IBM MQ 9.3.0, support for the encryption of passphrases for MQTT TLS channels is provided.

   Existing plain text passphrase are not changed to an encrypted form automatically. You must update your plain text passphrases to an encrypted form. For more information on how to encrypt your passphrases, see Encryption of passphrases for MQTT TLS channels.

Results

Message AMQ4616 indicates completion of the task. The existing MQTT channels and previous subscriptions are still present.

Related concepts

“Installation considerations for IBM MQ Telemetry” on page 248
IBM MQ Telemetry is a component of the main IBM MQ product. You can choose to install IBM MQ Telemetry when you first install IBM MQ, or when you modify an existing IBM MQ installation.

Related tasks

“Verifying the installation of IBM MQ Telemetry” on page 249
There are three ways to verify the installation of IBM MQ Telemetry. Any can be used, regardless of whether IBM MQ Telemetry was installed as a custom installation of IBM MQ, or added to an existing installation of IBM MQ.

“Verifying the installation of IBM MQ Telemetry by using IBM MQ Explorer” on page 249
Use the Define sample configuration wizard and the MQTT client utility in IBM MQ Explorer to verify that the IBM MQ Telemetry components have installed. Also check that publish/subscribe works correctly.

IBM i Migrating IBM MQ on IBM i

IBM MQ migration tasks associated with IBM i are grouped in this section.

Procedure

- For information about creating a migration plan, see “Planning to migrate IBM MQ to a later version on IBM i” on page 442.
- For information about migrating an IBM MQ classes for JMS and IBM MQ classes for Java client, see “Migrating an IBM MQ classes for JMS and Java client on IBM i” on page 443.
- For information about migrating a queue manager from a previous release, see “Migrating a queue manager to the latest version on IBM i” on page 444 and “Migrating a queue manager to a later version on IBM i - alternative method” on page 454.
- For information about upgrading an IBM MQ system, see “Upgrading an entire IBM MQ system on IBM i” on page 457.

- For information about upgrading an IBM MQ MQI client installation, see “Migrating an IBM MQ MQI client to the latest version on IBM i” on page 457.
- For information about converting a single instance queue manager to a multi-instance queue manager, see “Migrating from a single instance to a multi-instance queue manager on IBM i” on page 458.
- For information about reverting a multi-instance queue manager to a single instance queue manager, see “Reverting to a single-instance queue manager on IBM i” on page 461.

Related concepts

“Migration concepts and methods” on page 356
An overview of the various concepts and methods for migrating from one release of the product to another.

Related tasks

“Migrating IBM MQ on AIX and Linux” on page 416
Migration tasks associated with AIX and Linux platforms are grouped in this section.

“Migrating IBM MQ on Windows” on page 388
IBM MQ migration tasks associated with Windows platforms are grouped in this section.

“Migrating IBM MQ on z/OS” on page 462
Migration tasks associated with z/OS are grouped in this section.

Related reference

“Changes that affect migration” on page 352

IBM i *Planning to migrate IBM MQ to a later version on IBM i*

Before migrating IBM MQ to a later version on IBM i, review the system requirements information, and the information about any changes that might affect migration, then create a migration plan.

Before you begin

If there are concepts about migration you do not understand, see “Migration concepts and methods” on page 356.

If you are migrating to IBM MQ 10.0 from IBM MQ 9.2 or earlier, you must first migrate to an interim version. See Migration paths.

About this task

Use the following steps as a guide to creating a migration plan.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.
2. Review all the changes in IBM MQ that affect you.

   See “Changes that affect migration” on page 352.
3. Review performance changes.

   See MQ Performance documents.
4. Review the readme file for the later version of IBM MQ.

   See IBM MQ, WebSphere MQ, and MQSeries product readmes.
5. Plan the sequence and timing of queue manager migrations.
   - If the queue manager is part of a queue manager cluster, you must migrate the queue managers that are full repositories first.

- If the queue manager is part of a high availability cluster, plan the migration to minimize downtime and maximize availability; see “Migrating a queue manager in a high-availability configuration” on page 483.

6. Plan to migrate your queue manager to the later version.

   See IBM i - Migrating a queue manager to the later release or Migrating a queue manager to the later release, alternative method

   Backing up queue manager data is part of the queue manager migration task. An alternative approach is to install and configure a new server, then test the later version with a new queue manager on the new server. When you are ready to go into production on the later version, copy the queue manager configuration and data to the new server.
7. Plan to update any manual or automated procedures you have written with changes to messages and codes.

   A suffix letter, indicating the severity of a message (I, W, E, S or T) is appended to IBM MQ diagnostic (AMQ) messages. Existing scripts looking for error codes without the severity will fail. For example, existing scripts looking for error matching to AMQ7468 will fail. You must update the scripts to look for error codes with the severity suffix added (for example, AMQ7468I). For more information, see IBM MQ messages on Multiplatforms.
8. Decide on what regression tests to perform before putting the queue manager into production on the later version. Include the procedures and applications you identified in previous steps in your regression tests.
9. Plan to migrate your IBM MQ MQI client installations to the later version.
10. Plan to migrate your client and server applications to use new functions in the later version.
11. Decide which downloadable images you require for the migration.

    For more information, see “Where to find downloadable installation images” on page 12.

IBM i *Migrating an IBM MQ classes for JMS and Java client on IBM i*

If you have IBM MQ Java SupportPac MA88 installed, you must uninstall it first.

Before you begin

SupportPac MQ88 is installed.
If you try to install the latest version of IBM MQ classes for Java anyway, the installation fails with a warning requesting you to uninstall the old client. You must follow the steps in this task to uninstall IBM MQ classes for Java and IBM MQ classes for JMS.

A previous version of IBM MQ classes for Java is installed.
Installation of the latest version of IBM MQ classes for Java uninstalls the previous version automatically. Do not follow the steps in this task.

About this task

The steps in this task uninstall the IBM MQ classes for JMS and Java.

Procedure

To uninstall the previous IBM MQ Java client:

1. Delete the QMQMJAVA library and the /QIBM/ProdData/mqm/java directory, by issuing the command:

   ```
   DLTLICPGM LICPGM(5648C60) OPTION(*ALL)
   ```
2. If the previous step failed to delete the IFS directory /QIBM/ProdData/mqm/java and its subdirectories, use the **EDTF** command, for example:

   ```
   EDTF STMF('/QIBM/ProdData/mqm')
   ```

and select option 9 against the `java` directory.

IBM i *Migrating a queue manager to the latest version on IBM i*

Follow these instructions to migrate a queue manager on IBM i to the latest MQ version.

Before you begin

1. Create a migration plan. Use the planning task, Planning migration to the latest version, as a guide.
2. Review the IBM MQ system requirements for the latest version of the product; see System Requirements for IBM MQ
3. Review any other installed SupportPacs for their applicability to the latest version of the product.

About this task

There are two types of migration:

- The migration takes place on the same machine, optionally accompanied by a hardware upgrade. This migration is referred to as a *slip installation*. On IBM i, uninstalling the earlier version before you install the later version is optional.
- The migration takes place on a different machine. This migration is referred to as a *side-by-side installation*.

  A side-by-side installation lets you prepare the new environment first, without interrupting the queue manager. It also gives you the limited option of reverting to use the earlier version installation, if the migration is unsuccessful. It is limited, because you cannot restore the queue manager data from the later version. You must restart processing with the queue manager data at the point you stopped the queue manager on the earlier release.

  If you decide to do a side-by-side installation, you must prepare the new server first, installing the prerequisite software.

If you want to add Advanced Message Security to your system, you must select Option (2) when you install the product; see “Installing Advanced Message Security on IBM i” on page 234 for further information.

Related tasks

“Migrating a queue manager on AIX and Linux” on page 419
The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

“Migrating a queue manager on Windows” on page 390
The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

“Migrating IBM MQ on z/OS” on page 462
Migration tasks associated with z/OS are grouped in this section.

IBM i *Installation methods on IBM i*

Select a slip installation or a side-by-side installation to upgrade IBM MQ for IBM i.

About this task

A slip installation upgrades IBM MQ for IBM i on a computer with an earlier version is installed.

A side-by-side installation upgrades IBM MQ for IBM i on a different computer. You must save your queue managers before you start.

Follow the steps in the following tasks to carry out an upgrade.

The steps for both forms of upgrade are identical, except that you do not carry out the actions described in “Restore queue managers after upgrading IBM MQ on IBM i” on page 452 for a slip installation.

IBM i *End IBM MQ activity on IBM i*

End IBM MQ applications and connections, and remove any unwanted or indoubt messages.

About this task

Before performing a slip installation or side-by-side installation, carry out the following procedure:

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Stop all applications that are using the existing version of IBM MQ.

   To identify applications using the queue manager, use the command WRKMQM, option 22, Work with queue manager jobs, to help find them. Ignore jobs starting with AMQ* or RUN* and focus on your application job names.
3. End all channels for all queue managers on the system. To do so, use the WRKMQMCHL command and select option 15.
4. On each queue manager, end the command server. To do so, enter the command:

   ```
   ENDMQMCSVR MQMNAME( QMGRNAME ) OPTION(*IMMED)
   ```

   where *QMGRNAME* is the name of the queue manager.
5. Remove any unwanted messages from your queues.
6. Resolve any in-doubt messages that are held by sender or server channels. To do so, use the WRKMQMCHST command and select option 17.
7. On each queue manager, save the latest media recovery checkpoint. To do so, enter the following command:

   ```
   RCDMQMIMG OBJ(*ALL) OBJTYPE(*ALL) MQMNAME( QMGRNAME ) DSPJRNDTA(*YES)
   ```

IBM i *Quiesce IBM MQ on IBM i*

Stop all queue managers. If necessary force all queue managers to stop, tidy up shared memory and end all jobs in the QMQM subsystem.

About this task

The orderly shutdown of IBM MQ is called *quiescing*. You need to quiesce IBM MQ to upgrade to a newer version.

Procedure

Prepare to quiesce queue managers:

1. Sign on to a new interactive IBM i session, ensuring that you are not accessing any IBM MQ objects.
2. Ensure that you have the following authorities:
   - *ALLOBJ authority, or object management authority for the QMQM library.
   - Sufficient authority to use the ENDSBS command.
3. Warn all users that you are going to stop IBM MQ.
4. Stop the mqweb server by entering the following command:

   ```
   ENDMQWEB
   ```

Quiesce all queue managers:

5. Run the ENDMQM command:

```
ENDMQM MQMNAME(*ALL) OPTION(*CNTRLD) ENDCCTJOB(*YES) RCDMQMIMG(*YES)
TIMEOUT( 15 )
```

Where *15* is a timeout value in seconds.

If the ENDMQM command has not completed within a reasonable period (at least 10 minutes), use the WRKMQM command. This command identifies the queue managers that are still ending. Then force each one in turn to stop by running the following command:

```
ENDMQM MQMNAME( QMGRNAME ) OPTION(*IMMED)
```

Where *QMGRNAME* is the name of the queue manager.

Complete the tidying up of shared memory by running the following command:

```
ENDMQM MQMNAME(*ALL) OPTION(*IMMED) ENDCCTJOB(*YES) RCDMQMIMG(*NO)
TIMEOUT( 15 )
```

If the commands in the previous step do not complete, end the subsystem immediately:

6. Run the following command:

```
ENDSBS SBS(QMQM) OPTION(*IMMED)
```

If the command in the previous step also does not complete, use the operating system command ENDJOB to end all jobs in the subsystem QMQM:

Note: Do not use ENDJOBABN unless you intend to perform an IPL on the machine before starting IBM MQ. Ending IBM MQ jobs using ENDJOBABN can lead to damaged semaphores, which in turn can prevent your queue manager from starting.

7. If a QMGR must be shut down manually, end the jobs (ENDJOB) in the following order. Wait a few minutes for AMQA* or AMQZ* jobs to tidy up.
    a. RUNMQLSR - TCP listener (multi-threaded)
    b. AMQCLMAA - TCP listener (single-threaded)
    c. AMQRMPPA - Channel process pooling job
    d. RUNMQCHI - channel initiator
    e. AMQCRSTA - receiving MCA jobs
    f. RUNMQCHL - sending MCA jobs
    g. AMQCRS6B - LU62 receiver channel
    h. AMQPCSEA - command server
    i. RUNMQTRM - Application trigger monitor
    j. RUNMQDLQ - Dead letter queue handler
    k. AMQFCXBA - IBM Integration Bus Worker Job
    l. AMQFQPUB - Queued Publish/Subscribe Daemon
    m. RUNMQBRK - IBM Integration Bus Control Job
    n. AMQZMUC0 ('0' is a zero) - Utility Manager
    o. AMQZMUF0 ('0' is a zero) - Utility Manager
    p. AMQZMUR0 ('0' is a zero) - Utility Manager
    q. AMQZMGR0 ('0' is a zero) - Process Controller
    r. AMQRRMFA - cluster repository manager
    s. AMQZDMAA - deferred message manager
    t. AMQZFUMA - object authority manager
    u. AMQZLSA0 ('0' is a zero) - LQM agents
    v. AMQZLAA0 ('0' is a zero) - LQM agents

w. AMQZXMA0 ('0' is a zero) - Execution Controller

8. Run the following command:

```
ENDMQM MQMNAME( QMGRNAME ) OPTION(*IMMED)
```

9. Run the following command:

```
ENDMQM MQMNAME(*ALL) OPTION(*CNTRLD) ENDCCTJOB(*YES) RCDMQMIMG(*NO)
TIMEOUT( 05 )
```

Where *05* is a timeout value in seconds.

10. Manually clean up shared memory.

Run the following command:

```
EDTF '/QIBM/UserData/mqm/qmgrs'
```

then:

a. Take option 5 for **&SYSTEM** and check that the following directories are empty: `isem, esem, msem, ssem,` and `shmem`.

b. Take option 5 for **QMGRNAME** and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.

c. Take option 5 for **&ipcc** in the QMGRNAME directory and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.

d. Take option 5 for **&qmpersist** in the QMGRNAME directory and check that the following directories are empty:- `isem, esem, msem, ssem,` and `shmem`.

e. Take option 5 for **&app** and check that the following directories are empty: `isem, esem, msem, ssem,` and `shmem`.

IBM i *Save IBM MQ data on IBM i*

Save IBM MQ data after removing unwanted FDC, trace, and JOB files.

Before you begin

You need to have completed the tasks to remove unwanted and indoubt messages and quiesced IBM MQ.

About this task

Procedure

1. Create a save file for every queue manager library on your system. To do so, issue the command:

```
CRTSAVF FILE(QGPL/ queue_manager_library )
```

where the *queue_manager_library* name consists of the name of the queue manager preceded by `QM`.

2. Save your queue manager libraries into the save files. To do so, issue the commands:

```
SAVLIB LIB( queue_manager_library ) DEV(*SAVF)
SAVF(QGPL/ queue_manager_library )
```

3. Remove all unwanted FDC data from directory:

```
QIBM/UserData/mqm/errors
```

4. Remove old FDC files with the command:

```
RMVLNK OBJLNK('/QIBM/UserData/mqm/errors/*.FDC')
```

This command cleans up all files with an extension of 'FDC' in the IFS.

5. Remove old JOB files with the command:

```
RMVLNK OBJLNK('/QIBM/UserData/mqm/errors/*.JOB')
```

   This command cleans up all files with an extension of 'JOB' in the IFS.

6. Remove all unwanted trace data from directory, or remove the whole directory:

```
QIBM/UserData/mqm/trace
```

7. Remove all trace files with the command:

```
RMVLNK OBJLNK('/qibm/userdata/mqm/trace/*')
```

8. Create a save file for IBM MQ IFS data. To do so, issue the command:

```
CRTSAVF FILE(QGPL/QMUSERDATA)
```

9. Save your IBM MQ IFS data, using the command:

```
SAV DEV('/QSYS.LIB/QGPL.LIB/QMUSERDATA.FILE') OBJ('/QIBM/UserData/mqm')
```

10. If you are going to run IBM MQ on a new machine, transfer the save files to the new machine.

IBM i *Install IBM MQ server on IBM i*

Install the IBM MQ server in its primary language.

Before you begin

You have completed planning the installation, obtained the installation disks, and set the system values; see “Configuring and tuning the operating system on IBM i” on page 67.

About this task

Install the IBM MQ server and force object conversion. Object conversion migrates objects from the older to the newer version. By performing it now, rather than when an object is first used, you avoid slowing down the first use of the upgraded product.

After following the optional step to pre-agree the license, the **RSTLICPGM** command runs without requiring any interactive input. Otherwise the license agreement is displayed for you to accept. See “License requirements” on page 8.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Optionally pre-agree the license terms and conditions by running the command,

```
CALL PGM (QSYS/QLPACAGR) PARM ('5724H72' 'V8R0M0' '0000' 0)
```

   Where the parameters of **PARM** are,

   5724H72
   The product identifier for IBM i.

   V10R0M0
   The version, release, and modification level.

   0000
   The option number for the *BASE IBM MQ product option.

   0
   Unused error structure.

3. Install IBM MQ for IBM i, base product, and primary language.

```
RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
```

where the parameters of RSTLICPGM are,

LICPGM (5724H72)
The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

OPTION (*BASE)
Install the base IBM MQ for IBM i product.

Unspecified parameters
Unspecified parameters such as **RSTOBJ** (*ALL), revert to defaults. The command installs both IBM MQ and the language files for the primary language of your system. For installing additional languages see Installing translated versions.

What to do next

Install any Progam Temporary Fixes (PTF) that have been issued.

Install samples on IBM i

Install the IBM MQ samples

Before you begin

If you have not already done so, sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.

About this task

Install the samples.

After following the optional step to pre-agree the license, the **RSTLICPGM** command runs without requiring any interactive input. Otherwise the license agreement is displayed for you to accept. See “License requirements” on page 8.

Procedure

1. Optionally pre-agree the license terms and conditions by running the command,

   ```
   CALL PGM (QSYS/QLPACAGR) PARM ('5724H72' 'V8R0M0' '0001' 0)
   ```

   Where the parameters of **PARM** are,

   5724H72
   The product identifier for IBM i.

   V10R0M0
   The version, release, and modification level.

   0001
   The option number for the samples.

   0
   Unused error structure.
2. Install the samples using the command:

   ```
   RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (1) OUTPUT (*PRINT)
   ```

   Where the parameters of RSTLICPGM are,

   LICPGM (5724H72)
   The product identifier for IBM i.

DEV (*installation device*)
The device from which the product is to be loaded, typically an optical drive, for example, `OPT01`.

OPTION (1)
Install the samples for IBM i.

OUTPUT (*PRINT
The output is printed with the spooled output of the job.

IBM i *Install translated versions on IBM i*

Install translated versions of IBM MQ from a choice of national-languages.

