

WebSphere MQ for Linux for Intel and Linux for
zSeries



Quick Beginnings

V5.3

Note!

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 57.

First edition, October 2002

This edition applies to IBM® WebSphere® MQ for Linux for Intel, Version 5.3 and to IBM WebSphere MQ for Linux for zSeries™, Version 5.3 and to all subsequent releases and modifications until otherwise indicated in new editions.

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Welcome to WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries

This book describes WebSphere MQ for Linux for Intel Version 5.3 and WebSphere MQ for Linux for zSeries Version 5.3 and explains how to plan for the products, install them, and verify that the installations have worked.

See the:

- *WebSphere MQ Bibliography and Glossary* for an explanation of terms used in this book
- *WebSphere MQ System Administration Guide* for further information on using the control commands *crtmqm*, *strmqm*, and *endmqm*

Road map

Use Table 1 to find the information that you need to get started with WebSphere MQ for Linux for Intel and Linux for zSeries.

Table 1. Getting started road map

If you want to...	Refer to...
Learn about system requirements for WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries	Chapter 1, "Planning to install the WebSphere MQ for Linux products" on page 1 and Chapter 2, "Preparing to install the WebSphere MQ for Linux products" on page 9
Install WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries	Chapter 3, "Installing the WebSphere MQ for Linux for Intel or Linux for zSeries server" on page 13 and Chapter 4, "Verifying the server installation" on page 19
Install the WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries clients	Chapter 5, "Installing the WebSphere MQ for Linux for Intel or Linux for zSeries client" on page 29 and Chapter 6, "Verifying the client installation" on page 33
Apply maintenance to WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries	Chapter 7, "Applying maintenance to the WebSphere MQ for Linux products" on page 37
Uninstall a WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries server or client	Chapter 8, "Uninstalling the WebSphere MQ for Linux products" on page 41
Read more about WebSphere MQ	Chapter 9, "WebSphere MQ documentation" on page 43

Conventions

Knowing the conventions used in this book will help you to use it more efficiently.

- **Boldface type** indicates the name of an item that you need to select or the name of a command.
- *Italics type* indicates new terms, book titles, or variable information that must be replaced by an actual value.

Conventions

- Monospace type indicates an example (such as a fictitious path or file name) or text that is displayed on the screen.

Where appropriate, WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries are together referred to as the WebSphere MQ for Linux products.

What's new in WebSphere MQ for Linux for Intel, Version 5 Release 3

WebSphere MQ for Linux for Intel, Version 5 Release 3 provides the following new and changed functions:

- WebSphere MQ for Linux for Intel now supports WebSphere MQ channels protected using the industry standard Secure Sockets Layer (SSL). See *WebSphere MQ Security* for details. This support is based on IBM Global Security Kit; a copy of this product is included with WebSphere MQ.
- Support for Java™ is integrated within the product. This replaces the support previously provided by MQSeries® SupportPac™ MA88.
- Product documentation is now supplied on separate CD-ROMs.
- Support for the Internet Gateway has been removed. If you have this feature installed from a previous release of the product, you will lose it when you upgrade.
- A new form of license management is implemented for this release of the product.
- WebSphere MQ now supports generic authority administration.

WebSphere MQ for Linux for zSeries, Version 5 Release 3 is a new product.

Chapter 1. Planning to install the WebSphere MQ for Linux products

This chapter describes the prerequisites for running WebSphere MQ for Linux for Intel, V5.3 and WebSphere MQ for Linux for zSeries, V5.3, including:

- “Hardware requirements”
- “Prerequisite software” on page 2
- “Optional software” on page 3

The software that is supplied with the WebSphere MQ for Linux products is described in:

- “Delivery” on page 4
- “WebSphere MQ components” on page 5

The latest information about the product can be found in the README file (see “readme file” on page 8).

Hardware requirements

WebSphere MQ for Linux for Intel, V5.3 runs on any machine that supports the Linux for Intel operating system. WebSphere MQ for Linux for zSeries, V5.3 runs on any machine that supports the Linux for zSeries operating system.

Disk storage

The storage requirements for the WebSphere MQ for Linux products depend on which components you install (see “WebSphere MQ components” on page 5), and how much working space you need. This, in turn, depends 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.

Typical storage requirements are as follows:

- Server installation: 109 MB (Linux for Intel), 105 MB (Linux for zSeries)
- Client installation without SSL: 27 MB (Linux for Intel), 28 MB (Linux for zSeries)
- Client installation with SSL: 100 MB (Linux for Intel), 93 MB (Linux for zSeries)
- Data storage (server): 50 MB
- Data storage (client): 15 MB

Use the **df** command to determine the amount of free space on your system.

Disk storage is also required for:

- Prerequisite software
- Optional software
- Your application programs

See “Preparing for installation” on page 9 for information about creating the file systems you need to install and run the WebSphere MQ for Linux products.

Prerequisite software

This section gives the minimum supported software levels. Later levels, if any, are supported unless otherwise stated. These prerequisites apply to both client and server installations of WebSphere MQ.

Note: WebSphere MQ does not support host names that contain spaces. If you install WebSphere MQ on a computer with a host name that contains spaces, you will be unable to create any queue managers.

Operating system, Linux for Intel

WebSphere MQ for Linux for Intel, V5.3 can be installed on any distribution that supports:

- Linux kernel, Version 2.4
- glibc, Version 2.1.3 or greater
- Red Hat Package Manager (RPM) for installation

WebSphere MQ for Linux for Intel has been tested with the following distributions:

- Red Hat Linux V7.2
- Caldera OpenLinux V3.1
- SuSE Linux Enterprise Server V7
- Turbolinux V7.0

Operating system, Linux for zSeries

WebSphere MQ for Linux for zSeries can be installed on any distribution that supports:

- Linux kernel, Version 2.4
- glibc, Version 2.1
- Red Hat Package Manager (RPM) for installation

WebSphere MQ for Linux for zSeries has been tested with the following distributions:

- Red Hat Linux for S/390®
- SuSE Linux Enterprise Server V7

Compiler runtime environment, Linux for Intel

WebSphere MQ for Linux for Intel is built using the GNU C and C++ compilers, version 3. If you intend to run SSL channels then you must have installed the g++ version 3 runtime libraries, and if you intend to build C++ applications which connect to WebSphere MQ through SSL then you must have installed the g++ version 3 compiler.