About this task

The following language versions are available for IBM i:

Table 44. National-language versions of IBM MQ for IBM i

Language ID	Language
2909	Belgian English
2966	Belgian French MNCS (Multi-National Character Set)
2981	Canadian French MNCS
2975	Czech
2950	English uppercase
2924	English uppercase and lowercase
2984	English US DBCS
2938	English US uppercase DBCS
2928	French
2940	French MNCS
2929	German
2939	German MNCS
2976	Hungarian
2932	Italian
2942	Italian MNCS
2962	Japanese
2986	Korean
2978	Polish
2989	Simplified Chinese
2931	Spanish

IBM MQ for IBM i is installed in the language that is the primary language on your system.

You can install additional versions of the product in any of the languages shown in Table 44 on page 450. To do so complete the following steps:

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority

2. Issue the following command specifying the appropriate language ID:

```
RSTLICPGM LICPGM(5724H72) DEV( installation device ) RSTOBJ(*LNG) LNG( language ID )
```

This installs the commands, message file, and panel groups into the relevant QSYS library for the language. For example, library QSYS2928 is used for French. If this QSYS29nn library does not exist, it is created by the **RSTLICPGM** command.

Results

Note:

1. To run the Japanese language version of IBM MQ for IBM i, the CCSID of the job must be 939 (5035) rather than 930 (5026) because IBM MQ uses lowercase English characters.
2. If you are installing IBM MQ for IBM i onto a machine for which the primary language is not on the CD, the installation program prompts you to load a CD containing the product in that language. If, however, you have only one product CD, this means that the IBM MQ product has not been translated into your language. To get around this issue, proceed as follows:
   - Install the product in one of the supplied languages, and then add the corresponding QSYS29nn library into the *system library* list (for example using command **CHGSYSLIBL**). At the same time, check that there are no IBM MQ *CMD, *MENU, or *MSGF objects in libraries higher up the library list. If some exist, then either delete these objects (because they refer to an earlier version of IBM MQ) or reorder the System Library list (because the product has been installed in more than one of the supplied languages).

IBM i *Verify the installation on IBM i*

How to check that your installation has been successful.

Procedure

1. To ensure that the product has loaded correctly, issue the Display Software Resources (DSPSFWRSC) command and check that the licensed program 5724H72 is listed. If you have installed the base and the optional samples, you see:

```
Resource
ID    Option Feature Description
5724H72  *BASE  5050 IBM MQ for IBM i
5724H72  *BASE  2924 IBM MQ for IBM i
5724H72  1    5050 IBM MQ for IBM i - Samples
```

2. Press F11, while viewing the Display Software Resources screen, and you see the library and version number of the products installed:

```
Resource          Feature
ID    Option Feature  Type  Library  Release
5724H72  *BASE  5050   *CODE  QMQM V10R0M0 5724H72  *BASE  2924   *LNG   QMQM   V10R0M0
5724H72  1    5050   *CODE  QMQMSAMP V10R0M0
```

3. If you have installed additional language versions, you also see entries for these versions. For example, if you have installed the French version, for which the language ID is 2928, you see:

   a)

```
Resource
ID    Option Feature Description
5724H72  *BASE  2928 IBM MQ for IBM i
```

   b) and when you press F11:

```
Resource          Feature
ID    Option Feature  Type  Library   Release
5724H72  *BASE  2928  *LNG  QSYS2928  V10R0M0
```

4. Use the command DSPMQMVER to check exactly what version you have installed. For example, for V10R0M0, it reports:

```
Version: 9.2.0.0
```

IBM i *Verify the upgrade on IBM i*

After you have verified the installation, start the IBM MQ subsystem, check the queue managers, and take a fresh media recovery checkpoint.

About this task

To verify that you have migrated to the latest version IBM MQ for IBM i, successfully:

Procedure

1. Make QMQMADM either the primary or a secondary group profile for your user profile. To do so, issue one of the following commands:

```
CHGUSRPRF USRPRF( YOUR PROFILE ) GRPPRF(QMQMADM)
CHGUSRPRF USRPRF( YOUR PROFILE ) SUPGRPPRF(QMQMADM)
```

2. Start the IBM MQ subsystem with the command:

```
STRSBS SBSD(QMQM/QMQM)
```

   (If it is already running, you get error message CPF1010 which you can safely ignore).
3. Check that your queue managers are accessible by issuing the command:

```
WRKMQM
```

   Use option 14 against each queue manager to start it.

   Use option 5 against each queue manager to check its attributes.
4. You can use the other options to check your queue manager objects. For example, check your queues using option 18, check your channels using option 20, and so on.
5. Take a fresh media recovery checkpoint, using the following command:

```
RCDMQMIMG OBJ(*ALL) OBJTYPE(*ALL) MQMNAME( QMGRNAME ) DSPJRNDTA(*YES)
```

   Where *QMGRNAME* is the name of the queue manager.

IBM i *Restore queue managers after upgrading IBM MQ on IBM i*

Complete the side-by-side upgrade by restored the saved queue managers onto the server that you have upgraded.

Before you begin

Note: Carry out this task only if you are performing a side-by-side upgrade.

Ensure that you have saved your queue manager data, see “End IBM MQ activity on IBM i” on page 445, and installed and verified the upgrade.

About this task

Transfer the queue manager data, and journal receivers, onto the server that has been upgraded.

Procedure

1. Restore the queue manager libraries for every queue manager, using the command:

   ```
   RSTLIB SAVLIB( queue_manager_library ) DEV(*SAVF) (*PRINT)
   SAVF(QGPL/ queue_manager_library )
   ```

   where the *queue_manager_library* name consists of the name of the queue manager preceded by QM.
2. Restore the IBM MQ IFS data, using the command:

   ```
   RST DEV('/QSYS.LIB/QGPL.LIB/QMUSERDATA.FILE') OBJ('/QIBM/UserData/mqm') (*PRINT)
   ```
3. To associate the journal receivers, issue the command WRKJRN on the journal AMQAJRN in each queue manager library, by pressing *PF4* and selecting option 9.
4. If you want to set up your work management environment, job descriptions, and pools, see the Administering IBMi for guidance. Otherwise, use the default setup.

IBM i *After Upgrading on IBM MQ for IBM i*

Tasks to perform after you have upgraded IBM MQ for IBM i.

About this task

Satisfy yourself the upgrade has completed successfully.

Procedure

Delete the saved data in the save files in QGPL. This data was saved in "Save IBM MQ data on IBM i" on page 447.

IBM i *Post installation tasks for IBM i*

Tasks to perform after you have installed IBM MQ for IBM i, and before using it.

About this task

When you have correctly installed IBM MQ for IBM i on your system:

Procedure

1. For the latest product information for IBM i, see System requirements for IBM MQ .
2. To install and apply all fix packs, see "Applying maintenance level updates on IBM i" on page 304.
3. Where you have more than one system and a mixture of releases of OS/400 or IBM i, and IBM MQ, you must take care when compiling CL programs. You must compile CL programs either on the system they are to run on, or on one with an identical combination of releases of OS/400 or IBM i, and IBM MQ. When you install later versions of IBM MQ, delete all IBM MQ commands from previous releases in any QSYSVvRrMm libraries using the QSYS/DLTCMD command.
4. If you have not installed IBM MQ on your system before, you must add user profiles to the QMQMADM group profile. Make all user profiles that are to be used for creating and administering queue managers members of the QMQMADM group profile, using the command CHGUSRPRF.

   a) Start the IBM MQ subsystem, by issuing the command:

   ```
   STRSBS SBSD(QMQM/QMQM)
   ```

   Note: The subsystem must be started after each IPL of the system, so you might choose to start it as part of your system startup process.

5. Create the system-default objects. The system-default objects are created automatically when you issue the CRTMQM command to create a queue manager. For example: `CRTMQM MQMNAME(QMGRNAME) ASP(*SYSTEM)`. You can refresh them using the STRMQM command (Warning: this command will replace any existing default objects). For example: `STRMQM MQMNAME(QMGRNAME) RDEFSYS(*YES)`. Refer to the onscreen help for information about using this command.

   Note: on the command `STRMQM MQMNAME(QMGRNAME) RDEFSYS(*YES)`:

   - The command does not re-create the objects, it performs a CRTxxxx REPLACE(*YES) for all of the SYSTEM.* objects.
   - This means that it refreshes the parameters on the objects back to their defaults. So if, for example, on the SYSTEM.DEFAULT.LOCAL.QUEUE object, TRGENBL had previously been changed to *YES, then, when the command is run, it is changed back to TRGENBL(*NO).
   - If any messages exist on a queue, they are left intact, because the queues are not physically deleted.
   - The contents of the SYSTEM.AUTH.DATA.QUEUE are untouched when this command is run.
   - So, if the contents of this (or any other significant queue) become corrupt, it must be physically deleted and re-created either from scratch, or from a backup.

Results

You are now ready to start using IBM MQ for IBM i.

Note: When you install IBM MQ for IBM i, two user profiles are created:

- QMQM
- QMQMADM

These two objects are central to the correct running of IBM MQ for IBM i. Do not alter or delete them. If you do, IBM cannot guarantee correct behavior of your product.

If you uninstall IBM MQ and data, these profiles are deleted. If you uninstall IBM MQ only, these profiles are retained.

IBM i *Migrating a queue manager to a later version on IBM i - alternative method*

An alternative method of migrating a queue manager from an earlier version to a later version

Before you begin

1. Review the IBM MQ system requirements for the later version of the product; see System Requirements for IBM MQ
2. Review any other installed SupportPacs for their applicability to the later version of IBM MQ.

About this task

There are various parts to this form of migration:

1. As part of upgrading the IBM MQ product, carry out the following tasks:
   a. “Preparing to install IBM MQ on IBM i” on page 455
   b. “Install IBM MQ server on IBM i” on page 455
2. Following the IBM MQ product upgrade, carry out the following task:
   a. “Post installation tasks” on page 456

IBM i *Preparing to install IBM MQ on IBM i*

Carry out the following tasks to prepare your system for an upgrade.

Procedure

1. Stop the IBM MQ queue managers by issuing the following command:

   ```
   ENDMQM MQMNAME(*ALL) OPTION(*IMMED) ENDCCTJOB(*YES) RCDMQMIMG(*YES)
   TIMEOUT(30)
   ```

   Ensure that the user profile issuing this command has *ALLOBJ authority.
2. Create a save file for every queue manager library on your system. To do so, issue the command:

   ```
   CRTSAVF FILE(QGPL/ queue_manager_library )
   ```

   where the *queue_manager_library* name consists of the name of the queue manager preceded by QM.
3. Save your queue manager libraries into the save files. To do so, issue the commands:

   ```
   SAVLIB LIB( queue_manager_library ) DEV(*SAVF)
   SAVF(QGPL/ queue_manager_library )
   ```
4. Create a save file for IBM MQ IFS data. To do so, issue the command:

   ```
   CRTSAVF FILE(QGPL/QMUSERDATA)
   ```
5. Save your IBM MQ IFS data, using the command:

   ```
   SAV DEV('/QSYS.LIB/QGPL.LIB/QMUSERDATA.FILE') OBJ('/QIBM/UserData/mqm')
   ```
6. If you are going to run IBM MQ on a new machine, transfer the save files to the new machine.
7. Issue the following command before you upgrade your IBM MQ product, only if the upgrade is required on the same machine.

   a) DLTMQM *QMgrName*

   b) ENDSBS SBS(QMQM) OPTION(*IMMED)

   c) WRKOBJLCK OBJ(QMQM) OBJTYPE(*LIB)

   Relinquish any locks on the system.

IBM i *Install IBM MQ server on IBM i*

Install the IBM MQ server in its primary language and force object conversion.

Before you begin

In either of the following cases, ensure that you have completed the planning and set the system values; see “Configuring and tuning the operating system on IBM i” on page 67

- If you have obtained the product through the Passport Advantage and Passport Advantage Express website, follow the instructions in the EGA.README.txt file.
- If you have obtained the product on disk, follow the instructions within this topic.

About this task

Install the IBM MQ server and force object conversion. Object conversion migrates objects from the older to the newer version. By performing it now, rather than when an object is first used, you avoid slowing down the first use of the upgraded product.

After following the optional step to pre-agree the license, the **RSTLICPGM** command runs without requiring any interactive input. Otherwise the license agreement is displayed for you to accept. See “License requirements” on page 8.

Procedure

1. Sign on to the system with a user profile that has *ALLOBJ special authority, for example QSECOFR.
2. Optionally pre-agree the license terms and conditions by running the command,

   ```
   CALL PGM (QSYS/QLPACAGR) PARM ('5724H72' 'V8R0M0' '0000' 0)
   ```

   Where the parameters of **PARM** are,

   5724H72
   The product identifier for IBM i.

   V10R0M0
   The version, release, and modification level.

   0000
   The option number for the *BASE IBM MQ product option.

   0
   Unused error structure.
3. Install IBM MQ for IBM i, base product, and primary language.

   ```
   RSTLICPGM LICPGM (5724H72) DEV (installation device) OPTION (*BASE) OUTPUT (*PRINT)
   ```

   where the parameters of RSTLICPGM are,

   LICPGM (5724H72)
   The product identifier for IBM i.

   DEV (*installation device*)
   The device from which the product is to be loaded, typically an optical drive, for example, OPT01.

   OPTION (*BASE)
   Install the base IBM MQ for IBM i product.

   Unspecified parameters
   Unspecified parameters such as **RSTOBJ** (*ALL), revert to defaults. The command installs both IBM MQ and the language files for the primary language of your system. For installing additional languages see Installing translated versions.

What to do next

Install any Progam Temporary Fixes (PTF) that have been issued.

To install the IBM MQ samples, see: “Install samples on IBM i” on page 449.

Post installation tasks
Actions required after upgrading IBM MQ.

About this task

Install the samples.

Carry out these steps after installing the product.

Procedure

1. Issue the following commands:
   a) STRSBS SBSD(QMQM/QMQM)
   b) CRTMQM MQMNAME(*QMgrName*) DFTQMGR(*YES)
      You receive the message " IBM MQ queue manager created."
   c) STRMQM MQMNAME(*QMgrName*)
      You receive the message " IBM MQ queue manager '*QMgrName*' started."
2. Issue the following command:

```
STRMQMMQSC SRCMBR(QMgrName) SRCFILE(*CURLIB/QMQSC) OPTION(*RUN)
MQMNAME(QMgrName)
```

3. Reapply IBM MQ Authorities by issuing the command: `CALL PGM(*CURLIB/QMgrName)`
   a) You must compile the CLP as follows:

```
CRTCLPGM PGM(*CURLIB/QMgrName) SRCFILE(*CURLIB/QMAUT) SRCMBR(*PGM)
```

IBM i *Upgrading an entire IBM MQ system on IBM i*

How to upgrade an IBM MQ system on IBM i

Before you begin

Ensure that you have backed up your entire system.

About this task

To upgrade an IBM MQ system on IBM i you carry out a slip installation.

See “Installation methods on IBM i” on page 444 for further information.

Related tasks

“Migrating a queue manager on Windows” on page 390
The procedures for migrating a queue manager to a later version of the product, and for restoring a queue manager to an earlier version of the product are detailed in this section.

IBM i *Migrating an IBM MQ MQI client to the latest version on IBM i*

Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Before you begin

1. Create a migration plan. Use the planning task, “Planning to migrate IBM MQ to a later version on IBM i” on page 442, as a guide.

Procedure

1. Review the IBM MQ system requirements for the later version of the product.

   See System Requirements for IBM MQ.See “IBM MQ components and features” on page 6 and “Where to find downloadable installation images” on page 12.
2. Review all the changes in IBM MQ that affect you.

   See “Changes that affect migration” on page 352.
3. End all IBM MQ activity on the workstation.
4. Upgrade the client.

   To upgrade an IBM MQ MQI client for IBM i installation on a workstation; see “Installing an IBM MQ client on IBM i” on page 80.

What to do next

Complete the tasks in your migration plan, such as verifying IBM MQ MQI client applications work correctly with the latest version.

Related concepts

“IBM MQ MQI client migration” on page 361

IBM MQ MQI client migration is the process of converting IBM MQ MQI client configurations, and client and server channels from one version to another. Client migration can take place after upgrading the IBM MQ MQI client, and is reversible.

Related tasks

"Installing an IBM MQ client on IBM i" on page 80
The IBM MQ client for IBM i is a part of the IBM MQ product.

"Migrating an IBM MQ MQI client on AIX and Linux" on page 433
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

"Migrating an IBM MQ MQI client on Windows" on page 407
Before migrating an IBM MQ MQI client, create a migration plan. Stop all IBM MQ activity on the client workstation. Upgrade the IBM MQ MQI client installation. Make any essential configuration and application changes.

Installing IBM MQ MQI clients on the same machine as the server

IBM i *Migrating from a single instance to a multi-instance queue manager on IBM i*

To migrate a single instance queue manager to a multi-instance queue manager, on IBM i, you must move the queue manager data to a shared directory, and reconfigure the queue manager on two other servers.

Before you begin

You must check the prerequisites for running a multi-instance queue manager as part of this task. Some environments have been tested with multi-instance queue managers, and are known to work. IBM i has been tested with multi-instance queue managers and is known to work. For a list of tested environments, see Testing statement for IBM MQ multi-instance queue manager file systems. The support statement has detailed version and prerequisite information for each environment it lists. Other environments might work; a test tool is provided with IBM MQ to assist you in qualifying other environments.

You must have three servers to run a multi-instance queue manager. One server has a shared file system to store the queue manager data and logs. The other servers run the active and standby instances of the queue manager.

About this task

You have a single-instance queue manager that you want to convert to a multi-instance queue manager. The queue manager conversion itself is straightforward, but you must do other tasks to create a fully automated production environment.

You must check the prerequisites for a multi-instance queue manager, set up the environment and check it. You must set up a monitoring and management system to detect if the multi-instance queue manager has failed and been automatically restarted. You can then find out what caused the restart, remedy it, and restart the standby. You must also modify applications, or the way applications are connected to the queue manager, so that they can resume processing after a queue manager restart.

Procedure

1. Check the operating system that you are going to run the queue manager on, and the file system on which the queue manager data and logs are stored on. Check that they can run a multi-instance queue manager.
   a) Consult Testing statement for IBM MQ multi-instance queue manager file systems. See whether the combination of operating system and file system is tested and capable of running a multi-instance queue manager.

A shared file system must provide lease-based locking to be adequate to run multi-instance queue managers. Lease-based locking is a recent feature of some shared file systems, and in some case fixes are required. The support statement provides you with the essential information.

b) Run **amqmfsck** to verify that the file system is configured correctly.

File systems are sometimes configured with performance at a premium over data integrity. It is important to check the file system configuration. A negative report from the **amqmfsck** tool tells you the settings are not adequate. A positive result is an indication that the file system is adequate, but the result is not a definitive statement that the file system is adequate. It is a good indication.

c) Run the integrity checking application provided in the technote, Testing a shared file system for compatibility with IBM MQ Multi-instance Queue Managers.

The checking application tests that the queue manager is restarting correctly.

2. Configure a user and group to be able to access a share on the networked file system from each server that is running a queue manager instance.

   On IBM i, QMQM, QMQMADM, and any other user profiles that are granted access to the share must have the same passwords on all the servers

3. Set up a directory for the share on the networked file system with the correct access permissions.

   A typical configuration is to set up a single shared directory that contains all data and log directories for all queue managers that use the shared disk; see Share named qmgrs and log directories .