The GNU g++ libraries are called `libgcc_s.so` and `libstdc++.so.3` and are normally found in the directory `/usr/lib`. If these are not installed on your system, locate and install the rpm packages from your distribution vendor that contain these libraries or install the GNU gcc and g++ v3 compilers.

Installing the g++ version 3 runtime support

Locate and install the following RPM files from your Linux distribution provider (the names may vary depending on the version):

- `libgcc-3.0.1-3.i386.rpm` (which contains `libgcc_s.so`)
- `libstdc++3-3.0.3-3.i386.rpm` (which contains `libstdc++.so`)

Installing the gcc and g++ version 3 compilers

Locate and install the following RPM file from your Linux distribution provider (the name may vary depending on the version)

- gcc30-3.0.1-3.i386.rpm

Alternatively, you can download the source for the compilers from the GNU Web site at:

<http://www.gnu.org>

and follow the instructions to compile and install your chosen compilers.

Compiler runtime environment, Linux for zSeries

WebSphere MQ for Linux for zSeries is built using the GNU C and C++ compilers, version 2.95.3. If you intend to run SSL channels then you must have installed the g++ version 2.95.3 runtime libraries, and if you intend to build C++ applications which connect to WebSphere MQ through SSL then you must have installed the g++ version 2.95.3 compiler.

The GNU g++ runtime library is called `libstdc++-libc6.1-2.so.3` and is normally found in the directory `/usr/lib`. If this is not installed on your system, locate and install the rpm package from your distribution vendor that contains this library.

Connectivity

The network protocols supported by WebSphere MQ for Linux for Intel are TCP/IP and LU6.2. The network protocol supported by WebSphere MQ for Linux for zSeries is TCP/IP. TCP/IP is part of the Linux for Intel and Linux for zSeries operating systems. You can use any communications hardware supporting TCP/IP.

If you want to use the SNA LU6.2 support on WebSphere MQ for Linux for Intel, you need the IBM Communications Server for Linux 5799-RQA Version 6.0. The Communications Server is available as a PRPQ product from IBM. For more details, see:

<http://www.ibm.com/software/network/commserver/about/cslinux.html>

SSL (Secure Sockets Layer)

If you want to use the SSL support, you need IBM Global Security Kit V6. This is supplied with WebSphere MQ.

Optional software

The following products can be used with the WebSphere MQ for Linux products, but are not required. Unless otherwise stated, these products apply only to server installations of WebSphere MQ.

Compilers, Linux for Intel

The following compilers are supported for WebSphere MQ for Linux for Intel, V5.3.

C applications

- GNU C Compiler, any version

C++ applications

- GNU C++ Compiler, version 3 (the default)
- GNU C++ Compiler, version 2.95.2

Software requirements

Note: The C++ support libraries are installed in directories whose names match the compiler version, /opt/mqm/lib/<version>, and links are placed from /opt/mqm/lib to the default version, 3.0.3. If you wish to use the 2.95.2 C++ compiler then you must either explicitly use the path to the directory /opt/mqm/lib/2.95.2 or change the symbolic links in /opt/mqm/lib to point to the 2.95.2 directory. The names of the library links you need to change are:

- libimqb23gl.so
- libimqs23gl.so
- libimqc23gl.so
- libimqb23gl_r.so
- libimqs23gl_r.so
- libimqc23gl_r.so

The version 3 C++ libraries are compatible with all versions of the gcc v3 compiler.

Java applications

- IBM Developer Kit for Linux, Java Technology Edition, Version 1.3.1.

Compilers, Linux for zSeries

The following compilers are supported for WebSphere MQ for Linux for zSeries, V5.3.

C applications

- GNU C Compiler, any version

C++ applications

- GNU C++ Compiler, version 2.95.3

Java applications

- IBM Developer Kit for Linux, Java Technology Edition, Version 1.3.1.

Databases, Linux for Intel

The following databases are supported:

- DB2® Universal Database V7.1, Fixpak 4 or V7.2
- Oracle9i

Java

If you want to use the Java Messaging Support, you need the Java Runtime Environment Version 1.3 or later.

Delivery

WebSphere MQ for Linux for Intel, V5.3 and WebSphere MQ for Linux for zSeries, V5.3 are supplied on a number of CD-ROMs, as follows:

- WebSphere MQ for Linux for Intel Server
- WebSphere MQ for Linux for zSeries Server
- WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries Clients (2 CDs)
- WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries Documentation

WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries can be installed as a server or a client. See the *WebSphere MQ System Administration Guide* for an explanation of client and server installations of WebSphere MQ.

The Clients CD-ROMs contain the WebSphere MQ clients for AIX, HP-UX, Linux, Solaris, and Windows. Refer to the relevant *Quick Beginnings* book for information on how to install the client on other platforms.

The documentation CD-ROMs contain the product documentation in HTML and PDF formats.

WebSphere MQ components

When you install WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries, you can choose which components to install.

Server

The components available on the Server CD-ROM are as follows:

Runtime

Mandatory component. Provides support for external applications.

SDK Mandatory component. Needed for application development.

Server Provides messaging and queuing services to applications, and support for WebSphere MQ client connections.

Client Provides remote access to WebSphere MQ. Must be connected to a server. To install a client on the same machine as a server, use the Server CD-ROM; otherwise use the Clients CD-ROM.

Sample programs

Sample application programs. Needed if you want to check your WebSphere MQ installation using the verification procedures described in this book.

Java messaging

The files needed for messaging using Java (includes Java Messaging Service).

Message catalogs

A message catalog in U.S. English is installed automatically. Message catalogs are also available for the following national languages:

- Brazilian Portuguese
- French
- German
- Italian
- Japanese
- Korean
- Spanish
- Simplified Chinese
- Traditional Chinese

Man pages

UNIX[®] man pages, in U.S. English, for the following:

- Control commands
- Message Queue Interface (MQI) commands
- MQSC commands

WebSphere MQ components

WebSphere MQ support for the Global Security Kit (GSKit) and the Key Management tool (iKeyman)
Needed for SSL.

IBM Global Security Kit V6
Needed for SSL.

Client

The following components of WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries are available on the Clients CD-ROMs.

Runtime

Mandatory component. Provides support for external applications.

SDK Needed for application development.

Client Provides remote access to WebSphere MQ. Must be connected to a server. To install a client on the same machine as a server, use the Server CD-ROM; otherwise use the Clients CD-ROMs.