   For example, create a root directory on the share called MQHA that has subdirectories data and logs. Each queue manager creates its own data and log directories under data and logs. Create MQHA with the following properties:

   On IBM i, follow the instructions to create a network share using NetServer.

4. Copy the queue manager data and the logs to the share.

   You can choose to copy files manually, by following the procedure to back up the queue manager. elect one of these methods:

   - Follow the instructions in Backups of IBM MQ for IBM i data, copying the queue manager data to the share. You must use this method if the **DataPath** configuration attribute is specified for this queue manager.
   - Stop the queue manager, and then type the command,

     ```
     hamvmqm /m /dd share\data /dd share\logs
     ```

     Where *share* is to be the location of the data and logs that you created in step "3" on page 459.

5. Update the queue manager configuration information stored on the current queue manager server.

   If you moved the queue manager data and logs by running the **hamvmqm** command, the command has already modified the configuration information correctly for you.

   If you moved the queue manager data and logs manually, you must complete the following steps.

   - On IBM i,

     a. Modify the Log: stanza in the queue manager qm.ini file, which is on the *share*:

     ```
     LogPath= share/logs/QMgrName
     ```

     b. Modify the QueueManager: stanza in the IBM MQ mqs.ini file, which is typically in the /QIBM/UserData/mqm directory on IBM i:

     ```
     DataPath= share/data/QMgrName
     ```

Where, *QMgrName* is the `Directory` name in the `QueueManager:` stanza in the `mqs.ini` file on IBM i. *share* is share where the data and logs are moved to.

6. Add the queue manager configuration information to the new queue manager server.
   a) Run the **dspmqinf** command to display the queue manager information on the server that ran the queue manager in the previous release.

      ```
      dspmqinf -o command QMgrName
      ```

      The command output is formatted ready to create a queue manager configuration.

      ```
      addmqinf -s QueueManager -v Name= QMgrName -v Directory= QMgrName -v
      Prefix=d:\var\mqm Datapath= \share\data\QMgrName
      ```

   b) Create a queue manager configuration on the other server.

      Run the **addmqinf** command copied from the previous output
7. Add the network address of the new server to the connection name in client and channel definitions.
   a) Find all the client, sender, and requester TCPIP settings that refer to the server.

      Client settings might be in Client Definition Tables (CCDT), in environment variables, in Java properties files, or in client code.
      Cluster channels automatically discover the connection name of a queue manager from its cluster receiver channel. As long as the cluster receiver channel name is blank or omitted, TCPIP discovers the IP address of the server hosting the queue manager.

   b) Modify the connection name for each of these connections to include the TCPIP addresses of both servers that are hosting the multi-instance queue manager.

      For example, change:

      ```
      echo DISPLAY CHANNEL(ENGLAND) CONNAME | runmqsc QM1
      ```

      ```
      5724-H72 (C) Copyright IBM Corp. 1994, 2026.  ALL RIGHTS RESERVED.

      Starting MQSC for queue manager QM1.

      1: DISPLAY CHANNEL(ENGLAND) CONNAME

      AMQ8414: Display Channel details.

      CHANNEL(ENGLAND) CHLTYPE(SDR)

      CONNAME(LONDON)
      ```

      Into:

      ```
      echo ALTER CHANNEL(ENGLAND) CHLTYPE(SDR) CONNAME('LONDON, BRISTOL') | runmqsc QM1
      ```
8. Update your monitoring and management procedures to detect the queue manager restarting.
9. Update client applications to be automatically reconnectable, if appropriate.
10. Update the start procedure for your IBM MQ applications to be started as queue manager services.
11. Start each instance of the queue manager, permitting them to be highly available.

    The first instance of the queue manager that is started becomes the active instance.
    Issue the command twice, once on each server.

    ```
    strmqm -x QMgrName
    ```

What to do next

To get the highest availability out of multi-instance queue managers, you must design client applications to be reconnectable and server applications to be restartable; see Application recovery.

Related concepts

Application recovery

Automatic client reconnection

Channel and client reconnection

Multi-instance queue managers

IBM i Multi-instance queue managers on IBM i

Shared file system

Related tasks

Backing up queue manager data

Verifying shared file system locking

Related reference

amqmfsck (file system check)

Multi Changing IBM MQ configuration information on Multiplatforms

Related information

Testing a shared file system for compatibility with IBM MQ Multi-instance Queue Managers

Testing statement for IBM MQ multi-instance queue manager file systems

IBM i *Reverting to a single-instance queue manager on IBM i*

Revert a multi-instance queue manager to a single instance queue manager, on IBM i, by stopping the standby instance. Then restart the active instance and do not set the flag that permits standby instances.

Before you begin

You have at least three servers configured to run a queue manager as a multi-instance queue manager. The queue manager is currently running as a multi-instance queue manager, with one standby instance active.

About this task

The task involves deactivating the active standby so that only the running multi-instance queue manager remains active. To prevent a standby instance being started in the future, you must stop the active instance and restart it. When you restart it, you start it as a single instance queue manager that prevents standby instances being started. The standby instance is stopped as a separate step, to give you the option of restarting the active instance at a later date. You can stop both instances by running the standard endmqm *QMgrName* command on the server running the active queue manager.

Procedure

1. Stop the standby queue manager instance.

   On the server running the standby instance:

   ```
   ENDMQM MQMNAME (QMgrName) *WAIT
   ```

2. Stop the active queue manager instance.

   On the server running the active instance:

   ```
   ENDMQM MQMNAME (QMgrName) *WAIT
   ```

3. Restart the queue manager, preventing standbys.

   On the server that is going to run the queue manager:

```
STRMQM MQMNAME (QMgrName)
```

What to do next

You might want to run the queue manager as a single instance on the same server as the queue manager data.

When the queue manager is stopped move the queue manager data back to the server that is running the queue manager. Alternatively install IBM MQ, and then move the queue manager configuration definition onto the server with the queue manager data. Both tasks are variations of steps in “Migrating from a single instance to a multi-instance queue manager on IBM i” on page 458 to create a multi-instance queue manager.

z/OS Migrating IBM MQ on z/OS

Migration tasks associated with z/OS are grouped in this section.

Related concepts

“Migration concepts and methods” on page 356
An overview of the various concepts and methods for migrating from one release of the product to another.

“Migration paths” on page 353
An overview of the migration paths between different IBM MQ versions. For some IBM MQ for z/OS migration paths, you can revert to the version you were using prior to migration. For IBM MQ for Multiplatforms, you cannot easily revert to a previous version.

Related tasks

“Migrating IBM MQ on IBM i” on page 441
IBM MQ migration tasks associated with IBM i are grouped in this section.

“Migrating IBM MQ on AIX and Linux” on page 416
Migration tasks associated with AIX and Linux platforms are grouped in this section.

“Migrating IBM MQ on Windows” on page 388
IBM MQ migration tasks associated with Windows platforms are grouped in this section.

Related reference

“Changes that affect migration” on page 352

Related information

WebSphere MQ Support, Migration PTFs

z/OS *Upgrade and migration of IBM MQ on z/OS*

You can install new releases of IBM MQ to upgrade IBM MQ to a new version, release or modification (VRM) level. Running a queue manager at a higher level to the one it previously ran on requires migration.

When you install a new level of IBM MQ on z/OS using SMP/E, it creates a set of IBM MQ libraries. The libraries for different levels of IBM MQ can coexist on the same instance of z/OS, allowing you to run different queue managers against different levels of IBM MQ on the same z/OS LPAR.

If you start a queue manager running on a later release level, then migration of the queue manager to that release level is required, even if the difference is only in the modification level, some migration might be required. The migration tasks that you must perform to migrate from one version to another are documented in “Planning to migrate IBM MQ for z/OS to IBM MQ for z/OS 10.0” on page 464; see also “Changes that affect migration” on page 352.

Supported migration paths

Direct migration to IBM MQ for z/OS 10.0.0 is supported from IBM MQ for z/OS 9.3.0 and later, including all Continuous Delivery (CD) releases.

Migration from releases earlier than IBM MQ for z/OS 9.3.0, such as IBM MQ for z/OS 9.2.0, to IBM MQ for z/OS 10.0.0 is supported using the process described in “Migrating from earlier unsupported releases of IBM MQ for z/OS ” on page 463.

Backwards migration

Migration from IBM MQ for z/OS 9.3.0 or IBM MQ for z/OS 9.4.0 to IBM MQ for z/OS 10.0.0 Long Term Support (LTS) or IBM MQ for z/OS 10.0.0 Continuous Delivery (CD) releases are reversible; this reversal process is known as backwards migration.

Backwards migration is only supported if a queue manager was previously migrated.

Notes:

1. There is no longer a need to install migration and coexistence PTFs to enable backwards migration. The backwards migration process for IBM MQ for z/OS 10.0.0 is described in “Reverting a queue manager to a previous version on z/OS” on page 472.
2. Migration from a CD release, such as IBM MQ for z/OS 9.4.5 to IBM MQ for z/OS 10.0.0 LTS or CD is not reversible, neither is migration to a CD release, unless that CD release is IBM MQ for z/OS 10.0.0 CD.
3. Migration from releases earlier than IBM MQ for z/OS 9.3.0 is not reversible; see “Migrating from earlier unsupported releases of IBM MQ for z/OS ” on page 463.

Related concepts

“Queue manager coexistence” on page 372
Queue managers, with different names, can coexist on any server as long as they use the same IBM MQ installation. On z/OS, AIX, Linux, and Windows, different queue managers can coexist on the same server and be associated with different installations.

“Migration methods on IBM MQ for Multiplatforms” on page 363
There are three main methods of migrating from one release to another: Single-stage migration (called a slip installation on IBM i), side-by-side migration, and multi-stage migration. Multi-stage migration is not an option for IBM i.

z/OS *Migrating from earlier unsupported releases of IBM MQ for z/OS*

IBM MQ for z/OS 10.0 supports migration of queue managers that previously ran at IBM MQ for z/OS 9.3 or later.

Migrating from a release earlier than IBM MQ for z/OS 9.3

Migrating from a release earlier than IBM MQ for z/OS 9.3, for example, IBM MQ for z/OS 9.2 or IBM MQ for z/OS 9.1, requires a multi-stage migration.

Firstly, you must migrate the earlier release of IBM MQ to IBM MQ for z/OS 9.3 or IBM MQ for z/OS 9.4, following the instructions given in the documentation for that release. For more information about where to find the documentation for older versions of the product, see Documentation for older versions of IBM MQ.

You can then migrate to IBM MQ for z/OS 10.0 following the instructions in “Migrating IBM MQ for z/OS - order of tasks” on page 466.

Important: Ensure that your system is stable at IBM MQ for z/OS 9.3 or IBM MQ for z/OS 9.4, before migrating to IBM MQ for z/OS 10.0, so that you have a system to revert to, if necessary.

z/OS *Planning to migrate IBM MQ for z/OS to IBM MQ for z/OS 10.0*

Create a plan for migrating IBM MQ for z/OS to IBM MQ for z/OS 10.0.

Before you begin

If there are concepts about migration you do not understand, see “Migration concepts and methods” on page 356.

About this task

Use the following steps as a guide to creating your own plan to migrate your queue managers to IBM MQ for z/OS 10.0. Incorporate the task to migrate a queue manager, “Migrating IBM MQ for z/OS - order of tasks” on page 466, into your plan.

Migration plan overview for your enterprise	
Migration phase	**Required tasks**
Phase I, before migration.	Prepare each queue manager in your enterprise for migration. See “Preparing to migrate a single IBM MQ for z/OS queue manager” on page 467 for further information.
Phase II, migrate each single queue manager in the order listed.	Carry out this process for each queue manager. For queue managers in a cluster, migrate full repository queue managers before migrating any partial repository queue managers.
Phase III, post migration.	See “Post migration tasks” on page 475 for further information.

Procedure

1. Review the IBM MQ system requirements for IBM MQ for z/OS 10.0.
   See System requirements for IBM MQ.
2. Review all the changes in the product that affect you.
   For more information, see What's new and changed in IBM MQ for z/OS 10.0.0.
3. Review performance changes.
   See IBM MQ - Performance documents.
4. Plan the sequence and timing of queue manager migrations.
   - Check that any products using the queue managers support IBM MQ for z/OS 10.0.
   - If the queue manager is a member of a queue manager cluster, you must consider the order of migration of queue managers in the cluster; see “Migrating a queue manager cluster” on page 478.
   - Queue managers in a QSG, and queue managers in a cluster can be migrated in parallel, but at any time there should be enough queue managers working in the QSG, and cluster, to ensure that your business can operate satisfactorily while a staged migration takes place. See “Queue sharing group migration” on page 465.
5. Plan to update any manual or automated procedures you have written with changes to messages and codes.
6. Plan to update applications that might be affected by changes.
   Consider whether the application must be able to run on both the previous version and IBM MQ for z/OS 10.0. You might be able to change the application to be compatible with both code levels. If

you cannot, you can query the queue manager command level, and make the code conditional on the command level. Call `MQINQ` setting the `MQIA_COMMAND_LEVEL` selector.

7. Decide on what regression tests to perform after migrating.

   Include the procedures and applications you identified in steps "5" on page 464 and "6" on page 464 in your regression tests.
8. Plan to migrate other vendor software, such as WebSphere Application Server, or CICS to use the later version.
9. Review any other installed SupportPacs for their applicability to IBM MQ for z/OS 10.0.

What to do next

Perform the steps in your plan.

About the CICS-MQ adapter
IBM MQ Support, Migration PTFs
IBM MQ - SupportPacs by Product

z/OS *Queue sharing group migration*

Although you can include queue managers from different IBM MQ for z/OS versions in a queue sharing group, you should migrate all queue managers in a queue sharing group to the newest version as quickly as you can.

Queue sharing groups can contain queue managers with a restricted set of different versions. This is supported so that you can migrate and test the upgrade of each queue manager.

When you migrate queue managers in a queue sharing group, migrate all the queue managers to the new version as quickly as you can. Queue sharing groups with queue managers at different versions are harder to administer than if all the queue managers are at the same version.

Before you migrate any member of a queue sharing group, you must upgrade the early code on each LPAR that runs a member of the queue sharing group. The early code on each LPAR must be upgraded to the highest level of IBM MQ that you are migrating to. For more information, see step "2" on page 467 of "Preparing to migrate a single IBM MQ for z/OS queue manager" on page 467.

Migrate each queue manager, one at a time, leaving the queue sharing group running. At no stage is an outage of the entire queue sharing group required.

Migrating each queue manager comprises the bulk of the work of migrating a queue sharing group. Approach migrating a queue sharing group as requiring some extra tasks that must be completed during the migration of each queue manager. These tasks are listed in "Migrating IBM MQ for z/OS - order of tasks" on page 466 as part of the procedure to migrate a single queue manager.

A good approach is to create a migration plan that incorporates queue sharing group migration. For more information, see "Planning to migrate IBM MQ for z/OS to IBM MQ for z/OS 10.0" on page 464.

Queue managers that run at IBM MQ for z/OS 9.3.n, 9.4.n, and 10.0.n LTS and CD releases (where n is greater than or equal to 0) can coexist in a queue sharing group.

When you plan a migration, refer to Queue sharing group coexistence on z/OS to determine whether your queue sharing group supports the migration of your queue manager.

Related reference

"Queue sharing group coexistence on z/OS" on page 380
Queue managers running on IBM MQ for z/OS 10.0, or any of the IBM MQ for z/OS 10.0.x Continuous Delivery (CD) releases, can be part of a QSG with queue managers running on IBM MQ for z/OS 9.3.0 or

later. This applies to any combination of CD and Long Term Support (LTS) releases from IBM MQ for z/OS 9.3.0.

z/OS *Migrating IBM MQ for z/OS - order of tasks*

Perform these instructions, in the order shown, to migrate a single IBM MQ for z/OS queue manager.

Before you begin

Review "Planning to migrate IBM MQ for z/OS to IBM MQ for z/OS 10.0" on page 464.

About this task

This topic lists the tasks required in each part of the process to migrate a single IBM MQ for z/OS queue manager, and the order in which these tasks must be done.

Note: You must perform the tasks in the following order:

1. Before migration
2. Migrating to the next release
3. Post migration tasks

Procedure

Before migration

- Before migration, complete the following tasks:
  a) Make your existing queue manager ready for migration
  b) Install IBM MQ for z/OS 10.0
  c) Perform a backup operation
  d) V 10.0.0 V 10.0.0
  Migrate the Db2 tables if using queue sharing groups
  e) Bind and grant execute authority for the Db2 plans if using queue sharing groups
  f) Run CSQ5PQSG, if using queue sharing groups
  g) Update the STEPLIB concatenations for Batch, TSO, and RRS applications
  h) Define the data set and update the queue manager start up JCL If you are planning to define a QMINI data set.
  i) Update the libraries you added to connect CICS to the queue manager
  j) Update the libraries for the operations and control panels to the latest version IBM MQ libraries
  k) Update system libraries to format IBM MQ dumps using the Interactive Problem Control System (IPCS)
  l) Consider the migration of other server applications
  m) Prepare the mqweb server for migration

Migrating to the next release

- To migrate to the next release, complete the following tasks:
  a) Update the initialization input data sets
  b) Stop or disconnect all the applications using the queue manager
  c) Stop the queue manager and its channel initiator
  d) Update STEPLIB for the queue manager and the channel initiator
  e) Update the queue manager startup JCL to add the CSQMINI DD card
  f) If using a CipherSpec for a channel with SSLCIPH set to its direct hexadecimal value, for example 009D, update the channel initiator startup JCL to enable the relevant protocol .

g) If migrating from IBM MQ 9.3.0 or earlier, increase the MEMLIMIT parameter in the channel initiator JCL to a minimum of 2G.

h) Start the queue manager and channel initiator

i) Test that everything is working correctly. If a problem occurs, revert the queue manager to a previous version

j) Optionally, migrate the mqweb server

Post migration tasks

- After migration, complete the following tasks:

a) Check the changes in behavior

b) Modify the backup jobs to refer to the target version of IBM MQ libraries

c) Update the ZPARM module, if required

d) Perform a full regression test

e) Migrate client applications

f) Exploit the new functions provided by the migrated queue manager

g) Optionally, stop the mqweb server for previous versions

z/OS *Preparing to migrate a single IBM MQ for z/OS queue manager*

Review the z/OS and IBM MQ customization steps, and change any customizations before starting any queue managers at IBM MQ for z/OS 10.0. Follow the steps to prepare a single IBM MQ queue manager on z/OS for migration.

Before you begin

You can continue to run the queue manager on the previous version until it is ready to switch to IBM MQ for z/OS 10.0. Preparing for the switch can be a long process. Switching from the earlier version to IBM MQ for z/OS 10.0 is a quick process. The switch to IBM MQ for z/OS 10.0 occurs when you restart the queue manager using the IBM MQ for z/OS 10.0 libraries.