Sample programs

Sample application programs. Needed if you want to check your WebSphere MQ installation using the verification procedures described in this book.

Java messaging

The files needed for messaging using Java (includes Java Messaging Service).

Message catalogs

A message catalog in U.S. English is installed automatically. Message catalogs are also available for the following national languages:

- Brazilian Portuguese
- French
- German
- Italian
- Japanese
- Korean
- Spanish
- Simplified Chinese
- Traditional Chinese

WebSphere MQ support for the Global Security Kit (GSKit) and the Key Management tool (iKeyman)
Needed for SSL.

IBM Global Security Kit V6
Needed for SSL.

Documentation

HTML and PDF versions of the WebSphere MQ for Linux products books are available on the Documentation CD-ROM package, on two CD-ROMs, in some or all of the following national languages:

- Brazilian Portuguese
- French
- German
- Italian
- Japanese
- Korean

- Spanish
- Simplified Chinese
- Traditional Chinese
- U.S. English

See “Online information” on page 44 for details of the documentation CD-ROM package.

Note: HTML and PDF versions of the WebSphere MQ books can be viewed directly from the CD-ROMs.

Filesets

The filesets that correspond to each of the components are listed in Table 2.

Attention:

In Table 2, on Linux for Intel replace <arch> with i386 and on Linux for zSeries replace <arch> with s390.

Table 2. Filesets and components

Fileset	Component
gsk6bas-6.0-n.nn.<arch>.rpm ¹	The IBM Global Security kit. You must install this before installing the WebSphere MQ support for the Global Security kit.
MQSeriesClient-5.3.0-1.<arch>.rpm	Client
MQSeriesJava-5.3.0-1.<arch>.rpm	Java package.
MQSeriesKeyMan-5.3.0-1.<arch>.rpm	WebSphere MQ support for the IBM Global Security kit. You must install this after installing the Global Security kit.
MQSeriesMan-5.3.0-1.<arch>.rpm	Man pages (U.S. English)
MQSeriesMsg_de-5.3.0-1.<arch>.rpm	Message catalog (German)
MQSeriesMsg_es-5.3.0-1.<arch>.rpm	Message catalog (Spanish)
MQSeriesMsg_fr-5.3.0-1.<arch>.rpm	Message catalog (French)
MQSeriesMsg_it-5.3.0-1.<arch>.rpm	Message catalog (Italian)
MQSeriesMsg_ja-5.3.0-1.<arch>.rpm	Message catalog (Japanese)
MQSeriesMsg_ko-5.3.0-1.<arch>.rpm	Message catalog (Korean)
MQSeriesMsg_pt-5.3.0-1.<arch>.rpm	Message catalog (Brazilian Portuguese)
MQSeriesMsg_Zh_CN-5.3.0-1.<arch>.rpm	Message catalog (Simplified Chinese)
MQSeriesMsg_Zh_TW-5.3.0-1.<arch>.rpm	Message catalog (Traditional Chinese)
MQSeriesRuntime-5.3.0-1.<arch>.rpm	Runtime
MQSeriesSamples-5.3.0-1.<arch>.rpm	Sample programs
MQSeriesSDK-5.3.0-1.<arch>.rpm	SDK
MQSeriesServer-5.3.0-1.<arch>.rpm	Server
Notes: 1. To find the actual value represented by n.nn, look on the server or client CDs.	

readme file

Before starting to install the WebSphere MQ for Linux products, review the readme file for the latest information on the product. The readme files for all supported national languages are found in the READMEES directory on each CD-ROM.

Chapter 2. Preparing to install the WebSphere MQ for Linux products

This chapter describes what to do to prepare your system for installing WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries (see “Preparing for installation”).

If you are migrating from an earlier version of MQSeries, read “Migrating from an earlier version” on page 11.

“National language considerations” on page 11 describes how to select the national language for your WebSphere MQ installation.

Preparing for installation

Before you install the WebSphere MQ for Linux products, you need to:

1. Create the file systems used to hold WebSphere MQ and its data.
2. Set up the user ID and group for WebSphere MQ.

Creating WebSphere MQ file systems

The installation directory for the WebSphere MQ product code is /opt/mqm. Working data is stored in /var/mqm. You cannot change these.

Creating a file system for the product code

Install the WebSphere MQ for Linux products in /opt/mqm. The space required depends on how many components you install. Typically you need 109 MB (Linux for Intel) or 105 MB (Linux for zSeries) for a server installation, or 27 MB (Linux for Intel) or 28 MB (Linux for zSeries) for a client installation without SSL. You need 100 MB (Linux for Intel) or 93 MB (Linux for zSeries) for a client installation with SSL.

If you cannot install the product code in this file system (for example, if it is too small to contain the product), you can do one of the following:

1. Create a new file system and mount it as /opt/mqm.
2. Create a new directory anywhere on your machine, and create a symbolic link from /opt/mqm to this new directory. For example:

```
mkdir /bigdisk/mqm
ln -s /bigdisk/mqm /opt/mqm
```

Whichever of these options you choose, you must do it *before* installing the product code. The file system into which the code is installed can be a remote network device, for example, NFS. However, you must define the mount options defined on that device to allow **setuid** programs, including root access, to run.

Creating a file system for the working data

Before you install the WebSphere MQ for Linux products, create and mount a journalized file system called /var/mqm. Use a partition strategy with a separate volume for the WebSphere MQ data. This means that other system activity is not affected if a large amount of WebSphere MQ work builds up.

Preparation

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 SSL trace that is written to the `/var/mqm/trace` directory

Allow 50 MB as a minimum for a WebSphere MQ server. You need less space in `/var/mqm` for a WebSphere MQ client, typically 15 MB.

Creating separate file systems for working data

You can also create separate file systems for your log data (`/var/mqm/log`) and error files (`/var/mqm/errors`). If possible, store log files on a different physical volume from the WebSphere MQ queues (`/var/mqm`). This ensures data integrity in the case of a hardware failure.

If you create separate file systems:

- The `/var/mqm` and `/var/mqm/log` directories *must* be on a local file system.
- The `/var/mqm/errors` directory can be NFS mounted.

Attention

If you choose to NFS-mount `/var/mqm/errors`, the error logs might be lost if the network fails.

If you are creating separate file systems, allow a minimum of 30 MB of storage for `/var/mqm`, 20 MB of storage for `/var/mqm/log`, and 4 MB of storage for `/var/mqm/errors`.