Tips:

1. To migrate applications, or the queue manager, when moving to a new release of IBM MQ, without changing STEPLIB, create data set aliases such as `MQM.qmgr.SCSQLOAD`, and reference them in JCL.

   Map the aliases to the real data sets, such as `MQM.MQV1000.SCSQLOAD`.
2. You can use the z/OS command `D GRS,SYSTEM,RES=(*,MQM.V1000.SCSQLOAD)` to display which jobs are using the specified data set, and so identify which jobs and JCL need to be changed.

About this task

The steps are based on the setup procedure for new queue managers; see Customizing your queue managers.

To prepare to migrate an IBM MQ queue manager on z/OS, complete the following steps.

Procedure

1. **Make your IBM MQ configuration ready for migration.**

   Apply the latest maintenance to the current version libraries. See the Preventive Service Planning (PSP) bucket for your version of IBM MQ; see PSP Buckets - How to find them on Web.
2. **Install IBM MQ for z/OS 10.0, and make target libraries available to all z/OS systems that are running queue managers, and grant access.**

   Complete the following sub-steps for each z/OS system. If migrating a member of a queue sharing group, upgrade the early code on all LPARs that host a member of the group, before you migrate any members of the group.

a) Copy the IBM MQ target libraries to the system, and install the early code for IBM MQ for z/OS 10.0 (once for each z/OS system).

b) APF authorize the load libraries and grant access to the data sets using your external security system.

See APF authorize the IBM MQ load libraries for more information.

Ensure that the APF lists in SYS1.PARMLIB are updated to ensure that any changes made dynamically remain in effect after an IPL.

c) Make the IBM MQ for z/OS 10.0 early code and target libraries available on each z/OS system that is running queue managers.

This involves updating the LPA; see Update the z/OS link list and LPA for more information.

Once this is done, the following message is displayed in the job log of all queue managers when they start up, indicating they are using the most recent version of early code:

```
CSQ3111I <cpf> CSQYSCMD - EARLY PROCESSING PROGRAM IS V10.0.0 LEVEL 010-000
```

If you are using Advanced Message Security (AMS), also add CSQ0DRTM to the LPA as described in the previous link.

d) Copy the file system zFS and mount it read only.

You only need zFS if one of the following is installed:

- IBM MQ for z/OS UNIX System Services Components
- IBM MQ for z/OS Managed File Transfer
- IBM MQ for z/OS UNIX System Services Web Components
- IBM MQ for z/OS Connector Pack

See the Program Directory for further information. For download links for the Program Directories, see IBM MQ for z/OS Program Directory PDF files.

3. **Perform a back up operation for each queue manager in your enterprise, so that you have a copy of all objects and JCL before you make any changes.**

This makes rolling back to the current system easier, if you need to do so.

a) Back up your IBM MQ defined objects, for example using CSQUTIL COMMAND MAKEDEF(..)

See Using the COMMAND function of CSQUTIL for more information.

b) Back up:

- Started task procedures for the queue manager, channel initiator and, if applicable, the AMS address space.
- The Initialization input data sets used in the CSQINP1 and CSQINP2 concatenations
- The system parameter module (ZPARM) libraries
- The JCL libraries containing the configuration definitions for your queue manager
- Other libraries containing queue manager configuration or procedures.

Note: You might also make a back up of page sets, BSDSs, and active logs as a fallback option. See How to back up and recover page sets for more information on backing up IBM MQ resources.

4. V 10.0.0 V 10.0.0
If you are using queue sharing groups, migrate the Db2 tables.

IBM MQ 10.0 introduces a new column into several tables used by queue sharing groups. To add these new columns, customize and run the CSQ459TB sample in hlq.SCSQPROC. The sample contains instructions on how it should be customized and run.

5. **If you are using queue sharing groups, bind, and grant execute authority for the Db2 plans.**

Customize and run the CSQ45BPL and CSQ45GEX samples in hlq.SCSQPROC. Tailor these members to your environment, using your Db2 subsystem names and data set names.

The header information in CSQ45BPL and CSQ45GEX describes how to customize the samples:

- CSQ45BPL of hlq.SCSQPROC contains the plan names required for the latest version of IBM MQ
- CSQ45GEX of hlq.SCSQPROC contains the authorities required

See steps 5 and 6 of Set up the Db2 environment.

6. **If you are using queue sharing groups, run CSQ5PQSG.**

   You must specify the **MIGRATE QSG** or **MIGRATE DSG** function, to verify that all queue managers in the QSG or DSG are at a version that is compatible with IBM MQ for z/OS 10.0.

7. **Update the libraries you added to STEPLIB concatenations, to make Batch, TSO, and RRS adapters available to applications, so that they can always load the highest version IBM MQ library in the system.**

   Change the STEPLIB for the Batch, TSO, and RRS applications to reference the IBM MQ for z/OS 10.0 libraries, then restart the applications.

   See Set up Batch, TSO, and RRS adapters for more information.

   IBM MQ libraries include:

   thlqual.SCSQANL*x*
   This library contains error message information for your national language, where *x* is the language letter:

   - C, for Chinese
   - E, for US English mixed case
   - F, for French
   - K, for Japanese
   - U, for US English uppercase

   thlqual.SCSQAUTH
   This library contains the code that the applications use.

   Notes: You can:

   a. Connect applications that reference IBM MQ for z/OS 10.0 libraries in STEPLIB to a queue manager that is running on IBM MQ for z/OS 10.0 or earlier. You must not connect applications that reference a STEPLIB from an earlier version to a queue manager running on a later version.

   b. Use the following command, replacing *thlqual* with the High Level Qualifier for your installation, to check which jobs are running with the specified library:

   ```
   TSO ISRDDN ENQ 'thlqual.SCSQAUTH'
   ```

   You can then modify the JCL for those jobs accordingly.

8. **If you are planning to define a QMINI data set, define the data set and update the queue manager start up JCL to add CSQMINI DD to point to your QMINI data set.**

9. **Update the libraries you added to connect CICS to the queue manager.**

   You must update the IBM MQ libraries in the STEPLIB and DFHRPL concatenations of your CICS region JCL and restart CICS. You are then able to use the most recent IBM MQ features.

   The connection between IBM MQ and CICS is provided by CICS libraries that you must update. Without this change, you are not able to use the most recent IBM MQ features. You must change the SCSQCICS library in the DFHRPL concatenation provided by IBM MQ, and also the STEPLIB concatenation.

   For each CICS region that is connected to an IBM MQ queue manager, ensure that there is a separate CICS started procedure JCL.

   This ensures that the modification of reference to a certain version of IBM MQ libraries in the CICS started procedure JCL only has impact for that single CICS region. In this way you can migrate one

queue manager, and only the CICS region or regions connected to it, which makes staged migration possible.

CICS STEPLIB has thlqual.SCSQAUTH, and DFHRPL has thlqual.SCSQCICS, thlqual.SCSQLOAD, and thlqual.SCSQAUTH. For more information, see Setting up the CICS - IBM MQ adapter.

Note: You can connect applications that reference IBM MQ for z/OS 10.0 libraries in STEPLIB to a queue manager that is running on IBM MQ for z/OS 10.0 or earlier. You must not connect applications that reference a STEPLIB from an earlier version to a queue manager running on a later version.

10. **Update the libraries for the operations and control panels (CSQOREXX) to the IBM MQ for z/OS 10.0 libraries.**

    For more information, see Set up the operations and control panels.

    Note: You can connect the operations and control panel that references IBM MQ for z/OS 10.0 libraries to the queue manager that is running on IBM MQ for z/OS 10.0, or earlier. You must not connect the operations and control panel that references IBM MQ libraries from an earlier version to a queue manager running on a later version.

11. **Update system libraries to format IBM MQ dumps using the Interactive Problem Control System (IPCS).**

    For more information, see Include the IBM MQ dump formatting member.

12. **Migrate other software to use IBM MQ for z/OS 10.0 libraries.**

    Migrate software such as WebSphere Application Server for z/OS, Liberty, IBM Integration Bus, or IMS.

    a) WebSphere Application Server for z/OS

       If you are running in an application server environment where a bindings connection is being used, you need to update the WAS STEPLIB with IBM MQ libraries.

       See IBM MQ libraries and the WebSphere Application Server for z/OS STEPLIB for further information.

       You also need to configure the IBM MQ messaging provider with native libraries from IBM MQ for z/OS 10.0 of the IBM MQ installation; see Configuring the IBM MQ messaging provider with native libraries for further information.

       Use the latest level of native libraries in z/OS UNIX System Services.

    b) WebSphere Application Server for z/OS Liberty

       If you are running in an application server environment where a bindings connection is being used, you need to update the Liberty STEPLIB to use the updated IBM MQ for z/OS libraries.

       You should also update the *wmqJmsClient.rar.location* variable, and the **wmqJmsClient nativeLibraryPath** attribute, in the Liberty `server.xml` to point to the new path to the z/OS UNIX System Services components feature.

    c) IMS

       For more information, see Setting up the IMS adapter.

    Note: You can connect applications that reference IBM MQ for z/OS 10.0 libraries in STEPLIB to a queue manager that is running on IBM MQ for z/OS 10.0 or earlier. You must not connect applications that reference a STEPLIB from an earlier version to a queue manager running on a later version.

13. **If you have configured the IBM MQ Console or REST API, you might need to prepare the mqweb server for migration.**

    The mqweb server that hosts the IBM MQ Console and REST API can only connect directly to queue managers at the same version of IBM MQ.

    If you only have one queue manager on the z/OS system, you do not need to do anything now. You can migrate the existing mqweb server at the same time as the queue manager.

If you have more than one queue manager on the z/OS system, that will be running at different versions of IBM MQ during migration, create a new mqweb server at the latest level.

a) Create a new mqweb server by following the procedure in Create the mqweb server.

b) Create a started task procedure for the new mqweb server by following the procedure in Create a procedure for the mqweb server.

c) Copy any relevant configuration settings from the `mqwebuser.xml` configuration file of the existing server to the `mqwebuser.xml` file of the new mqweb server.

The `mqwebuser.xml` file is in the *`WLP_user_directory`*`/servers/mqweb` directory, where *WLP_user_directory* is the directory that was specified when the **crtmqweb** script ran to create the mqweb server definition.

Configure the new server to use different HTTP and HTTPS ports to any existing servers.

d) Start the new mqweb server by issuing the MVS **START procname** command, where *procname* is the name of the new mqweb server started task procedure.

Results

You have prepared your IBM MQ queue manager on z/OS for migration.

What to do next

Follow the instructions in "Migrating a single IBM MQ z/OS queue manager to IBM MQ for z/OS 10.0" on page 471 to migrate the queue manager.

z/OS *Migrating a single IBM MQ z/OS queue manager to IBM MQ for z/OS 10.0*

Before you begin

This task assumes that you have completed the task "Preparing to migrate a single IBM MQ for z/OS queue manager" on page 467.

About this task

To migrate an IBM MQ queue manager on z/OS to IBM MQ for z/OS 10.0, complete the following steps.

Procedure

1. **Update the initialization input data sets.**

   Each IBM MQ queue manager gets its initial definitions from a series of commands contained in the IBM MQ initialization input data sets. These data sets are referenced by the Data Definition (DD) names CSQINP1, CSQINP2, and CSQINPT defined in the queue manager started task procedure. The channel initiator started task procedure has a similar data set referenced by the CSQINPX DD name.

   See Customize the initialization input data sets for more information on the initialization input data sets.

   The samples supplied for the initialization input data sets can change between versions of IBM MQ. You must review the customization you have made previously to CSQINP1, CSQINP2, CSQINPT, and CSQINPX, and merge them into the initial definitions provided with the latest version of the product.

2. **Stop or disconnect all the applications using the queue manager, and the IBM MQ channels that are connected to other queue managers.**

   For example, stop or disconnect CICS, IMS, or batch applications.

3. **Stop the queue manager and its channel initiator.**

4. **Update the STEPLIB for the queue manager, channel initiator, and (if appropriate) AMS.**

   Update the STEPLIB so that started task procedures can use the IBM MQ for z/OS 10.0 libraries.

5. **Update the queue manager startup JCL to add the CSQMINI DD card.**

See The QMINI data set.

6. Deprecated **If any channels running to or from the queue manager specify a hexadecimal value directly as their SSLCIPH value, you must update the channel initiator startup JCL to include DD cards to enable the relevant protocol for that CipherSpec.**

   See Deprecated CipherSpecs.

7. **If migrating from IBM MQ 9.3.0 or earlier, increase the value of the MEMLIMIT parameter in the channel initiator JCL to a minimum of 2G.**

   See Storage configuration.

8. **Start the queue manager and its channel initiator.**

9. **Test that everything is working correctly.**

   If there is a problem starting the queue manager, consider reverting the queue manager. See Reverting a queue manager to a previous release.

10. **If you have configured the IBM MQ Console or REST API, migrate the mqweb server.**

    If you only have one queue manager on the z/OS system, migrate the mqweb server to IBM MQ for z/OS 10.0.

    a) Stop the mqweb server started task.

    b) Edit the mqweb server started task.

    - Change STEPLIB to reference the IBM MQ for z/OS 10.0 libraries.
    - Change INSTDIR, PATH and LIBPATH to reference IBM MQ for z/OS 10.0 files in z/OS UNIX System Services.
    - Review JAVA_HOME, and make sure that it references the IBM Semeru Runtime 21 or later.

    For more information on configuring the mqweb server started task procedure, see Create a procedure for the mqweb server.

    c) Ensure that the mqweb server is associated with the correct product ID, see Associating the mqweb server with a PID.

    d) Start the mqweb server started task.

    e) Test that the queue manager can be accessed in the IBM MQ Console and REST API.

    If you have more than one queue manager on the z/OS system, running at different versions of IBM MQ, you should already have created a new mqweb server at the latest level. Use the new mqweb server to access queue managers that have been migrated to IBM MQ for z/OS 10.0. You might need to change the HTTP host name or port used by applications that use the REST API.

Results

You have migrated your IBM MQ for z/OS queue manager to the latest release.

What to do next

Follow the instructions in “Post migration tasks” on page 475 to complete the migration process.

z/OS *Reverting a queue manager to a previous version on z/OS*

After migrating to IBM MQ for z/OS 10.0.0 LTS or IBM MQ for z/OS 10.0.0 CD, from either IBM MQ for z/OS 9.4.0 or IBM MQ for z/OS 9.3.0, you can backward migrate, or fallback, to the version you were using prior to migration, using the **BACKMIG** option on the **START QMGR** command. Backwards migration is not supported for a CD release such as IBM MQ for z/OS 9.3.5.

Before you begin

Certain function available in IBM MQ for z/OS 10.0 can affect the ability to backwards migrate. These functions are not enabled by default, but if you have enabled these functions, you need to disable them prior to performing backwards migration.

You should not exploit new IBM MQ for z/OS 10.0 functions, until you are sure that you will not need to perform backwards migration.

Migrating back to IBM MQ for z/OS 9.4.0

Before performing backwards migration the following changes might be needed.

Any channels that have been adjusted to have a CONNAME longer than 48 characters must be changed to use a CONNAME less than or equal to 48 characters. If the CONNAME is not changed, then backwards migration of the channel results in the CONNAME being replaced with blank characters, and the message CSQY046I (see Initialization procedure and general services messages (CSQY...)) is issued. Before using the channel, the CONNAME needs to be updated to a suitable value, for example an IP address or a shorter hostname.

If IgnoreSeqNumberMismatch (see The QMINI data set) has been set in the QMINI data set, then the channels stanza needs to be removed from the data set.

The OTELTRAC and OTELPCTL parameters no longer apply and, for private and copy object definitions and the queue manager object, the new options are deleted at the point of backwards migration. Any shared queues with OTELPCTL(AUTO) defined should be changed back to OTELPCTL(QMGR) to prevent inconsistencies in behavior across the queue sharing group.

If the value of OUTBUFF (see Using CSQ6LOGP) has been increased beyond 4000, it should be changed back to 4000 and the system parameters recompiled.

Migrating back to IBM MQ for z/OS 9.3.0

Information described in the preceding **Migrating back to IBM MQ for z/OS 9.4.0** section applies.

When migrating back to IBM MQ for z/OS 9.3.0, the first-class **CAPEXPRY** attribute no longer applies to any object definitions, and is deleted at the point of backwards migration. If you want to maintain these **CAPEXPRY** values, identify any objects with the first-class **CAPEXPRY** attribute set, and revert to using the **CUSTOM** attribute before migrating.

For example, if `MY.QUEUE` has a **CAPEXPRY** value of 5000:

```
ALTER QL(MY.QUEUE) CAPEXPRY(NOLIMIT) CUSTOM('CAPEXPRY(5000)')
```

Attention: It is not a supported configuration to leave the first-class **CAPEXPRY** attribute set on a shared object if any queue managers in the queue sharing group are being backwards migrated. This configuration might lead to both the first-class **CAPEXPRY** and **CUSTOM CAPEXPRY** attributes being set at the same time.

In this instance, the first-class attribute is always used by the queue managers that do support it, and the **CUSTOM** attribute is used by those that do not. Therefore, if any queue managers are being backwards migrated, only the **CUSTOM CAPEXPRY** value should be set, to avoid confusion.

About this task

A queue manager can only be backwards migrated if it outputs the CSQY039I message at start up. In this case you can use the information in this topic to perform the backwards migration.

Backwards migration is normally only performed immediately after a migration fails for some reason. However, it is possible to perform backwards migration at any time if the CSQY039I message is output at queue manager start up.

Notes:

- After performing a `START QMGR BACKMIG(vrm)`, the queue manager is ready to be started at the specified level.

  If, instead, you start the queue manager at a higher version level than was specified for the **BACKMIG** operation, the queue manager forward-migrates the queue manager to the higher version, and it is no longer possible to backwards migrate unless you repeat the `START QMGR BACKMIG` operation.
- The **BACKMIG** operation makes direct changes to the page sets of IBM MQ and the objects stored on them. This means that you can restart the queue manager at the specified **BACKMIG** version, even if an IPL occurs before queue manager restart, or if the queue manager is started on a different LPAR.

If a queue manager issues the CSQY040I message at start up, backwards migration is not supported, and the procedure described in the following text is not applicable. If you have a back up of the queue manager data, prior to the migration, you could use that data to start the queue manager up at the earlier release.

Procedure

1. Ensure that the queue manager does not have any offline page sets.

   If it does, use the command **CSQUTIL FORMAT** to bring the page sets back online.
2. Shut the queue manager down cleanly.
3. Run the command `START QMGR BACKMIG(vrm)` where *vrm* is the version, release and modifier value of the release previously migrated from, for example `930`.

   This value is output in the CSQY039I message at queue manager start up.

   Attention: You need to remove the period characters from the message output.

   You should include the **PARM** parameter, if it is used usually with the **START QMGR** command.

   The queue manager starts up, rewrites its data in a format suitable for backwards migration, and shuts down. If the command processes successfully, the CSQY045I message is output.

   If the CSQY043E message is output, examine the messages displayed to resolve the problem and retry the command again.
4. Switch back to use the MSTR and CHINIT started procedure JCLs with the IBM MQ for z/OS 9.4.0 or IBM MQ for z/OS 9.3.0 libraries, as required.

   If data set aliases are being used for load libraries, switch the aliases to refer to the IBM MQ for z/OS 9.4.0 or IBM MQ for z/OS 9.3.0 libraries.

   For example, an alias named `MQM.MQP1.SCSQLOAD`, referring to `MQM.MQV100.SCSQLOAD`, needs to be changed to refer to `MQM.MQV940.SCSQLOAD` or `MQM.MQV930.SCSQLOAD`, as required.
5. Revert to using the system parameter module (CSQZPARM) with IBM MQ for z/OS 9.4.0 or IBM MQ for z/OS 9.3.0, prior to migration, and linking to the IBM MQ for z/OS 9.4.0 or IBM MQ for z/OS 9.3.0 code, as required.
6. Verify the backwards migration by starting the queue manager, channel initiator and, listener or listeners separately.
7. Check for, and resolve, any errors that occur during start up.

   Once all three components start up cleanly, you can combine the start up of the three components, if required.
8. Verify correct functioning of existing applications.

Results

Your queue manager will now be running at the version of code it was originally migrated from.

Note: It is not necessary to revert the early code to the previous version, for this installation, when reverting your queue manager to an earlier version.

Early code refers to the IBM MQ load modules that must be loaded into the Link Pack Area (LPA) for IBM MQ to act as a z/OS subsystem. When a command is issued to a queue manager, or when an application connects to a queue manager, the first action taken by the IBM MQ system is to load the early code.

The LPA must contain the IBM MQ early code modules from the latest version of IBM MQ running on the system. For example, if an IBM MQ for z/OS 10.0 and IBM MQ for z/OS 9.4.0 queue manager run on the same system, the early code for IBM MQ for z/OS 10.0 must be loaded in the LPA.

For more information, see Early code.

Related information

START QMGR (start queue manager) on z/OS

z/OS *Post migration tasks*

Follow the steps to perform the tasks you need to carry out after migrating a single IBM MQ queue manager on z/OS.

About this task

After you have migrated an IBM MQ queue manager on z/OS you need to carry out the detailed steps in this topic, using the links within this overview.

1. Check the changes in behavior; see step "1" on page 475.
2. Modify the backup jobs to refer to the target version of IBM MQ libraries; see step "2" on page 475.
3. Update the ZPARM module if you have not already done so before starting the queue manager; see step "3" on page 475.
4. Perform a full regression test; see step 4.
5. Migrate client applications; see step 5.
6. Exploit the new functions provided by the migrated queue manager; see step 6.
7. Optionally, stop the mqweb server for previous versions; see step 7.

Procedure

1. Check the changes in behavior made by default configuration changes.

   The default values of some properties might have been changed in the new version, which can lead to changes in behavior.
2. Modify backup and other administrative jobs, such as jobs to backup IBM MQ objects and channel authentication records, and MAKEDEF jobs.

   For example using CSQUTIL COMMAND MAKEDEF(..); see Using the COMMAND function of CSQUTIL to refer to the target version of IBM MQ libraries.
3. Update the system parameter (ZPARM) module if required.

   Note the following:

   - You should review changes to the ZPARM parameters between the version you have migrated from, and IBM MQ 10.0.0.
   - If you need to change the value of any parameters, you should generate a new ZPARM at this point. Do this by:

     a. Tailoring the ZPARM sample to use the new IBM MQ libraries

     b. Updating values for the parameters as necessary, and

     c. Recompiling, to generate the new ZPARM.
   - You do not have to recompile the ZPARM, if you do not change the values of any parameters.
4. Perform a full regression test.
5. Migrate client applications.

   Client applications can be considered any time throughout the migration phase.

Clients are backwards and forwards compatible. It is advisable to migrate the client libraries to the same, or later, level as the queue manager, so that the latest function is available.

6. Exploit new functions provided by the migrated queue manager.

   Your queue manager has been fully migrated to a new version level, so you can now take benefit of new capabilities.

   However, note that additional configuration might be required to enable selected new features.

   Review What's new and changed in IBM MQ 10.0 and check which features best serve your business needs. Plan your action to develop new applications, or changing configurations, to enable those features.
7. If you created a new mqweb server for the latest version, you can stop the mqweb server for any previous versions when all queue managers on the z/OS system have been migrated to the latest version.

Results

You have completed the migration of a single IBM MQ for z/OS queue manager.

z/OS *Migrating a Managed File Transfer for z/OS installation to the next version of the product*

Follow these instructions to migrate an IBM MQ Managed File Transfer for z/OS installation to IBM MQ for z/OS 10.0.

Migration process

The process of migrating MFT to a new version is:

1. Install IBM MQ for z/OS 10.0, including the MFT component.
2. Perform a controlled shutdown of all of the agents in your topology:
   a. For agents that are administered using JCL, you can do this by running the BFGAGSP member within the agent's data set
   b. For agents that are being administered using z/OS UNIX, run the command **fteStopAgent** *agent_name*.
3. Stop your loggers:
   a. If your logger is being administered using JCL, run the BFGLGSP member within the logger's data set.
   b. For loggers that are administered using z/OS UNIX, run the command **fteStopLogger** *logger_name*
4. For each agent or logger that is being administered by JCL:
   a. Copy the SCSQFCMD data set from the IBM MQ for z/OS 10.0 installation into a new data set specific to that agent or logger.
   b. Edit the BFGCUSTM member inside the data set, and set the parameters enclosed within ++ characters to the appropriate values.
   c. Run BFGCUSTM inside the copy of the data set. This generates a new set of JCL that can be used to administer the agent or logger.
   d. Start the agent or logger again by running either the BFGAGST or BFGLGST member within the data set.
5. For each agent or logger that is being administered from z/OS UNIX:
   a. The **fte*** commands used to administer the agent or logger are located in a `mqft/bin` directory under the IBM MQ for z/OS UNIX System Services Components install; for example: `/mqm/V10R0M0/mqft/bin`.

      You need to adjust any scripts calling these commands, to take account of this change.

b. Additionally, you might need to update the STEPLIB environment variable if the queue manager has been migrated at the same time.

   This variable might be set in a `.wmqfterc` file as described in Environment variables for MFT on z/OS.

c. Finally, you need to set the BFG_DATA environment variable to the same value as it was before, to ensure the agent or logger has access to its existing configuration.

   This variable might be set in a `.wmqfterc` file as described in Environment variables for MFT on z/OS.

d. Start the agent or logger again

Related tasks

Using Managed File Transfer for z/OS

z/OS *Adding a new queue sharing group to an existing Db2 data sharing group that is used by existing queue sharing groups*

Follow these steps to add a new queue sharing group, containing queue managers running at IBM MQ for z/OS 10.0, to a Db2 data sharing group used by existing queue sharing groups, running at earlier versions of IBM MQ for z/OS.

Before you begin

Ensure all queue managers in the existing queue sharing groups have the latest versions of maintenance applied, including all migration and coexistence PTFs that are applicable.

For example, if the existing queue sharing groups contain a mixture of IBM MQ for z/OS 9.1, 9.2 and 9.3 queue managers, the IBM MQ for z/OS 9.1 queue managers should have the migration and coexistence PTFs that allow them to coexist with 9.2 and 9.3 queue managers.

Note: There are no migration and coexistence PTFs specific to IBM MQ for z/OS 9.2 or higher.

About this task

A Db2 data sharing group can be used by multiple different queue sharing groups, running a variety of different versions of IBM MQ for z/OS.

All the different queue sharing groups will share the same set of IBM MQ related tables, and these tables must use the definitions provided by the highest version of IBM MQ using the Db2 data sharing group, which in this case will be IBM MQ for z/OS 10.0.

Procedure

Follow the instructions in Configuring the queue sharing group with the exception that the steps in Set up the Db2 environment need to be changed as follows:

- Steps 1 to 4 are not needed because the IBM MQ database and tables already exist.
- V 10.0.0 V 10.0.0
  IBM MQ 10.0 adds new columns to two of the existing tables. To accommodate this, you must customize and run the sample JCL CSQ459TB in thlqual.SCSQPROC.
- Steps 5 and 6 are run as normal to bind the latest plans, and grant access to them.

OpenShift CP4I-SC2 CD Migrating IBM MQ to a CP4I container

The key steps to migrate an existing IBM MQ queue manager into a container environment using the IBM Cloud Pak for Integration container for IBM MQ.

About this task

This scenario is documented here: Migrating IBM MQ to a CP4I container scenario

Migrating a queue manager cluster

You can migrate queue managers in a cluster all at once, or one at a time, which is called a staged migration. Migrate full repository queue managers in a cluster before partial repository queue managers. You must consider what the effect is of migrating some queue managers in a cluster, before all the queue managers are migrated.

Before you begin

Before starting the migration, check that no cluster-specific migration issues are identified for the migration you are intending to perform.

Consider the following issues that relate to migrating a queue manager cluster:

- Minimizing application outages.
- Measuring and verifying migration success and planning for backward migration if there are any migration problems.
- Taking advantage of new IBM MQ features
- Managing the migration of a cluster in the context of the wider IBM MQ network and the systems architecture of your organization.

About this task

Cluster queue managers can participate in clusters with other queue managers running at different versions, which is why a staged migration is possible. Being able to stage a migration is important, as migrating each queue manager in a cluster takes time. By staging the migration, which leaves other queue managers that are in the cluster running, you reduce the effect of queue manager downtime on applications.

Migrate queue managers with full repositories first. Then migrate the other queue managers, which have partial repositories, one at a time. Complete migration of the entire cluster before starting to use new functions.

If you do have to start using new functions before completing migration of the entire cluster, you might need to refresh the partial repositories. After each migration of a queue manager with a partial repository, issue the **REFRESH CLUSTER** command on the newly migrated queue manager. The command updates the cluster records in the newly migrated queue manager, potentially receiving updates for any new attributes. Do not do this step if you migrated the entire cluster before using new function. The **REFRESH CLUSTER** command takes a long time for all the changes to work through the cluster.

Note: For large clusters, using the **REFRESH CLUSTER** command can be disruptive to the cluster while it is in progress, and again at 27 day intervals thereafter when the cluster objects automatically send status updates to all interested queue managers. See Refreshing in a large cluster can affect performance and availability of the cluster.

If full repositories are not migrated before partial repositories, the cluster continues to work, but without all the new features in a version working as expected. To work predictably, the full repository queue managers must be running the latest IBM MQ major version (for LTS users) or CD version (for CD users). This ensures that the full repositories can store information from the rest of the cluster that arises from using new features.

A repository stores a record it receives in its own version. If the record it receives is at a later version, the later version attributes are discarded when the record is stored. An IBM MQ 9.4 queue manager receiving information about an IBM MQ 10.0 queue manager stores only IBM MQ 9.4 information. An IBM MQ 10.0 repository receiving an IBM MQ 9.4 record stores default values for attributes introduced in the later version. The defaults define the values for the attributes that are not included in the record it receives. For more information, see “How mixed version cluster repositories are updated” on page 479.

Note: In exceptional circumstances, it might be necessary to upgrade some of your partial repositories before your full repositories.

While the product supports this configuration, in this situation be very careful to avoid use of any new clustering function on the partial repositories, until your full repositories have been upgraded, to avoid unexpected results.

Procedure

- For information about creating a migration plan for a queue manager cluster, see "Creating a migration plan for a queue manager cluster" on page 480.
- For information about creating a backout plan for the migration of a queue manager cluster, see "Creating a backout plan for queue manager cluster migration" on page 481.
- For information about how to migrate one queue manager in a queue manager cluster, see "Migrating one cluster queue manager" on page 481.

How mixed version cluster repositories are updated

Repositories store records for an object in a cluster in the version of the record format that matches the version of the queue manager hosting the repository. Repository queue managers forward object records, before they are stored, in the format that they are received in. The recipient ignores fields from a newer version, and uses default values for fields that are not present in the record.

Cluster repositories hold records that represent objects, for example, a queue record represents a cluster queue. A full repository holds records for all objects in the cluster. Partial repositories hold records for local objects and remote objects that are used locally. A repository record can hold information only about attributes at the same command level as the queue manager holding that repository. So for example, an IBM MQ 9.4 repository contains only IBM MQ 9.4 level attribute information. An IBM MQ 10.0 repository contains all IBM MQ 9.4 records, plus IBM MQ 10.0 records containing additional IBM MQ 10.0 attributes.

A repository stores a record it receives in its own version. If the record it receives is at a later version, the later version attributes are discarded when the record is stored. An IBM MQ 9.4 queue manager receiving information about an IBM MQ 10.0 queue manager stores only IBM MQ 9.4 information. An IBM MQ 10.0 repository receiving an IBM MQ 9.4 record stores default values for attributes introduced in the later version. The defaults define the values for the attributes that are not included in the record it receives.

A repository normally sends records in its own version format, which is the same as the format it has stored them in. There is one exception to this rule. When a full repository receives a record from a partial repository, it is immediately forwarded in the same format. So if an IBM MQ 9.4 full repository were to receive a record from an IBM MQ 10.0 partial repository, it would forward the IBM MQ 10.0 record. It sends the record to any other full repositories, and any other partial repositories that have subscriptions that match the record.

A partial repository reflects whichever full repository sent it the latest update to a record. As a consequence, you might see the information held by an IBM MQ 10.0 partial repository for new IBM MQ 10.0 attributes changing unexpectedly. The values might change from actual IBM MQ 10.0 information to default values. The changes occur if the full repositories in the cluster are at different levels. Migrate full repositories first to avoid instability.

A partial repository sends information about its objects to a full repository periodically at least once every 27 days. Information is sent about any object when it is altered or defined. See How long do the queue manager repositories retain information?

After migrating all full repositories to IBM MQ 10.0, some attributes might hold default values. The attributes might hold default values in place of actual values, if a repository has not received an update. You can refresh the repository in either of two ways:

- Alter the object which the record containing default values represents, for example, using `ALTER QL` for a local queue. The alteration forces the local repository to send the record again.
- Issue the **REFRESH CLUSTER** command on the partial repository which holds the record containing default values. **REFRESH CLUSTER** forces the partial repository to discard the record containing default values and get a new record as required.

  Note: For large clusters, using the **REFRESH CLUSTER** command can be disruptive to the cluster while it is in progress, and again at 27 day intervals thereafter when the cluster objects automatically

send status updates to all interested queue managers. See Refreshing in a large cluster can affect performance and availability of the cluster.

In summary, for the most predictable, and fastest migration, when you stage cluster migration do these steps in the following order:

1. Migrate the queue managers with full repositories.
2. Migrate the queue managers with partial repositories.
3. Start using new function in the cluster.

Note: In exceptional circumstances, it might be necessary to upgrade some of your partial repositories before your full repositories.

While the product supports this configuration, in this situation be very careful to avoid use of any new clustering function on the partial repositories, until your full repositories have been upgraded, to avoid unexpected results.

Related concepts

How long do the queue manager repositories retain information?

Creating a migration plan for a queue manager cluster

Before carrying out the migration of a queue manager cluster, plan what you are going to do. Identify the roles that different queue managers play in the cluster, and decide in what order to migrate the queue managers.

Procedure

- What queue manager and application migration issues must be dealt with between the old and new versions?
- What system architecture and change control procedures must you consider?
- Consider migration questions specific to clusters, such as migrating full repositories first, and migrating overlapping clusters.
- Are any of the queue managers in a queue sharing group, or part of a high-availability solution?
- Is the cluster a publish/subscribe cluster? Which queue manager is a cluster topic host?
- Decide whether to carry out a staged migration, or migrate all queue managers at the same time.
- Do you have a test system to migrate , and a production system?
- Document and test the plan before migrating production queue managers.

Related concepts

“Application migration and interoperation” on page 362
IBM MQ supports running applications compiled and linked against previous versions of IBM MQ, with later levels of IBM MQ. Use the new version of the libraries to build the applications, once the queue managers have been upgraded.

Availability of cluster topic host queue managers

“How mixed version cluster repositories are updated” on page 479
Repositories store records for an object in a cluster in the version of the record format that matches the version of the queue manager hosting the repository. Repository queue managers forward object records, before they are stored, in the format that they are received in. The recipient ignores fields from a newer version, and uses default values for fields that are not present in the record.

“Queue manager migration” on page 359
After upgrading an installation, queue manager migration might be required. Migration takes place when you start a queue manager. You can remove an upgrade before you have started a queue manager. However, if you remove the upgrade after a queue manager has been started, the queue manager will not work.

“Queue sharing group migration” on page 465

Although you can include queue managers from different IBM MQ for z/OS versions in a queue sharing group, you should migrate all queue managers in a queue sharing group to the newest version as quickly as you can.

Related tasks

"Migrating a queue manager in a high-availability configuration" on page 483
High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

Creating a backout plan for queue manager cluster migration

Before performing a migration, decide on a backout plan in case of failure.

Before you begin

What backout capabilities do the queue managers in the cluster support?

z/OS If the libraries of the earlier level of IBM MQ include the appropriate PTFs to be able to backward migrate, queue managers running on z/OS can be reverted to an earlier level by changing the load libraries.

On other platforms, the only backout option is to restore a queue manager to a previous state. In restoring a queue manager, you lose any persistent changes since the queue manager started running at the new level.

About this task

The backout plan must consider how to maintain the availability of the cluster. It must deal with any issues arising from migrating a queue manager in the cluster.

Procedure

The backout plan must describe the following points:

- What constitutes a successful migration.
- The conditions that trigger the backout procedure.
- Alternative backout actions, such as:
  a) Suspending a queue manager from the cluster.
  b) Backward migration
  c) Keeping a queue manager offline until an external issue is resolved.

Related concepts

"Queue manager migration" on page 359
After upgrading an installation, queue manager migration might be required. Migration takes place when you start a queue manager. You can remove an upgrade before you have started a queue manager. However, if you remove the upgrade after a queue manager has been started, the queue manager will not work.

Migrating one cluster queue manager

Follow these steps to migrate a single queue manager in a cluster, starting with a queue manager in your test system. Base these steps on your cluster migration plan.

Procedure

1. Suspend the queue manager that you want to migrate from the cluster:
   a) Issue the **MQSC** command:

```
SUSPEND QMGR CLUSTER(cluster name)
```

For more information, see SUSPEND QMGR.

b) Check that no messages are sent to the queue manager.

You must close any application that continues to send messages to this queue manager. The cluster workload algorithm might choose the suspended queue manager. If there are no other valid destinations, or if an application has an affinity with the queue manager, it might select the queue manager.