If you want to use individual queues that will hold more than 2 GB of data, you must enable `/var/mqm` to use large files.

The size of the log file depends on the log settings that you use. The size we recommend is for circular logging using the default settings. For further information on log sizes see the *WebSphere MQ System Administration Guide*.

Setting up the user ID and group

A user ID of the name `mqm`, with a primary group of `mqm`, is created automatically during installation (unless you are using Caldera Linux). After installation, the `mqm` user ID owns the directories and files that contain the resources associated with the product.

You can create the user ID and group IDs yourself, as described in the next section. For example, you might want to do this if you are setting up all security groups before installing WebSphere MQ. If you are using Caldera Linux, you *must* create them yourself.

Creating the user ID and group

If you want to create the required user ID and group ID yourself, you must do it *before* you install WebSphere MQ and you must create *both* IDs; if you create only one of them, the installation will fail. Both user ID and group ID must be set to `mqm`. For stand-alone machines, you can create the new user ID and group IDs

locally; for machines administered in a network information services (NIS) domain, an administrator must create the IDs on the NIS master server machine.

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.

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

Migrating from an earlier version

This section describes differences between WebSphere MQ for Linux for Intel and earlier versions of the product.

Client applications

An MQSeries Version 5 client can connect to all queue managers that support client attach. Note, however, that you cannot use features and structures specific to WebSphere MQ for Linux for Intel, V5.3 in your client application.

National language considerations

This section includes information on displaying messages in your national language and national language support for manuals.

Displaying messages in your national language

Messages in U.S. English are always available. If you require messages in a different language, ensure that:

1. You install the appropriate message catalog (see “WebSphere MQ components” on page 5).
2. Your **NLSPATH** environment variable includes the appropriate directory. For example, to select messages in German use the following:

```
export LANG=de
export NLSPATH=/usr/share/locale/%L/LC_MESSAGES/%N
```

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

National language support for manuals

The documentation for WebSphere MQ is supplied in HTML and PDF formats on a separate CD-ROM. The documentation is available in any of the languages that are supported by the WebSphere MQ for Linux products.

See “Online information” on page 44 for more information about hypertext linking between books in different national languages.

Chapter 3. Installing the WebSphere MQ for Linux for Intel or Linux for zSeries server

This chapter tells you how to install the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries server.

It also tells you how to migrate from a version of MQSeries (see “Migrating from an earlier version” on page 16), and describes some other procedures that might be needed after you have installed WebSphere MQ.

Chapter 4, “Verifying the server installation” on page 19 describes how to verify that your installation of the WebSphere MQ server is working.

If you want to install the WebSphere MQ client, see Chapter 5, “Installing the WebSphere MQ for Linux for Intel or Linux for zSeries client” on page 29.

Kernel configuration

WebSphere MQ makes use of System V IPC resources, in particular shared memory and semaphores. The default configuration of these resources, supplied with your installation, is probably adequate for WebSphere MQ but if you have a large number of queues or connected applications, you might need to increase this configuration.

The amount of System V IPC resources available may be determined by looking at the contents of the following files:

- `/proc/sys/kernel/shmmax` - The maximum size of a shared memory segment.
- `/proc/sys/kernel/shmni` - The maximum number of shared memory segments.
- `/proc/sys/kernel/shmall` - The maximum amount of shared memory that may be allocated.
- `/proc/sys/kernel/sem` - The maximum number and size of semaphore sets that may be allocated.

For example, to view the maximum size of a shared memory segment that can be created enter:

```
cat /proc/sys/kernel/shmmax
```

To change the maximum size of a shared memory segment to 256 MB enter:

```
echo 268435456 > /proc/sys/kernel/shmmax
```

To configure these values every time the machine is restarted we recommend that you add these commands to a startup script in `/etc/rc.d/...`

Maximum open files

If the system is heavily loaded, you might need to increase the maximum possible number of open files. If your distribution supports the `proc` filesystem you can do this by issuing the following command:

```
echo 32768 > /proc/sys/fs/file-max
```

If you are using a pluggable security module such as PAM (Pluggable Authentication Module), ensure that this does not unduly restrict the number of

Kernel configuration

open files for the 'mqm' user. For a standard WebSphere MQ queue manager, set the 'nofile' value to 10240 or more for the 'mqm' user. We recommend that you add this command to a startup script in /etc/rc.d/...

Maximum processes

A running WebSphere MQ queue manager consists of a number of thread programs, and each connected application will increase the number of threads running in the queue manager processes. By default, the Linux 2.4 kernel is capable of running a large number of processes; however, you should ensure that the maximum number of processes which the mqm user is allowed to run is not unduly restricted by one of the pluggable security modules such as PAM. Set nproc for the mqm user to 4090 or more.

Installation procedure

This section describes the installation of the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries server, using the Red Hat Package Manager (RPM) installer, enabling you to choose which components you want to install. The components and filesets are listed in "WebSphere MQ components" on page 5; you must install at least the Runtime, SDK, and Server components.

Note: If you are using a screenreader, you are recommended to use the silent installation option, so that you can accept the license without viewing it.

Before you start the installation procedure, make sure you have prepared your system as described in "Preparing for installation" on page 9.

1. Log in as root.
2. Mount the WebSphere MQ for Linux for Intel, or WebSphere MQ for Linux for zSeries, Server CD-ROM on the target machine, and change into the CD-ROM directory.

Notes:

- a. If you do not have a locally attached CD-ROM drive, you can copy the contents of the CD-ROM from a machine that does have a CD-ROM drive to the target machine using, for example, the ftp utility.

You can now install WebSphere MQ from the local copy. When you do, *ensure* that you copy the entire contents of the CD-ROM and maintain the directory structure when you place the files on the target machine.

- b. If the machine hosting the CD-ROM has an NFS Server capability, you can mount the contents of the CD-ROM on the target machine using NFS.
3. Run the mqlicense.sh script.

If you want to view a text-only version of the license, which can be read by a screen-reader, type:

```
mqlicense.sh -text_only
```

The license is displayed.

Note: Pay particular attention to the section that outlines the number of license units you need, because you will be asked later to confirm that you have purchased sufficient license units for the number of processors you have in your computer.

Installing the server

If you accept the license, the installation continues. If you decline, the message: **Product cannot be installed until the license agreement has been accepted...** is displayed, and the installation fails.