2. Save a record of all cluster objects known by this queue manager. This data is used after migration to check that objects have been migrated successfully.
   a) Issue the command to view cluster queue managers.

```
DISPLAY CLUSQMGR(*)
```

   b) Issue the command to view cluster queues.

```
DISPLAY QC(*)
```

   c) Issue the command to view cluster topics.

```
DISPLAY TCLUSTER(*)
```

3. Save a record from the full repository of its view of the cluster objects owned by this queue manager. The record is used after migration to check that objects have been migrated successfully.
   a) Issue the command on the full repositories to display this queue manager.

```
DISPLAY CLUSQMGR(migrated queue manager name)
```

   b) Issue the command on the full repositories to display the cluster queues for this queue manager

```
DISPLAY QC(*) WHERE(CLUSQMGR EQ migrated queue manager name)
```

   c) Issue the command on the full repositories to display the cluster topics for this queue manager.

```
DISPLAY TCLUSTER(*) WHERE(CLUSQMGR EQ migrated queue manager name)
```

4. Migrate the queue manager.

Do one of the queue manager migration tasks, depending on the platform; see “Migrating a queue manager on Windows” on page 390.

The queue manager migration process is, in outline:

   a) Stop the queue manager.
   b) Take a backup of the queue manager.
   c) Install the new version of IBM MQ.
   d) Restart the queue manager.

5. Ensure that all cluster objects have been migrated successfully.
   a) Issue the command to view cluster queue managers and check the output against the data saved before migration.

```
DISPLAY CLUSQMGR(*)
```

   b) Issue the command to view cluster queues and check the output against the data saved before migration.

```
DISPLAY QC(*)
```

   c) Issue the command to view cluster topics and check the output against the data saved before migration.

```
DISPLAY TCLUSTER(*)
```

6. Check that the queue manager is communicating with the full repositories correctly.
7. Check that cluster channels to full repositories can start.
8. Check that the full repositories still have information about the migrated cluster queue manager, its cluster queues, and its cluster topics.
   a) Issue the command on the full repositories and check the output against the data saved before migration.

   ```
   DISPLAY CLUSQMGR(migrated_queue_manager_name)
   ```

   b) Issue the command on the full repositories and check the output against the data saved before migration.

   ```
   DISPLAY QC(*) WHERE(CLUSQMGR EQ migrated_queue_manager_name)
   ```

   c) Issue the command on the full repositories and check the output against the data saved before migration.

   ```
   DISPLAY TCLUSTER(*) WHERE(CLUSQMGR EQ migrated_queue_manager_name)
   ```

9. Test that applications on other queue managers can put messages to queues owned by the migrated cluster queue manager.
10. Test that applications on the migrated queue manager can put messages to the queues owned by other cluster queue managers.
11. Resume the queue manager by issuing the following command:

    ```
    RESUME QMGR CLUSTER(cluster name)
    ```

12. Closely monitor the queue manager and applications in the cluster for a while.

What to do next

When you have completed the migration of one queue manager in a cluster, on your test system, complete the migration of the other queue managers in each cluster on the test system.

When you have competed the migration of all of the queue managers on your test system, migrate each of the queue managers on your production system.

Related concepts

“Queue manager migration” on page 359
After upgrading an installation, queue manager migration might be required. Migration takes place when you start a queue manager. You can remove an upgrade before you have started a queue manager. However, if you remove the upgrade after a queue manager has been started, the queue manager will not work.

Related reference

DISPLAYCLUSQMGR
DISPLAYQUEUE
RESUME QMGR
SUSPEND QMGR

Migrating a queue manager in a high-availability configuration

High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

About this task

Multi For IBM MQ for Multiplatforms, high-availability configurations can be implemented by using a high-availability cluster solution or by using multi-instance queue managers. Red Hat Cluster Suite or Microsoft Cluster Service (MSCS) are examples of high-availability cluster solutions.

Linux For Linux platforms, you can implement high availability by using replicated data queue managers (RDQMs). For migrating RDQMs, see “Migrating replicated data queue managers” on page 487.

z/OS For IBM MQ for z/OS there are several alternative techniques to increase queue manager availability; see Availability on z/OS. Migration considerations on z/OS depend on the availability techniques that are employed, and are not described in this topic. The term high-availability configuration refers only to queue managers in configurations on platforms other than z/OS.

MQ Appliance Another solution is to configure a high availability group on a pair of IBM MQ Appliances. See the Appliance documentation for details of migrating HA queue managers.

The overall principles involved in queue manager migration in a high availability configuration based on multi-instance queue managers or on a high-availability cluster are the same. In either case, the principles are as follows:

1. You must not restart a queue manager at a lower command level than the one it was previously running.
2. You cannot upgrade the code if an active queue manager is running.
3. You cannot back up an active queue manager.

Procedure

- To migrate a multi-instance queue manager, see “Migrating a multi-instance queue manager” on page 484.
- To migrate a high availability cluster queue manager, see “Migrating a high-availability cluster queue manager” on page 485.

Related tasks

“Migrating an MSCS configuration on Windows” on page 413
Migrate queue managers in a Microsoft Cluster Service (MSCS) configuration one node at a time, following these instructions.

Migrating a multi-instance queue manager

Follow the steps listed to migrate a queue manager in a multi-instance queue manager configuration.

Before you begin

The following terms are relevant:

active queue manager instance
A queue manager instance that has been started permitting standby instances, and is running.

standby queue manager instance
A queue manager instance that has been started permitting standby instances, and is in standby. It is ready to take over from the active instance automatically.

Procedure

Base your migration procedure on the following steps:

1. Before you start the migration process, create a different queue manager on a server, on which you have installed the upgrade.
2. Test the upgrade by performing whatever verification checks that your organization requires.

3. If you have a pool of servers that you pick from, when starting a queue manager instance, upgrade IBM MQ on the servers that are in the pool and are neither active or acting as a standby.
4. Stop the standby queue manager instance.

   Ensure that you have no system management procedure running that restarts the instance automatically.
5. If you do not have a pool of servers, upgrade IBM MQ on the server that was running the standby instance
6. Decide whether downtime or recoverability is more important in the migration.
7. Optional: Follow this procedure if recoverability is more important, and you must take a backup:
   a) Stop the active queue manager instance, without switching to any standby.
   b) Back up the queue manager
   c) Start a queue manager instance, permitting standbys, on one of the upgraded servers.
   d) If you have a pool of upgraded servers, start another one, permitting standbys.
8. Optional: Follow this procedure if availability is more important. You do not need to take a backup.
   a) Start a queue manager instance as a standby on one of the upgraded servers.
   b) Stop the active queue manager instance, switching to the standby.
   c) If you have a pool of upgraded servers, start another one, permitting standbys.
9. Upgrade the IBM MQ code on the server that was the active queue manager instance.
10. Start the server as the standby instance if you have not already started a standby.

"Migrating a queue manager in a high-availability configuration" on page 483
High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

"Migrating a high-availability cluster queue manager" on page 485
Follow the steps listed to migrate a queue manager in a high-availability queue manager configuration.

Migrating a high-availability cluster queue manager

Follow the steps listed to migrate a queue manager in a high-availability queue manager configuration.

Before you begin

The following terms are relevant:

active server
The running server or active queue manager instance

passive server
A server that is ready to take over from the active server automatically.

inactive server
A server that is not prepared to take over automatically. The server might have been removed from the cluster, or taken offline in some way.

Procedure

Base your migration procedure on the following steps. The details depend on the specific commands in the cluster concerned.

1. Before you start the migration process, create a different queue manager on a server on which you have installed the upgrade.
2. Test the upgrade by performing whatever verification checks that your enterprise requires.
3. Form two cluster pairs if you have four servers available.

With two pairs, the queue manager can continue to run in a cluster-pair at the old command level. When you are ready, you can transfer the queue manager to the pair of servers at the new command level.

4. Remove a passive server from the cluster.

   Ensure that the cluster cannot automatically restart the server. The server is made inactive.
5. Create a second location for the upgraded code, if a high-availability cluster is using a common location for IBM MQ code.
6. Install, or upgrade, IBM MQ code using the server that is not now running the queue manager.
7. Verify the upgrade by creating a different queue manager on the server, and performing whatever verification checks that your organization requires.
8. If more than half the servers remain in the cluster, remove a server, upgrade IBM MQ, and verify the upgrade.

   Each server is made inactive as part of the process. Continue until half the servers are upgraded.
9. If your active server is part of a remaining cluster, deactivate the passive servers so that the cluster cannot reactivate them automatically.
10. Decide whether downtime or recoverability is more important in the migration.
11. Optional: Follow this procedure if recoverability is more important:
    a) Stop the queue manager and remove the server from the cluster.
    b) Back up the queue manager.
12. Optional: Follow this procedure if downtime is more important:
    a) Add the migrated servers back into the cluster, as passive servers.
    b) Switch the remaining server in the high-availability server cluster over to one of the passive servers.

       The switch causes the running queue manager to stop, and restarts it on one of the passive servers.
13. Upgrade any remaining high-availability servers, and add them back into the cluster.

"Migrating a queue manager in a high-availability configuration" on page 483
High-availability configurations of queue managers can increase the availability of IBM MQ applications. If a queue manager, or server fails, it is restarted automatically on another server. You can arrange for IBM MQ MQI client applications to automatically reconnect to the queue manager. Server applications can be configured to start when the queue manager starts.

"Migrating a multi-instance queue manager" on page 484
Follow the steps listed to migrate a queue manager in a multi-instance queue manager configuration.

Migrating an RDQM configuration from RHEL 8 to RHEL 9

If you upgrade from RHEL 8 to RHEL 9, you must create a new Pacemaker cluster and migrate your replicated data queue managers (RDQMs) to the new cluster.

About this task

You must set up a separate RHEL 9 cluster and migrate each RDQM HA queue manager to it, using a backup and restore procedure. If you use a floating IP address to connect to an RDQM queue manager then you must recreate that floating IP address on the RHEL 9 cluster.

Procedure

1. Configure three RHEL 9 nodes.
2. Install IBM MQ Advanced on each of them, see "Installing IBM MQ Advanced for Multiplatforms" on page 232.
3. Configure a new Pacemaker cluster to create a new HA group, see Defining the Pacemaker cluster (HA group).

4. Recreate each queue manager that you want to from the existing RHEL 8 HA Group, see Creating an HA RDQM.
5. For each RDQM queue manager to be moved, complete the following actions:
   a) End the RDQM queue manager on the RHEL 9 node.
   b) End the RDQM queue manager on the RHEL 8 node.
   c) Take a backup of the RDQM queue manager, its config and its data as required, on the RHEL 8 node, see Backing up and restoring IBM MQ queue manager data.
   d) Restore the backup on the RHEL 9 node.
6. Start the RDQM queue manager on the RHEL 9 node.
7. If required, configure the floating IP address on the RHEL 9 HA group, see Creating and deleting a floating IP address.
8. After you confirm that the RDQM queue manager is working correctly on the RHEL 9 HA group, delete the queue manager from the RHEL 8 HA group, see Deleting an HA RDQM.

Linux MQ Adv. *Migrating replicated data queue managers*

When you need to migrate replicated data queue managers (RDQMs), you must upgrade all nodes in a sequence. Do not try to operate with the nodes at different levels.

This guidance is appropriate for moving between major releases, or CD releases, but not for applying (fix pack) maintenance. (See “Applying maintenance level updates for RDQM” on page 313.)

Note: RHEL 7 is not supported on 10.0. If you were using RHEL 7 you must upgrade to RHEL 8 or RHEL 9 as part of this migration. You must set up a separate RHEL 9 or RHEL 8 cluster and migrate each RDQM HA queue manager to it, using a backup and restore procedure. If you use a floating IP address to connect to an RDQM queue manager then you must recreate that floating IP address on the new cluster.

The upgrade sequence for HA RDQM configurations consists of suspending a node, uninstalling IBM MQ and RDQM support, installing the newer version of IBM MQ and RDQM support, then resuming the node. You then move on and repeat this sequence on the next node. Following this sequence ensures that your queue managers continue to run on one of the nodes in the HA group while the migration is in progress.

The upgrade sequence for DR RDQM configurations consists of upgrading the recovery node, running the DR queue managers on the newly upgraded recovery node, upgrading the primary node, switching the DR queue managers back to running on the primary node.

The upgrade sequence for DR/HA RDQM configurations consists of upgrading the HA group on the recovery site, performing a managed failover from the main site to the recovery site, and then upgrading the HA group on the main site before failing the queue managers back to the main site.

You can back up a replicated data queue manager before migration.

Related tasks

“Installing RDQM (replicated data queue managers)” on page 253
Installation tasks associated with RDQM are grouped in this section. RDQM is available on x86-64 for RHEL 8 (8.8 or later) and RHEL 9 (9.2 or later).

Migrating HA RDQMs
Follow this sequence of steps to upgrade all the RDQM nodes in an HA group and so migrate the replicated data queue managers (RDQMs).

About this task

You should upgrade all the nodes in an HA group in the same sequence to avoid operating with the nodes in the group at different levels.

Note: RHEL 7 is not supported on 10.0. If you were using RHEL 7 you must upgrade to RHEL 8 or RHEL 9 as part of this migration. You must set up a separate RHEL 9 or RHEL 8 cluster and migrate each RDQM HA queue manager to it, using a backup and restore procedure. If you use a floating IP address to connect to an RDQM queue manager then you must recreate that floating IP address on the new cluster.

If you have configured your HA group such that one node acts as a primary for all RDQMs, with the other two nodes as secondaries, you should upgrade the secondary nodes first and leave the primary node until last.

The sequence in which you upgrade, and the nodes that are marked as preferred and second preferred locations for RDQMs, affect where the RDQMs fail over to as you upgrade. During the migration sequence, while nodes are running different levels, the options for failing over are limited. An RDQM running on a lower level node can fail over to a higher level node but, once a queue manager has been started at the new level, it cannot fail over to a lower level node. You should choose an upgrade sequence and use preferred and second preferred locations settings to keep queue managers running on the lower level nodes for as long as possible. You should make changes to preferred and second preferred location settings before you suspend nodes, to ensure that the changes are effective immediately.

If you are also running DR RDQMs on any of the nodes, you should deal with these queue managers at the same time by following the instructions in “Migrating DR RDQMs” on page 489.

Procedure

- Uninstall HA RDQM support and upgrade RDQM and IBM MQ.
  a) Suspend the HA group on the node, by entering the following command:

  ```
  rdqmadm -s
  ```

  b) Log in as root or switch to superuser using the **su** command.
  c) Uninstall IBM MQ (this step also uninstalls RDQM):

  ```
  rpm -qa | grep MQSeries | xargs dnf -y remove
  ```

  d) Uninstall Pacemaker:

  ```
  rpm -qa | grep linbit | xargs dnf -y remove
  ```

  e) Uninstall DRBD:

  ```
  rpm -qa | grep drbd | xargs dnf -y remove
  ```

  f) Verify that the DRBD kernel was successfully unloaded:

  ```
  lsmod | grep drbd
  ```

  g) Uninstall the tlshd service:

  ```
  rpm -qa | grep ktls-utils | xargs dnf -y remove
  ```

  h) Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).
  i) Resume the HA group on the node by entering the following command:

  ```
  rdqmadm -r
  ```

  You can now proceed to the next node in the group.
- Repeat the steps for the second node in the HA group. (Use the same path as you did on the first node.)
- Repeat the steps for the third node in the HA group. (Use the same path as you did on the first node.)

Related reference
rdqmadm (administer replicated data queue manager cluster)

Linux *Migrating DR RDQMs*

Follow this sequence of steps to upgrade the primary and recovery nodes in a disaster recover replicated data queue manager (DR RDQM) configuration.

About this task

The suggested sequence for upgrading your nodes is to upgrade your recovery node, then run your DR queue managers there while you then upgrade your primary node. When both nodes are upgraded you can restore the original primary and recovery roles.

Note: RHEL 7 is not supported on 10.0. If you were using RHEL 7 you must upgrade to RHEL 8 or RHEL 9 as part of this migration. You must set up a separate RHEL 9 or RHEL 8 cluster and migrate each RDQM queue manager to it, using a backup and restore procedure.

If you do not require to run your DR queue managers during the upgrade procedure, then you can omit the steps for failing over to the recovery node. You can just stop your DR queue managers and restart them after you have upgraded both nodes.

If you are also running HA RDQMs on either of the nodes, you should deal with these queue managers at the same time by following the instructions in “Migrating HA RDQMs” on page 487.

Procedure

- Uninstall DR RDQM and IBM MQ and upgrade RDQM and IBM MQ.
  a) Upgrade the DR secondary node:
     a. Log in as root or switch to superuser using the **su** command.
     b. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

     c. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

     d. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

     e. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

     f. Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

     g. Install the new levels of IBM MQ and RDQM, see Installing RDQM (replicated data queue managers).
  b) On the DR primary node, do one of the following steps:
     – End the DR queue managers, or
     – Perform a managed failover of the DR queue managers to the DR secondary node.
  c) Upgrade the DR primary node:
     a. Log in as root or switch to superuser using the **su** command.
     b. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

c. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

d. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

e. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

f. Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

g. Install the new levels of IBM MQ and RDQM, see Installing RDQM (replicated data queue managers).

d) On the DR primary node, do one of the following steps:

- Start the DR queue managers (if you previously ended them), or
- Perform a managed failover of the DR queue managers back to the DR primary node.

Migrating DR/HA RDQMs
Follow these steps to upgrade all the RDQM nodes in both HA groups in a DR/HA configuration, and so migrate the replicated data queue managers (RDQMs).

About this task

The suggested sequence for upgrading your nodes is to upgrade the HA group at your recovery site, then run your DR/HA queue managers there while you upgrade the HA group at your main site. When both HA groups are upgraded you can restore the original main and recovery roles.

Note: RHEL 7 is not supported on 10.0. If you were using RHEL 7 you must upgrade to RHEL 8 or RHEL 9 as part of this migration. You must set up a separate RHEL 9 or RHEL 8 cluster and migrate each RDQM HA queue manager to it, using a backup and restore procedure. If you use a floating IP address to connect to an RDQM queue manager then you must recreate that floating IP address on the new cluster.

Procedure

- Uninstall DR/HA RDQM and IBM MQ and upgrade RDQM and IBM MQ.
  a) Upgrade the HA group on your recovery site (presuming that the DR/HA RDQMs are running on the main site). Complete the following steps on each node in the group in turn.
    a. Log in as root or switch to superuser using the **su** command.
    b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

    c. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

    d. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

    e. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

    f. Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

g. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

h. Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).

i. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

You can now proceed to the next node in the group.

b) On the HA group at the main site, either stop your queue managers, or perform a managed failover to the HA group that you have just upgraded on the recovery site.

c) Upgrade the HA group on your main site. Complete the following steps on each node in the group in turn.

a. Log in as root or switch to superuser using the **su** command.

b. Suspend the HA group on the node, by entering the following command:

```
rdqmadm -s
```

c. Uninstall IBM MQ (this step also uninstalls RDQM):

```
rpm -qa | grep MQSeries | xargs dnf -y remove
```

d. Uninstall Pacemaker:

```
rpm -qa | grep linbit | xargs dnf -y remove
```

e. Uninstall DRBD:

```
rpm -qa | grep drbd | xargs dnf -y remove
```

f. Verify that the DRBD kernel was successfully unloaded:

```
lsmod | grep drbd
```

g.

Uninstall the tlshd service:

```
rpm -qa | grep ktls-utils | xargs dnf -y remove
```

h. Install the new level of IBM MQ and dependent software, see Installing RDQM (replicated data queue managers).

i. Resume the HA group on the node by entering the following command:

```
rdqmadm -r
```

You can now proceed to the next node in the group.

d) You can now either start your queue managers (if you previously stopped them) or fail them back over to the main site from the recovery site.

Related tasks

“Migrating HA RDQMs” on page 487
Follow this sequence of steps to upgrade all the RDQM nodes in an HA group and so migrate the replicated data queue managers (RDQMs).

“Migrating DR RDQMs” on page 489

Follow this sequence of steps to upgrade the primary and recovery nodes in a disaster recover replicated data queue manager (DR RDQM) configuration.

Migrating RDQM HA/DR solutions - quick path
Follow this method to migrate RDQM queue managers without having to back up and restore them.

About this task

You can migrate your RDQM HA/DR configuration using this procedure provided that new nodes can assume the identity (hostname and IP addresses) of the nodes that they are replacing. This method does not require that you back up and restore queue manager data.

You can use this method, for example, if you want to move to a new RHEL version, such as moving from RHEL 8 to RHEL 9. You first replace at the recovery site, then switch over to that site and replace the nodes at the live site. You then switch back and resume normal operation.

Procedure

- To replace the nodes at the recovery site.
  a) Ensure that all the RDQM queue managers are running on the main site (have the DR primary role on the main site).
  b) Disable all the nodes at the recovery site. The configuration no longer has disaster recovery capability.
  c) Configure new nodes at the recovery site, using the hostnames and IP addresses of the original nodes.
  d) Create a new recovery HA group using these newly-configured nodes (see Configuring HA groups for HA/DR RDQMs).
  e) Recreate the RDQM queue managers on the new recovery site nodes. You can do this by running the **rdqmdr -d** command for each of the RDQM queue manager on the live site. You then copy the **crtmqm** command that is output for each queue manager, and run the command on the recovery nodes. See rdqmdr (manage DR RDQM instances).

     After the initial sync has completed for each RDQM queue manager, full HA/DR capability is restored. Be aware, however, that if the IBM MQ version has changed, after failover to the recovery site it is not possible to switch back to the main site until it has also been migrated.
- To replace the nodes at the main site:
  a) Switch over all the RDQM queue managers to the recovery site. (See Switching over to a recovery node for planned test or maintenance in a DR/HA configuration.)
  b) Disable all the nodes at the main site. The configuration no longer has disaster recovery capability.
  c) Configure new nodes at the main site, using the hostnames and IP addresses of the original nodes.
  d) Create a new HA group using these newly-configured nodes (see Configuring HA groups for HA/DR RDQMs).
  e) Recreate the RDQM queue managers on the new main site nodes. You can do this by running the **rdqmdr -d** command for each of the RDQM queue manager on the recovery site. You then copy the **crtmqm** command that is output for each queue manager, and run the command on the main site nodes. See rdqmdr (manage DR RDQM instances).
  f) After the initial sync has completed for each RDQM queue manager, full HA/DR capability is restored. You can switch the queue managers back to running on the live site, and resume normal operation. (See Switching over to a recovery node for planned test or maintenance in a DR/HA configuration.)

Related information
Replacing a failed node in a DR/HA configuration

Migrating to Internet Protocol version 6 (IPv6)

IBM MQ lets queue managers communicate using IPv6 in addition to IPv4. This simplifies migration from IPv4 to IPv6.

Before you begin

When you are thinking of installing IBM MQ and using IPv6, bear in mind the following key points:

- IBM MQ recognizes IPv6 hexadecimal addresses (for example fe80:43e4:0204:acff:fe97:2c34:fde0:3485) as well as IPv4 dotted decimal addresses (for example 9.20.9.30).
- For a system running both IPv4 and IPv6 system, the connection name (CONNAME) you specify for a given channel determines the IP protocol for the channel making a connection.
- To ensure consistency across the network, you should plan the introduction of IPv6 for the whole network, especially where clusters are involved. For example, although a queue manager is now IPv6 capable, this doesn't imply that the queue managers it can communicate with are also IPv6 capable.
- When setting the domain name server (DNS) or equivalent, consider whether the system on which the target queue manager is running can resolve to an IPv4 address, an IPv6 address or a dual IPv4 and IPv6 address.
- If the system that you are installing IBM MQ on does not support IPv6, IBM MQ will only be able to connect using IPv4.
- For a queue manager running on an IPv6 enabled system to be able to communicate with a queue manager running on an IPv4 enabled system, the IPv4 enabled system must have a host name that resolves to an IPv4 address only.
- If there are multiple domain name servers in an IBM MQ network, each host name used in a channel definition must resolve to the same address (or addresses), regardless of which DNS is used.

About this task

Internet Protocol version 6 (IPv6) is designed by the Internet Engineering Task Force (IETF) to replace Internet Protocol version 4 (IPv4). IPv4 has been in use for over 20 years and is one of the primary methods for machines to communicate with each other over the internet. IPv4 is limited to 32-bit addressing for internet addresses. These addresses are needed by all new machines added to the internet and they are beginning to run out. The IETF is the controlling standards body for the Internet and to meet the growing demand for internet addresses the IETF has increased the number of digits used for Internet addresses from 32 to 128 bits. IPv6 offers a far larger number (2^{128}) of internet addresses and should solve the address shortage for the foreseeable future. IPv6 is expected to gradually replace IPv4, with the two protocols coexisting for a number of years. IPv6 also simplifies header formats and improves support for extensions and options, flow labeling capability, and consolidated authentication and privacy capabilities.

IPv6 is supported on the following IBM MQ platforms:

-

AIX
-

IBM i
-

Linux
-

Windows
-

z/OS

For more information about IPv6, see IPv6.

Migrating a queue manager to IPv6

Two example scenarios for migrating a non-cluster queue manager topology to an IPv6 network.

Before you begin

To use the IPv6 protocol, IBM MQ must be installed on a system that is IPv6 capable.

About this task

If both IPv4 and IPv6 are available, the preferred IP version that two systems use for communicating is determined by the queue manager attribute **IPADDRV**. This parameter only has an effect if the host name resolves ambiguously to both an IPv4 address and an IPv6 address.

These are the broad steps to migrate a queue manager to use the IPv6 protocol. They are described in more detail in each of the two scenarios.

1. Configure dual IPv4 and IPv6 protocols on the system where the queue manager to be migrated resides.
2. Install IBM MQ.
3. Add an entry to the DNS to resolve the host name of the system that is to be migrated, to both an IPv4 address and an IPv6 address.
4. Set the **IPADDRV** parameter to IPv6 (or set the **LOCLADDR** parameter to resolve to an IPv6 address).

   Note:

   - Not all IPv6 software can interpret an IPv4 mapped IPv6 address. If the combination of **CONNAME** and **LOCLADDR** results in an IPv4 mapped IPv6 address, ensure that the system hosting the target queue manager is capable of handling this.
   - Using mapped addresses can require protocol translators in the IP network.

There are a number of different interconnection possibilities. Use the following two scenarios to help you understand how IBM MQ works in each case.

Procedure

- **Non-cluster migration scenario 1**

  Three systems exist that are IPv4-only capable. Each system hosts a queue manager (QM1, QM2, and QM3) and each queue manager connects to the other two. All **CONNAME** parameters in the cluster channel definitions are set using DNS names rather than IP addresses.

  To enable QM1 to be able to use channels running over IPv6, complete the following steps:

  a) Upgrade the host system to have dual IPv4 and IPv6 stacks.

     Important: A listener is required for each IP stack.

  b) Install the latest version of IBM MQ.

  c) Update the DNS table so that it has two entries for the system running QM1; one entry for its IPv4 address and one for its IPv6 address.

     This enables a DNS name request to return both IPv4 and IPv6 addresses for this host.

  d) Set the queue manager **IPADDRV** attribute to IPv6.

     Note: Even with these changes made to support IPv6 addressing, QM1 can still communicate with queue managers (both existing and new ones) that are only IPv4 capable.

  e) Enable QM2 to use channels running over IPv6, as previously enabled for QM1.

  The queue managers can now connect as follows:

  – Communications between QM1 and QM2 are now over IPv6.

  – Communications between QM1 and QM3 are still over IPv4.

– Communications between QM2 and QM3 are still over IPv4.

With the queue manager **IPADDRV** attribute set to IPv6, the preference is set for the queue manager to connect using the IPv6 protocol. If a channel from QM1 to QM3 has **LOCLADDR** set to a host name that resolves to an IPv6 address, or has both IPv4 and IPv6 addresses and the **IPADDRV** attribute is set to IPv6, then the IPv6 address is returned and the channel attempts to use the IPv6 protocol. If the IPv6 protocol installed on the QM1 host system can use a mapped address, then QM1 communicates with QM3 over IPv6. Otherwise, the channel cannot resolve the **CONNAME**.

While QM3 remains a queue manager on an earlier version of the product, you must ensure that no **CONNAME** used to start a channel to QM3 resolves either to an IPv6 address, or to dual IPv4 and IPv6 addresses where the IPv6 address could be returned. Otherwise QM1 attempts to start the channel over IPv6, which fails because it cannot resolve the **CONNAME**.

You can upgrade a system to have dual IPv4 and IPv6 capability and still run a queue manager on an earlier version of the product. Although it is not recommended to run this type of configuration, it should work provided the addresses that are returned to this level of queue manager are either IPv4 addresses, or IPv4 mapped versions of IPv6 addresses.

- **Non-cluster migration scenario 2**

  Three systems exist that are IPv4-only capable. Each system hosts a queue manager (QM1, QM2, and QM3) and each queue manager connects to the other two. All **CONNAME** parameters in the cluster channel definitions are set using IP addresses.

  Because addresses are specified instead of DNS names, to allow a queue manager to connect to another using the IPv6 protocol you need to duplicate the definitions that use IPv4 addresses between them, and provide them with IPv6 addresses instead. The original definitions that use IPv4 addresses continue to work, but to take advantage of the IPv6 protocol you need to connect using the new definitions.

  To enable QM1 to be able to use channels running over IPv6, complete the following steps:

  a) Upgrade the host system to have dual IPv4 and IPv6 stacks.

     Important: A listener is required for each IP stack.

  b) Install IBM MQ.

  c) Duplicate the channel, transmission queue and, where applicable, any process definitions using IPv6 addresses where required.

     Note: Even with these changes made to support IPv6 addressing, QM1 can still communicate with existing queue managers that are only IPv4 capable.

  d) Enable QM2 to use channels running over IPv6, as previously enabled for QM1.

  e) Where necessary, amend applications to write to the new remote queue that was created for QM1 with the IPv6 addresses.

  f) Verify the channels can be started.

  The queue managers can now connect as follows:

  – QM1 can now connect with QM2 over either IPv4 or IPv6, depending on the channel the application writes its messages to.

  – QM1 still connects with QM3 over IPv4, using the original definitions.

Related tasks

Migrating a cluster to IPv6

Two example scenarios for migrating a queue manager cluster topology to an IPv6 network.

Related reference

Abbreviated migration scenarios

This section gives some abbreviated scenarios for when you are thinking of installing clusters on IBM MQ

Migrating a cluster to IPv6

Two example scenarios for migrating a queue manager cluster topology to an IPv6 network.

Before you begin

Before an IPv6 capable system can be added to an IBM MQ cluster, all full repository systems in that cluster must be IPv6 capable.

About this task

This task gives an overview of approaches that can be taken when migrating a cluster to the latest version of IBM MQ. Because of the variations that can occur within a cluster, the detail is deliberately general and should only be seen as a guide to the likely course of action you need to take.

The following two scenarios are seen as the ones most likely to occur in customer installations. They describe the changes that are likely to be required.

Procedure

- **Cluster migration scenario 1**

  A cluster from an earlier version of IBM MQ is installed on a system that is IPv4-only capable. You need to connect an IPv6-only capable system into the cluster. All **CONNAME** parameters in cluster channel definitions are set using DNS names rather than IP addresses.

  a) Identify the queue managers that your IPv6 system will communicate with.

     These include:

     – The queue managers your system sends messages to.
     – The queue managers your system receives messages from.
     – The full repository queue managers.

     These queue managers must be upgraded to IPv6, by completing the next two steps, before you introduce the new system.

  b) Upgrade each of the systems hosting a full repository queue manager, as described in Non-cluster migration scenario 1.

  c) Upgrade the remaining cluster systems that need to be IPv6 capable, as described in Non-cluster migration scenario 1.

  The queue managers can now connect as follows:

  – The new IPv6-only capable system communicates with the cluster using IPv6 addressing.
  – All remaining IPv4 systems that connect into the cluster continue to communicate using IPv4 addressing.
  – The systems in the cluster can connect to each other using either IPv4 or IPv6 addressing. The decision as to which address is used depends on whether you have set **IPADDRV** to specify IPv4 or IPv6 connections.

- **Cluster migration scenario 2**

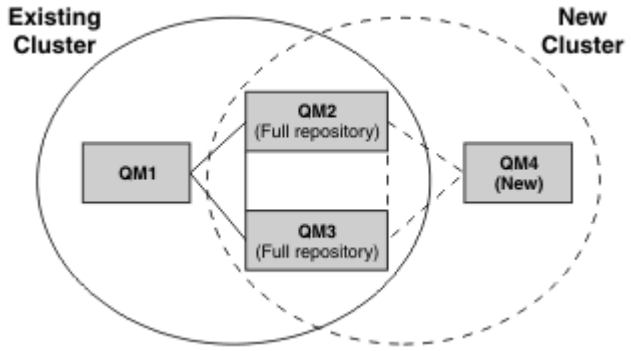
  A cluster from an earlier version of the product is installed on IPv4-only capable systems and you need to connect an IPv6-only capable system into the cluster. Either your network does not support adding both IPv6 and IPv4 addresses using the same host name, or you are using IP addresses rather than DNS names in the cluster channel **CONNAME** parameters.

  The problem here is likely to be that all of the systems cannot be switched to IPv6 simultaneously and some at least must remain only IPv4 capable. The systems that your new IPv6-only system communicates with must be IPv4 and IPv6 capable. You should not simply add a new set of IPv6

channels into the cluster for the IPv6 system to use, because the IPv4 system would also try to use them, resulting in communication errors.

a) Define a new cluster which contains the IPv6-only capable system or systems with new IPv6 addresses and channel definitions.

   The existing cluster remains, and contains the IPv4-only system definitions. The following image gives a pictorial representation of this. QM1, QM2, and QM3 represent the original IPv4 cluster. QM2, QM3, and QM4 represent the new cluster created to allow the IPv6-only capable system (QM4) to connect into your configuration.



b) If you are using DNS names, give each of the systems separate DNS names for IPv4 and IPv6.

   For example, `system1_ip4.ibm.com` and `system1_ip6.ibm.com`.

c) Define a new CLUSRCVR channel, and any corresponding CLUSSDR channels, using the new IPv6 names or IP addresses on each system in the new cluster.

   This means that the systems with only IPv4 or IPv6 capability do not see channels that they cannot use, and no communications errors are caused.

There are both IPv4 and IPv6 definitions connecting the full repositories, so that definitions for both new and existing cluster definitions are replicated between them.

Be aware that the queue managers QM1 and QM4 cannot communicate directly, because they do not share a common network. They could communicate indirectly, for example by using **ALIAS** queues defined in the queue managers QM2 and QM3.

In the configuration shown in the diagram, pay attention to the ordering of application messages flowing between QM2 and QM3 because multiple routes exist. If this is relevant to your configuration, you can use **BIND_OPEN** to fix the route.

Related tasks

Migrating a queue manager to IPv6

Two example scenarios for migrating a non-cluster queue manager topology to an IPv6 network.

Related reference

Abbreviated migration scenarios

This section gives some abbreviated scenarios for when you are thinking of installing clusters on IBM MQ

Abbreviated migration scenarios

This section gives some abbreviated scenarios for when you are thinking of installing clusters on IBM MQ

Abbreviated scenarios: Effects of CONNAME and LOCLADDR settings

The following table provides an overview of what will occur for the different TCP/IP stacks (IPv4 only, IPv6 only and dual IPv4 and IPv6 stacks) and given the settings for CONNAME and LOCLADDR the expected connection result.

Note: Using mapped addresses can require protocol translators in the IP network.

Table 45. Effects of CONNAME and LOCLADDR settings

Stack Type	CONNAME setting	LOCLADDR setting	Connection result
IPv4 only stack	IPv4 address		Channel binds to IPv4 stack
	IPv6 address		Channel fails to resolve CONNAME
	Host name resolves to both IPv4 and IPv6 addresses		Channel binds to IPv4 stack
	IPv4 address	IPv4 address	Channel binds to IPv4 stack
	IPv6 address	IPv4 address	Channel fails to resolve CONNAME
	Host name resolves to both IPv4 and IPv6 addresses	IPv4 address	Channel binds to IPv4 stack
	Any address	IPv6 address	Channel fails to resolve LOCLADDR
	IPv4 address	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv4 stack
	IPv6 address	Host name resolves to both IPv4 and IPv6 addresses	Channel fails to resolve CONNAME
	Host name resolves to both IPv4 and IPv6 addresses	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv4 stack
Dual IPv4 and IPv6 stack	IPv4 address		Channel binds to IPv4 stack
	IPv6 address		Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses		Channel binds to stack determined by IPADDRV
	IPv4 address	IPv4 address	Channel binds to IPv4 stack
	IPv6 address	IPv4 address	Channel fails to resolve CONNAME
	Host name resolves to both IPv4 and IPv6 addresses	IPv4 address	Channel binds to IPv4 stack
	IPv4 address	IPv6 address	Maps an IPv4 CONNAME to an IPv4 mapped IPv6 address. IPv6 implementations that do not support IPv4 mapped IPv6 addressing fail to resolve CONNAME
	IPv6 address	IPv6 address	Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses	IPv6 address	Channel binds to IPv6 stack

Table 45. Effects of CONNAME and LOCLADDR settings (continued)

Stack Type	CONNAME setting	LOCLADDR setting	Connection result
	IPv4 address	Host name resolves to both IPv4 and IPv6 addresses	Maps an IPv4 CONNAME to an IPv4 mapped IPv6 address. IPv6 implementations that do not support IPv4 mapped IPv6 addressing fail to resolve CONNAME
	IPv6 address	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv6 stack
IPv6 only stack	IPv4 address		Maps an IPv4 CONNAME to an IPv4 mapped IPv6 address. IPv6 implementations that do not support IPv4 mapped IPv6 addressing fail to resolve CONNAME
	IPv6 address		Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses		Channel binds to IPv6 stack
	Any address	IPv4 address	Channel fails to resolve LOCLADDR
	IPv4 address	IPv6 address	Maps an IPv4 CONNAME to an IPv4 mapped IPv6 address. IPv6 implementations that do not support IPv4 mapped IPv6 addressing fail to resolve CONNAME
	IPv6 address	IPv6 address	Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses	IPv6 address	Channel binds to IPv6 stack
	IPv4 address	Host name resolves to both IPv4 and IPv6 addresses	Maps an IPv4 CONNAME to an IPv4 mapped IPv6 address. IPv6 implementations that do not support IPv4 mapped IPv6 addressing fail to resolve CONNAME
	IPv6 address	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv6 stack
	Host name resolves to both IPv4 and IPv6 addresses	Host name resolves to both IPv4 and IPv6 addresses	Channel binds to IPv6 stack

Abbreviated scenarios: System configurations

Table 47 on page 500 gives a number of abbreviated scenarios based on the configuration of the installed queue managers and the IP configuration they are running on. The list is not intended to be exhaustive, but to give a number of examples of what to expect based on the configurations shown.