If you are performing a silent or remote install, you can run the `mqlicense.sh` script with the `-accept` option, so that the license is accepted without being displayed.

4. Use the **rpm -i** command to install each component that you require. For example:

On Intel, enter the following commands (in this order) for a minimum installation:

```
rpm -i MQSeriesRuntime-5.3.0-1.i386.rpm
rpm -i MQSeriesSDK-5.3.0-1.i386.rpm
rpm -i MQSeriesServer-5.3.0-1.i386.rpm
```

On zSeries, enter the following commands (in this order) for a minimum installation:

```
rpm -i MQSeriesRuntime-5.3.0-1.s390.rpm
rpm -i MQSeriesSDK-5.3.0-1.s390.rpm
rpm -i MQSeriesServer-5.3.0-1.s390.rpm
```

The WebSphere MQ license notice is shown when the first component is installed; it is not shown again for subsequent components.

Once you have installed the WebSphere MQ for Linux products, you need to run the **setmqcap** command, inputting the number of processors that you have paid for. The relationship between processors and license units for UNIX servers is shown in Table 3.

Table 3. Relationship between processors and license units for UNIX servers

Server	License units required
RISC 1-2 processors per box	4
RISC 3-8 processors per box	8
RISC 9-23 processors per box	16
RISC 24 or more processors per box	30

The first time that you start a queue manager on this machine, if you have not already run the **setmqcap** command, you get a warning saying Purchased license units not set (use **setmqcap**), or if you have already run **setmqcap** but entered an incorrect value, you get the warning Insufficient license units. You need to run **setmqcap** to correct this before you can start a queue manager.

Note: Ensure that `/bin/sh` is a valid shell interpreter compatible with the Bourne shell, or the post-installation configuration of WebSphere MQ will not complete successfully.

If your Linux machine was not installed with RPM, you might see a prerequisites failure of `/bin/sh` when you try to install WebSphere MQ. This is because the RPM tables do not recognize that a valid shell interpreter is installed.

Installing the server

If this occurs, you can reinstall the `/bin/sh` shell using RPM, or specify the RPM option `--nodeps` to disable dependency checking during installation of the WebSphere MQ for Linux products.

Migrating from an earlier version

The Java support previously supplied in SupportPac MA88 – MQSeries classes for Java and MQSeries classes for Java Message Service – is now part of the WebSphere MQ for Linux products. If you have installed SupportPac MA88, you must remove it before installing WebSphere MQ for Linux for Intel.

Always backup the `/var/mqm` directory before starting to migrate from a version of MQSeries for Linux.

To migrate to WebSphere MQ for Linux for Intel, V5.3:

1. End all queue manager activity on the target machine.
2. Uninstall the old MQSeries product as described in Chapter 8, “Uninstalling the WebSphere MQ for Linux products” on page 41. Do not delete the `/var/mqm` directory tree if you want to retain existing WebSphere MQ information, for example your queue manager data. After you uninstall MQSeries for Linux, V5.2, manually remove the following directories:

```
/opt/mqm/html  
/opt/mqm/books
```

3. Install WebSphere MQ for Linux for Intel, V5.3 as described in “Installation procedure” on page 14.

Differences between WebSphere MQ for Linux for Intel, V5.3 and earlier versions of MQSeries for Linux are described in “Migrating from an earlier version” on page 11.

AMQ_INHIBIT_DLCL0SE

Set the environment variable `AMQ_INHIBIT_DLCL0SE=TRUE` globally to overcome a known problem with base Linux. Details of the known problem can be found at:

www.gnu.org:8080/cgi-bin/wwwgnats.pl/full/1738

The effect of setting the environment variable is to prevent WebSphere MQ from calling the `dlclose()` function to unload shared libraries that were dynamically loaded using `dlopen()` within WebSphere MQ libraries. The typical effect of not setting this environment variable is a segmentation violation shortly after an MQDISC from a threaded process (either a WebSphere MQ internal process or a user application). This is a temporary workaround and will not be required when a fix to the base Linux problem is available.

Setting the queue manager CCSID

The coded character set identifier (CCSID) is fixed when you create a queue manager. The CCSID is determined by the locale that you use to run the `crtmqm` command. For more information on using command sets see the *WebSphere MQ System Administration Guide*

The following table gives an example of using the `LC_ALL` parameter to change the code set and CCSID.

Table 4. Example of setting the CCSID

Example	Code set	CCSID
export LC_all=en_US	ISO8859-1	819

To modify an existing queue manager CCSID, follow this procedure:

1. Start MQSC commands by typing: `runmqsc`
2. Display the existing queue manager CCSID, using the MQSC command:
`display qmgr ccsid`
3. Change the CCSID to the new CCSID with the MQSC command:
`alter qmgr ccsid (new.ccsid)`

where *new.ccsid* is the number of the new CCSID.
4. Stop MQSC commands by typing: `end`
5. Stop the queue manager, and then restart it and any channels that it uses.

See Chapter 10, “Code sets supported by the WebSphere MQ for Linux products” on page 47 for further information about supported code sets. See “Migrating to euro support” on page 50 for information on migrating to a CCSID that supports the euro character.

User exits

User exit programs are supported by the WebSphere MQ for Linux products.

- For information about data-conversion exits, see the *WebSphere MQ Application Programming Guide*.
- For information about channel exits, see the *WebSphere MQ Intercommunication* book.
- For information about cluster-workload exits, see the *WebSphere MQ Queue Manager Clusters* book.

Compile a user exit program for a non-threaded environment as follows:

```
gcc -I/opt/mqm/inc -shared -lmqm -ldl -o exit <exit>.c
```

Compile a user exit program for a multi-threaded environment as follows, entering the command on one line:

```
gcc -I/opt/mqm/inc -D_REENTRANT -shared -lmqm_r -lpthread -ldl \
-o exit_r <exit>.c
```

For more information, see Chapter 11, “Building applications on Linux” on page 53.

Chapter 4. Verifying the server installation

This chapter describes how to verify that the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries server has been correctly installed and configured. You can verify a WebSphere MQ server installation at different levels:

- A local (stand-alone) installation that has no communication links with other WebSphere MQ installations. This is described in “Verifying a local installation”.
- A server-to-server installation that includes communication links to other WebSphere MQ installations. This is described in “Verifying a server-to-server installation” on page 20.