The abbreviations are combined in Table 47 on page 500 to give the configuration of the systems involved in trying to establish communication. For example:

- v71 + IPv6: Represents a queue manager from an earlier version of the product on a system with a TCP/IP 6 stack
- v8 + Dual: Represents a queue manager from the latest version of the product on system with a dual TCP/IP 4 and 6 stack

Table 46. Abbreviations used in system configurations

Abbreviation	Meaning
v71	queue manager from an earlier version of the product
v8	queue manager from the latest version of the product
IPv4	a system using an IPv4 only stack
IPv6	a system using an IPv6 only stack
Dual	a system using both an IPv4 and an IPv6 stack
IPv4DNS	DNS returns an IPv4 address only for host name of system holding the responding queue manager
IPv6DNS	DNS returns an IPv6 address only for host name of system holding the responding queue manager
DualDNS	DNS returns an IPv4 and IPv6 address for host name of system holding the responding queue manager
LOCLADDR4	The LOCLADDR parameter is set to IPv4 addressing
LOCLADDR6	The LOCLADDR parameter is set to IPv6 addressing
IPADDR4	IPADDRV is set to IPv4 addressing
IPADDR6	IPADDRV is set to IPv6 addressing

Table 47. System configurations

Originating queue manager		Responding queue manager			Result
Queue manager and Stack	**LOCLADDR**	**IPADDRV**	**Queue Manager and Stack**	**DNS Return**	
v71 + IPv6	Any	Not applicable			IP Error
v71 + IPv4 or v71 + Dual	Both LOCLADDR4 & LOCLADDR6	Not applicable	v71 + IPv4 or v71 + Dual	IPv4DNS or DualDNS	IPv4 connection can be established

Table 47. System configurations (continued)

Originating queue manager		Responding queue manager			Result
Queue manager and Stack	**LOCLADDR**	**IPADDRV**	**Queue Manager and Stack**	**DNS Return**	
v71 + IPv4 or v71 + Dual	Blank or LOCLADDR4	Not applicable	v71 + IPv4 or v71 + Dual	IPv4DNS or DualDNS	IPv4 connection can be established
v71 + IPv4 or v71 + Dual	Blank or LOCLADDR4	Not applicable	v71 + Dual	IPv6DNS	Unable to resolve CONNAME
v71 + IPv4 or v71 + Dual	Blank or LOCLADDR4	Not applicable	v71 + Dual or v8 + Dual v8 + IPv4	IPv4DNS or DualDNS	IPv4 connection can be established
v71 + IPv4 or v71 + Dual	LOCLADDR6	Not applicable			IP Error
v71 + IPv4 or v71 + Dual	Blank or LOCLADDR4 or both LOCLADDR4 & LOCLADDR6	Not applicable	v8 + IPv6	IPv6DNS	Unable to resolve CONNAME
v8 + IPv4	Blank or LOCLADDR4	Not specified	v71 + IPv4 or v71 + Dual or v8 + IPv4	IPv4DNS or DualDNS	IPv4 connection can be established
v8 + IPv4	LOCADD6	Not specified			Unable to resolve LOCLADDR
v8 + IPv4	Blank or LOCLADDR4	Not specified	v8 + IPv6	IPv6DNS	Unable to resolve CONNAME
v8 + IPv6	Blank or LOCLADDR6	Not specified	v71 + Dual	DualDNS	Attempts to start IPv6 channel and fails as there will be no IPv6 listener available
v8 + IPv6	Blank or LOCLADDR6	Not specified	v71 + IPv4	IPv4DNS	Attempts to start IPv6 channel and fails as there will be no IPv6 listener available
v8 + IPv6 or v8 + Dual	LOCLADDR6	Blank or IPADDR6	v8 + IPv6 or v8 + Dual	IPv6DNS or DualDNS	IPv6 connection can be established

Table 47. System configurations (continued)

Originating queue manager		Responding queue manager			Result
Queue manager and Stack	**LOCLADDR**	**IPADDRV**	**Queue Manager and Stack**	**DNS Return**	
v8 + Dual	LOCLADDR6	IPADDR4	v8 + Dual	IPv4DNS or DualDNS	IPv6 connection can be established where mapped addressing can be used
v8 + Dual	Blank or LOCLADDR4	IPADDR4	v71 + Dual	IPv4DNS or DualDNS	IPv4 connection can be established
v8 + Dual	Both LOCLADDR4 & LOCLADDR6	Blank or IPADDR4	v71 + Dual	IPv4DNS or DualDNS	IPv4 connection can be established
v8 + Dual	LOCLADDR4	IPADDR4			Unable to resolve LOCLADDR
v8 + Dual	LOCLADDR6 or both LOCLADDR4 & LOCLADDR6	Blank or IPADDR6	v8 + IPv6 or v8 + Dual	IPv6DNS or DualDNS	IPv6 connection can be established

Related tasks

Migrating a queue manager to IPv6
Two example scenarios for migrating a non-cluster queue manager topology to an IPv6 network.

Migrating a cluster to IPv6
Two example scenarios for migrating a queue manager cluster topology to an IPv6 network.

Migrating existing security configurations to use an alias CipherSpec

Migrating existing secure channel definitions to use an alias CipherSpec, for example, ANY_TLS12_OR_HIGHER, ANY_TLS13_OR_HIGHER, and so on, means that your enterprise can adapt to cipher additions and deprecations without needing to make further invasive configuration changes in the future.

In general terms, the migration step to use an alias CipherSpec is no different from the process you use to change any CipherSpec. That is, change the value of the CipherSpec for the channel definition at each end, and then restart the channels for the change to take effect.

The procedure described in the preceding text can be particularly challenging in clustering environments. Typically, you need to update manually defined channel definitions to a full repository one at a time.

To simplify migration, you make the change to specify an alias CipherSpec on a channel definition pairing on the responding message channel agent (that is SVRCONN, RCVR, and so on) first. For example, if the channel definition currently uses a specific TLS 1.2 CipherSpec, then modifying the responding message channel agent to use ANY_TLS12_OR_HIGHER allows the sending message channel agent to continue using the specific TLS 1.2 cipher.

If you plan to change an existing cluster to use alias CipherSpecs, you first need to ensure that all members of the cluster are at IBM MQ 9.1.4, or higher, and if there are z/OS queue managers in the

cluster, these need to be at IBM MQ 9.2.0 or later, in order to understand the new CipherSpec value. The procedure for migration is the same as migrating from plaintext to SSL or TLS. See Upgrading clustered queue managers and channels to SSL/TLS for more information.

Once both initiating and responding channel definitions use an alias CipherSpec, the negotiation of the TLS cipher varies, based on the availability of different algorithms on platform and maintenance levels.

Note, that although no assurance can be made on the exact CipherSpec that is chosen, the channel will only use the TLS protocol allowed by the alias CipherSpec considering FIPS, SUITEB, and weak CipherSpec deprecations and re-enablement on both peers.

Attention: Alias CipherSpecs do not guarantee that a specific CipherSpec will be used on a running channel, only that the negotiated CipherSpec is enabled and acceptable to IBM MQ on both ends of the channel. To request that a specific CipherSpec is used by a channel, you must specify that specific value on both ends of the channel.

If you add support for a new CipherSpec to the IBM MQ installations on the initiating and responding ends of the channel, the alias CipherSpec will allow this new CipherSpec to be used automatically without making any configuration changes.

Related tasks

Enabling CipherSpecs

Related reference

ALTER CHANNEL

Migrating IBM MQ Managed File Transfer

Use the following topics to guide you through various migration scenarios for IBM MQ Managed File Transfer.

Migrating Managed File Transfer agents from an earlier version

Agents migrated from versions of IBM MQ prior to IBM MQ 9.1.4 run as non highly available. You can make them run in high availability mode by carrying out the following procedure.

Procedure

1. Create the SYSTEM.FTE.HA.<agent name> queue in the agent queue manager using the following sample definition:

```
DEFINE QLOCAL(SYSTEM.FTE.HA.SRC) +
 DEFPRTY(0) +
 DEFSOPT(SHARED) +
 GET(ENABLED) +
 MAXDEPTH(0) +
 MAXMSGL(0) +
 MSGDLVSQ(PRIORITY) +
 PUT(ENABLED) +
 RETINTVL(999999999) +
 SHARE +
 NOTRIGGER +
 USAGE(NORMAL) +
 REPLACE
```

2. Provide the required authorities on the queue for the agent to open the queue for GET.
3. Create a replica of the agent configuration on another machine
4. Add the **highlyAvailable** property, and set the property to *true*, in the agent.properties file for both agent configurations.

Related concepts

Maintenance in highly available agents

Migrating MFT to a new machine with a different operating system

The core steps required to successfully achieve a migration of MFT configurations to a new system or platform. The task is primarily focused on MFT configuration migration, but also discusses queue manager migration where appropriate.

Before you begin

Ensure that any agents you are going to migrate have completed any in-progress or pending transfers, and that you have taken a back up of:

- The coordination queue manager
- Agent queue managers
- Agents
- Resource Monitors
- Transfer Templates
- Scheduled Transfers

Important: IBM MQ installation names on one system are unlikely to match the installation names on the new system unless the old and new systems only have one installation, or you specify an installation name as part of the IBM MQ installation process.

About this task

The following migration procedure is based on the scenario where `QMA` is both the coordination queue manager for topology, and the agent queue manager for an agent called `Agent1`.

`Agent1` has a monitor, transfer template and scheduled transfer. `QMA` also connects to a queue manager called `QMB` running on another system using their sender and receiver channels for file transfers.

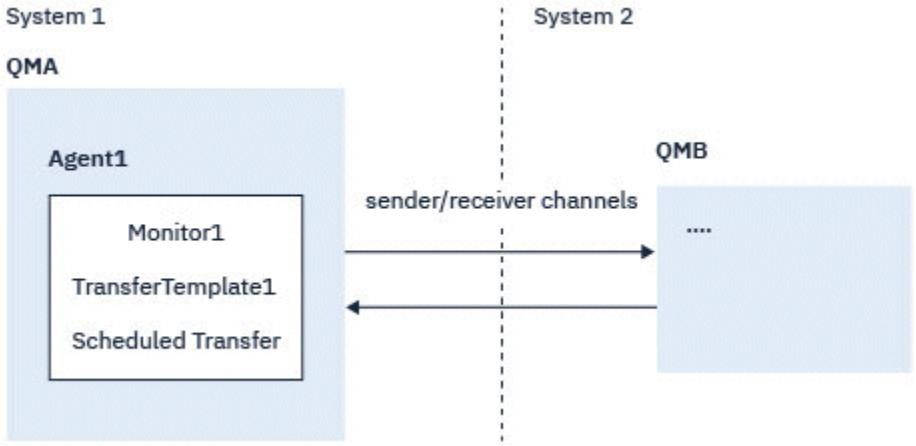


Figure 13. Migrating the MFT configuration on System 1

Attention: The following procedure explains only how to backup and restore MFT configurations. If you are migrating MFT to a new machine with the same operating system, queue manager data and log files can be backed up and restored by copying all the data files from the old system to the appropriate directories on the new system.

However, if the new machine has a different operating system, it is not possible to migrate the data files, because they are created platform specific.

Procedure

1. Backup procedure

a) Save the queue manager configuration using the **dmpmqcfg** command to rebuild it later from its definition.

For example:

```
dmpmqcfg -m QMA -a > /mq/backups/QMA.mqsc
```

b) Back up the configuration files for the agent that are stored under the IBM MQ data directory `/MQ_DATA_PATH/mqft`

The `mqft` directory normally has three sub-directories, which are `config`, `installation`, and `logs`. These contain agent installation data, configuration, and database logger files respectively.

If the agent is Protocol Bridge Agent, the `ProtocolBridgeCredentials.xml` file in the agent configuration directory also needs to backed up. This file defines the user names and credential information that the protocol bridge agent uses to authorize itself with the protocol server.

c) Export the configuration of the resource monitor to an XML file using the MFT **ftelistMonitors** command with the **-ox** option.

For example:

```
fteListMonitors -ma Agent1 -mn Monitor -ox Monitor1Definition.xml
```

d) Export transfer templates to XML files using the MFT **fteListTemplates** command with the **-x** and **-o** options.

For example, the following command creates `TransferTemplate1.xml` in the current directory:

```
fteListTemplates -x -o . TransferTemplate1
```

e) Manually back up the scheduled transfer definitions.

It is not possible to export the definitions to XML files, but you can list scheduled transfers using the MFT fteListScheduledTransfers command and backing up the definitions manually.

2. Recreate procedure

a) Recreate queue manager QMA after installing IBM MQ and MFT on the new system.

b) Restore the QMA configuration by running the **runmqsc** command to parse in the queue manager configuration saved in Step "1.a" on page 505

For example:

```
runmqsc QMA< /mq/backups/QMA.mqsc
```

c) Recreate the sender and receiver channels that connect to QMB on System two.

d) On the QMB queue manager side, update the connections details, such as host name and port number of the sender channel that connects to QMA.

e) Recreate `Agent1` by copying all of the backed up agent configuration files to the new system, and start the agent.

f) Import the XML file for `Monitor1` using the MFT fteCreateMonitor command with the **-ix** and **-f** options.

For example:

```
fteCreateMonitor  -ix Monitor1Definition.xml  -f
```

g) Publish a message containing the contents of TransferTemplate1.xml in the message body to the SYSTEM.FTE topic on the coordination queue manager.

Use a stand-alone application, and specify the topic string:

```
SYSTEM.FTE/Templates/<template_id>
```

where `<template_id>` is the transfer template ID that can be found inside the `TransferTemplate1.xml` file.

For example, if the xml contains:

```
<?xml version="1.0" encoding="UTF-8"?><transferTemplateid="a7838085-0f2a-4980-
b958-2dbbdfb22702"
version="6.00">
```

, the topic string should be:

```
SYSTEM.FTE/Templates/a7838085-0f2a-4980-b958-2dbbdfb22702
```

h) Recreate the scheduled transfers manually using the MFT **fteCreateTransfers** command.

Migrating IBM MQ Internet Pass-Thru

Follow this procedure to upgrade to a new version of IBM MQ Internet Pass-Thru (MQIPT), or to apply fix pack maintenance to your MQIPT installation. You can also use this procedure to upgrade from MQIPT support pack 2.1 to the latest version of MQIPT.

Procedure

1. Make backups of your data.

   See Making backups for details.
2. Install the new version of MQIPT.

   You can install the new version of MQIPT before uninstalling any versions of MQIPT that are currently installed. See “Installing MQIPT” on page 284 for details.
3. Restore the backed-up data files to the MQIPT home directory to be used by the new installation.

   If the MQIPT installation directory is used as the home directory, then overwrite any newly installed copies of data files with the backed-up files.
4. Ensure that any properties that contain file names in the new `mqipt.conf` configuration file, refer to files to be used by the new installation of MQIPT.
5. Review the list of changes and new features in the new version or fix pack of MQIPT.

   If you need to make any changes to the MQIPT configuration for the new version, make the necessary changes to the new copies of the data files.
6. Stop the current version of MQIPT by issuing the following command:

   ```
   mqiptAdmin -stop
   ```
7. Start MQIPT at the latest version by issuing the following command:

   - On AIX and Linux systems:

     ```
     MQIPT_INSTALLATION_PATH/bin/mqipt MQIPT_HOME_DIR
     ```
   - On Windows systems:

     ```
     MQIPT_INSTALLATION_PATH\bin\mqipt MQIPT_HOME_DIR
     ```

   where

   - *MQIPT_INSTALLATION_PATH* is the directory where that latest version of MQIPT is installed.
   - *MQIPT_HOME_DIR* is the MQIPT home directory containing the data files to be used by the latest installation of MQIPT.
8. Test that MQIPT works correctly at the latest version.

   After you confirm that the latest version of MQIPT is configured correctly, you can uninstall the previous version. See “Uninstalling MQIPT” on page 286 for details.
9. If there are any passwords in your MQIPT configuration that have not been encrypted, or passwords that were encrypted prior to MQIPT in IBM MQ 9.1.5, encrypt these passwords using the latest protection method by following the procedure in Encrypting stored passwords.

Linux Upgrading and applying maintenance to the stand-alone IBM MQ Web Server

Follow this procedure to upgrade to a new version of the stand-alone IBM MQ Web Server, or to apply maintenance to your installation.

About this task

This procedure installs a new version or fix pack of the stand-alone IBM MQ Web Server in a new installation directory. The existing installation of the stand-alone IBM MQ Web Server is preserved. When the migration to the new version of the stand-alone IBM MQ Web Server is complete, the installation directory for the existing version can be deleted.

The stand-alone IBM MQ Web Server is available only on Linux.

Procedure

1. Download the stand-alone IBM MQ Web Server installation file.

   Follow this link to Fix Central. Select the correct version of the download package for your system. The download package is a `tar.gz` file, for example `9.4.0.0-IBM-MQ-Web-Server-LinuxX64.tar.gz`.
2. On the target system, create an installation directory for the new version of the stand-alone IBM MQ Web Server.
3. Decompress the installation file in the installation directory that you created in step “2” on page 507.
4. Set the **MQ_OVERRIDE_DATA_PATH** environment variable to the stand-alone IBM MQ Web Server data directory.
   For example, if you chose to use `/var/mqweb` as the data directory when you first configured the stand-alone IBM MQ Web Server, issue the following command:

   ```
   export MQ_OVERRIDE_DATA_PATH=/var/mqweb
   ```
5. Stop the existing mqweb server.
   a) Set up the IBM MQ environment for the existing installation of the stand-alone IBM MQ Web Server.

      Change to the `bin` directory of the existing installation directory for the stand-alone IBM MQ Web Server, then issue the following command:

      ```
      . ./setmqenv -s
      ```

   b) Issue the following command to stop the mqweb server:

      ```
      endmqweb
      ```
6. Start the mqweb server at the new version or fix pack level.
   a) Set up the IBM MQ environment for the new version of the stand-alone IBM MQ Web Server.

      Change to the `bin` directory of the installation directory that you created in step “2” on page 507, then issue the following command:

      ```
      . ./setmqenv -s
      ```

   b) Optional: If you are upgrading to a new version of the stand-alone IBM MQ Web Server, use the **mqlicense** command to review and accept the IBM MQ license.

      You must run this command as a user that has write access to the IBM MQ Web Server installation directory.

      For example, issue the following command to view the IBM MQ license:

      ```
      mqlicense
      ```

   c) Issue the following command to start the mqweb server:

```
strmqweb
```

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