See Chapter 6, “Verifying the client installation” on page 33 if you have a client/server installation that includes communication links between a server machine and a WebSphere MQ client.

Verifying a local installation

To verify a local installation with a simple configuration of one queue manager and one queue, use sample programs to put a message onto the queue and to read the message from the queue.

Note: WebSphere 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.

The procedures outlined in this section describe how to configure your default queue manager from the command line.

Setting up the installation

From a shell window, use these steps to install a queue manager and a queue:

1. Create a default queue manager called `venus.queue.manager` by entering the following command:

```
crtmqm -q venus.queue.manager
```

You will see messages telling you that the queue manager has been created, and that the default WebSphere MQ objects have been created.

2. To start the queue manager, type: `strmqm`

A message tells you when the queue manager has started.

The first time that you start a queue manager on a machine, you might get one of the following warnings: Purchased license units not set (use `setmqcap`) or Insufficient license units. See “Installation procedure” on page 14 for how to correct this.

3. Enable MQSC commands by typing: `runmqsc`

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

4. Define a local queue called `ORANGE.QUEUE` by entering the following command:

```
define qlocal (orange.queue)
```

Verifying a local installation

A message tells you when the queue has been created.

5. Stop MQSC by typing: `end`

You will see some messages, followed by the command prompt.

You have now defined:

- A default queue manager called `venus.queue.manager`
- A queue called `ORANGE.QUEUE`

Testing the installation

To test the queue manager and queue, use the **amqspout** sample program to put a message on the queue, and the **amqsget** sample program to get the message back from the queue:

1. Change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.
2. Put a message on the queue using the following command:

```
./amqspout ORANGE.QUEUE
```

The following messages are displayed:

```
Sample amqspout0 start  
target queue is ORANGE.QUEUE
```

3. Type some message text, on one or more lines, followed by a blank line. The following message is displayed:

```
Sample amqspout0 end
```

Your message is now on the queue and the command prompt is displayed again.

4. To get the message from the queue, use the following command:

```
./amqsget ORANGE.QUEUE
```

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

You have now successfully verified the local installation.

Verifying a server-to-server installation

There are more steps involved in verifying a server-to-server installation, because you need to check the communications link between the two machines. Before you can do this, you must ensure that the communications protocol has been installed and configured on both systems. WebSphere MQ for Linux for Intel supports both TCP and SNA; WebSphere MQ for Linux for zSeries supports TCP. This example explains how to verify your installation if you are using TCP; if you are using SNA, refer to the *WebSphere MQ Intercommunication* manual.

To test the installation, set up two workstations, one as a sender and one as a receiver. You test communications between sender and receiver using sample programs, which you must install on both workstations. The verification procedure

assumes that both workstations are UNIX machines; if this is not the case, some of the commands are different (for details, refer to the documentation for the workstation).

Note: WebSphere 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.

Setting up the sender workstation

From a shell window, use these steps to set up the sender machine:

1. Create a default queue manager called `saturn.queue.manager` with the following command:

```
crtmqm -q saturn.queue.manager
```

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

2. To start the queue manager, type: `strmqm`

A message tells you when the queue manager has started.

The first time that you start a queue manager on a machine, you might get one of the following warnings: Purchased license units not set (use `setmqcap`) or Insufficient license units. See “Installation procedure” on page 14 for how to correct this.

3. Start MQSC commands by typing: `runmqsc`

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

4. Define a local queue called `TRANSMIT1.QUEUE` (to be used as a transmission queue) by entering the following command:

```
define qlocal (transmit1.queue) usage (xmitq)
```

A message tells you when the queue has been created.

5. Define a local definition of the remote queue with the following command:

```
define qremote (local.def.of.remote.queue) rname (orange.queue) +  
rqmname ('venus.queue.manager') xmitq (transmit1.queue)
```

The name specified by the `RNAME` parameter must be the same as the name of the queue to which you are sending the message (`ORANGE.QUEUE` on the receiver workstation).

6. Define a sender channel with the following command:

```
define channel (first.channel) chltype (sdr) +  
conname ('con-name(port)') xmitq (transmit1.queue) trtype (tcp)
```

The value *con-name* is the TCP address of the receiver workstation, and *port* is the port name, with 1414 as default.

7. Stop MQSC by typing: `end`

Some messages are displayed, followed by the command prompt.

You have now defined the following objects:

Verifying a server-to-server installation

- A default queue manager called saturn.queue.manager
- A transmission queue called TRANSMIT1.QUEUE
- A local definition of a remote queue called LOCAL.DEF.OF.REMOTE.QUEUE
- A sender channel called FIRST.CHANNEL

Setting up the receiver workstation

Now follow these steps to set up the receiver:

1. Create a default queue manager called venus.queue.manager by entering the following command:

```
crtmqm -q venus.queue.manager
```

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

2. To start the queue manager, type: `strmqm`

A message tells you when the queue manager has started.

The first time that you start a queue manager on a machine, you might get one of the following warnings: Purchased license units not set (use `setmqcap`) or Insufficient license units. See “Installation procedure” on page 14 for how to correct this.

3. Start a WebSphere MQ listener as a background task by entering the following command:

```
runmqclsr -t tcp &
```

You can use the `-p` parameter to specify the number of a port that the listener should listen on. If you do not specify it, the default of 1414 is used. The port number must be the same as the one that you specify when setting up the sender.

4. Enable MQSC commands by typing: `runmqsc`

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

5. Define a local queue called ORANGE.QUEUE by entering the following command:

```
define qlocal (orange.queue)
```

A message tells you when the queue has been created.

6. Define a receiver channel with the following command:

```
define channel (first.channel) chltype (rcvr) trptype (tcp)
```

A message tells you when the channel has been created.

7. Stop MQSC by typing: `end`

Some messages are displayed, followed by the command prompt.

You have now defined the following objects:

- A default queue manager called venus.queue.manager
- A queue called ORANGE.QUEUE
- A receiver channel called FIRST.CHANNEL

Testing communication between the workstations

Finally, use the **amqspout** sample program to put a message from the sender workstation to a queue at the receiver, and the **amqsget** sample program on the receiver workstation to get the message from the queue:

1. If the queue managers on the two workstations have stopped, restart them now by typing: `strmqm`
2. On the **sender** workstation, start the sender channel as a background task by entering the following command:

```
runmqchl -c FIRST.CHANNEL -m saturn.queue.manager &
```

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

3. On the **sender** workstation, change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.
4. To put a message on the local definition of the remote queue (which in turn specifies the name of the remote queue), use the following command:

```
./amqspout LOCAL.DEF.OF.REMOTE.QUEUE
```

You will see the following messages:

```
Sample amqspout0 start
target queue is LOCAL.DEF.OF.REMOTE.QUEUE
```

5. Type some message text on one or more lines, followed by a blank line. You will see the following message:

```
Sample amqspout0 end
```

Your message is now on the queue and the command prompt is displayed again.

6. On the **receiver** workstation, change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.
7. To get the message from the queue at the receiver, enter the following command:

```
./amqsget ORANGE.QUEUE
```

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

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

Verifying the installation using the JMS Postcard application

To use the **JMS Postcard**, you must install the optional Java Messaging and sample programs features of WebSphere MQ, and you must have a working JRE (Java Runtime Environment).

Note: If you want the **JMS Postcard** application to use font and color settings different from the Java Virtual Machine defaults, change the Postcard.ini file. For more information see *WebSphere MQ Using Java*.

Use the **JMS Postcard** application to verify that WebSphere MQ is successfully installed, the associated communication links are working properly, and that WebSphere MQ Java Messaging support is successfully installed.

You can use the **JMS Postcard** application to verify a *local* installation (which does not have any communication links with other WebSphere MQ installations). For further information, see “Using the JMS Postcard application to verify a local installation” on page 25.

You can also use the **JMS Postcard** application to verify communication between your machine and the machine of another named user, where that machine is running WebSphere MQ and using TCP/IP. Therefore, you can use the **JMS Postcard** application to verify that you can communicate with another server. To use the **JMS Postcard** application for this type of verification, either both machines must be in the same cluster (the simplest method), or you must configure channels to communicate between the two machines (see “Verifying a server-to-server installation” on page 20)

To ensure that both machines are part of the same cluster, you can do either of the following:

- Run the **JMS Postcard** application for the first time on each machine. The **JMS Postcard** application detects that there are no local queue managers defined for that machine, and displays the Default Configuration wizard so that you can create the default queue managers and link them to the default cluster.
- Create your own queue managers on both machines, create a cluster, and ensure that the queue managers that you create on each machine belong to the same cluster.

You can use the **JMS Postcard** application with existing queue managers, as long as both queue managers belong to the same cluster, or communication channels have been configured between the queue managers. Alternatively, you can exchange postcards between two queues that are using the same queue manager as their mailbox.

For further information, see “Using the Postcard application to verify a server-to-server installation” on page 27.

Setting up your system to run the JMS Postcard

Before you can run the **JMS Postcard** application, you must ensure that:

- You are a member of the WebSphere MQ administrators group (mqm). If you are not a member of mqm, ask someone who is a member to run the Default Configuration tool on your behalf, either directly, or by running the **JMS Postcard** application, which runs the Default Configuration tool indirectly.

Verifying a server-to-server installation

- A supported Java Virtual Machine is installed on your system and suitably configured in the system path so that the java command can be executed.
- The required environment variables are defined.

Define the environment variables as follows:

1. Log on as user mqm.
2. Add the required environment variables to the .profile file using a text editor. These are shown in the following table:

CLASSPATH	/opt/mqm/java/lib/com.ibm.mq.jar: /opt/mqm/java/lib/com.ibm.mqjms.jar: /opt/mqm/java/lib/connector.jar: /opt/mqm/java/lib/jms.jar: /opt/mqm/java/lib/jndi.jar: /opt/mqm/java/lib/jta.jar: /opt/mqm/java
MQ_JAVA_INSTALL_PATH	/opt/mqm/java
MQ_JAVA_DATA_PATH	/var/mqm
LD_LIBRARY_PATH	/opt/mqm/java/lib
PATH (for JRE settings)	\$PATH:/opt/java1.3/bin

Using the JMS Postcard application to verify a local installation

Note: A queue manager that can be used as a mailbox must be already set up. This queue manager can be either the default queue manager, which is set up automatically when you run the Default Configuration wizard, or another queue manager that you have set up yourself.

To verify that the local installation is working, you can use the **JMS Postcard** application. This application allows you to create two postcards on the same machine and send messages between them, verifying that WebSphere MQ messaging is working correctly on the machine, and that WebSphere MQ Java Messaging support is successfully installed.

Note: If you want the **JMS Postcard** application to use font and color settings different from the Java Virtual Machine defaults, change the Postcard.ini file. For more information see *WebSphere MQ Using Java*.

1. Change directory to /opt/mqm/java/bin
2. Run the Postcard shell script.

If there are no queue managers on your machine, the **Incomplete Default Configuration** window is displayed. From here you can either run the Default Configuration wizard to create a queue manager to use with the **JMS Postcard** application, or you can close the application.

3. The **JMS Postcard - Sign On** window is displayed.

Type in a nickname to use to send messages within the postcard application (for example, user1).

If the only queue manager on your machine is the default queue manager that you created by running the Default Configuration wizard, this queue manager is used as your mailbox for postcards. Click **OK** to display your first postcard, then go to step 5.

Verification — local installation

4. Select the queue manager to use as the mailbox:
 - If you have created one or more of your own queue managers, but you have not run the Default Configuration wizard, select the appropriate queue manager from the list displayed.
 - If you have run the Default Configuration wizard and you want to use the default queue manager, but there is more than one queue manager on your machine, select the **Advanced** checkbox, then select **Use Default Configuration as mailbox**.
 - If you have run the Default Configuration wizard and also created one or more of your own queue managers, and you do not want to use the default queue manager, select the **Advanced** checkbox, select **Choose queue manager as mailbox**, then select the appropriate queue manager from the list displayed.

When your selection is complete, click **OK** to display your first postcard window.

5. Run the Postcard shell script again. This opens a second postcard window.
6. The **JMS Postcard - Sign On** panel is displayed again. Type in a second nickname to use to send messages within the Postcard application (for example, user2).
7. Repeat the selection of the queue manager that you want to use as the mailbox (as described earlier). The queue manager you select for this second postcard must either be in the same cluster as the queue manager for the first postcard, or communication links must have been set up between them.
8. You now have two postcards, one with the nickname user1 and one with the nickname user2.
9. In one of the postcards (for example, user1), type some message text in the **Message:** field and the nickname of the other postcard (for example, user2) in the **To:** field.

Note: Because the sender and receiver are on the same machine, you do not need to type anything in the **On:** field.

If the receiver is on a different machine, and is using the default queue manager as the mailbox, you need to type the recipient's machine in the **On:** field.

If the receiver is on a different machine, and is not using the default queue manager as the mailbox, you need to type the recipient's queue manager in the **On:** field.

10. Click **Send**.
11. The **Postcards sent and received** area of the postcard shows details of the message. In the sending postcard, the message is displayed as *sent*. In the receiving postcard, the message is displayed as *received*.
12. From the receiving postcard, double-click the message in the **Postcards sent and received** area to view it.

If you complete this procedure successfully, it verifies that WebSphere MQ is working correctly, and that the WebSphere MQ Java messaging support is successfully installed.

What next?

Depending on your situation, you might want to do the following:

- Install WebSphere MQ on other machines. Follow the same installation procedure that you used for the first machine. Ensure that you use the Join Default Cluster window in the Default Configuration wizard to add the other machines to your first machine's cluster.
- Install the WebSphere MQ client on other machines. See the Chapter 5, "Installing the WebSphere MQ for Linux for Intel or Linux for zSeries client" on page 29.
- Continue with further administration tasks. See the *WebSphere MQ System Administration Guide*.

Using the Postcard application to verify a server-to-server installation

You can use the **JMS Postcard** application to verify communication between your machine and the machine of another named user, where that machine uses TCP/IP. Therefore, you can use the Postcard applications to verify that you can communicate with another server. Before you start:

- Make sure that TCP/IP and WebSphere MQ are installed on both machines.
- Check that either of the following apply:
 - Both machines are in the same cluster (this is the simplest method)
 - You have configured channels to communicate between the two machines (see "Verifying a server-to-server installation" on page 20).

To verify that the communication between two machines, the *sender* of the message and the *receiver*, are working correctly, and that the WebSphere MQ Java messaging support is successfully installed, you can use the **JMS Postcard** application.

On the sender machine:

1. Change directory to /opt/mqm/java/bin
2. Run the Postcard shell script.

If there are no queue managers on your machine, the **Incomplete Default Configuration** window is displayed. From here you can either run the Default Configuration wizard to create a queue manager to use with the **JMS Postcard** application, or you can close the application.

3. The **JMS Postcard - Sign On** window is displayed.

Type in a nickname to use to send messages within the Postcard application (for example, user1).

If the only queue manager on your machine is the default queue manager that you created by running the Default Configuration wizard, this queue manager is used as your mailbox for postcards. Click **OK** to display your postcard, then go to step 5.

4. Select the queue manager to use as the mailbox:
 - If you have created one or more of your own queue managers, but you have not run the Default Configuration wizard, select the appropriate queue manager from the list displayed.

Verification — server-to-server

- If you have run the Default Configuration wizard and you want to use the default queue manager, but there is more than one queue manager on your machine, select the **Advanced** checkbox, then select **Use Default Configuration as mailbox**.
- If you have run the Default Configuration wizard and also created one or more of your own queue managers, and you do not want to use the default queue manager, select the **Advanced** checkbox, select **Choose queue manager as mailbox**, then select the appropriate queue manager from the list displayed.

When your selection is complete, click **OK** to display your postcard.

5. Type in the following:
 - Some message text in the **Message:** field.
 - The nickname of the recipient in the **To:** field.
 - If the receiver is using the default queue manager as the mailbox, the machine name of the recipient in the **On:** field. If the receiver is not using the default queue manager, type the queue manager name in the **On:** field.
6. Click **Send**.

On the receiver machine:

1. To receive the message, run the Postcard shell script.

If there are no queue managers on your machine, the **Incomplete Default Configuration** window is displayed. From here you can either run the Default Configuration wizard to create a queue manager to use with the **JMS Postcard** application, or you can close the application.
2. Type in the nickname of the recipient, select the queue manager to use as the mailbox, then click **OK** to display the **JMS Postcard** window.
3. In the **Postcards sent and received** area of the postcard, details of the new message are displayed. The message is displayed as *received*.

When this message arrives, this verifies that WebSphere MQ and the Java messaging support are correctly installed and that your communication link between the two machines is working correctly.

When all installation and verification is complete, you are ready to start using WebSphere MQ (see the *WebSphere MQ System Administration Guide*).

Chapter 5. Installing the WebSphere MQ for Linux for Intel or Linux for zSeries client

There are two types of clients in WebSphere MQ for Linux for Intel, V5.3 and WebSphere MQ for Linux for zSeries, V5.3:

Standard client

This is the standard WebSphere MQ client. Use this client if you do **not** require Secure Sockets Layer (SSL) support. You install this client from Client CD-ROM 2.

Client with SSL

This is the standard WebSphere MQ client with additional code to allow you to use SSL support. You can install the client with SSL from either the client or the server CD.

For more information about SSL, see the *WebSphere MQ Security* book.

This chapter tells you how to install each of the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries clients.

If you want to install the client on the same machine as a WebSphere MQ server, see “Installing the client on the same machine as a server” on page 31.

Chapter 6, “Verifying the client installation” on page 33 describes how to verify that your installation of the WebSphere MQ client is working.

If you want to install the WebSphere MQ server, see Chapter 3, “Installing the WebSphere MQ for Linux for Intel or Linux for zSeries server” on page 13.

Installation procedure

This installation procedure uses the Red Hat Package Manager (RPM) installer, enabling you to choose which components you want to install. The components (or filesets) are listed in “WebSphere MQ components” on page 5.

Before you start the installation procedure, make sure that you have prepared your system as described in “Preparing for installation” on page 9.

1. Log in as root.
2. Mount the WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries Client CD-ROM 2 on the target machine.

Notes:

- a. If you do not have a locally attached CD-ROM drive, you can copy the contents of the client directory from a machine that does have a CD-ROM drive to the target machine using, for example, the ftp utility.
You can now install WebSphere MQ from the local copy.
 - b. If the machine hosting the CD-ROM has an NFS Server capability, you can mount the contents of the CD-ROM on the target machine using NFS.
3. Select the set of client components that you want to use for the installation, and change into the corresponding directory on the CD-ROM.

Client installation

If you select a set of client components without the SSL support, you cannot install the IBM Global Security Kit (GSKit) V6 or the WebSphere MQ support for iKeyman. Table 5 shows each set of client components and its corresponding directory on the CD-ROM.

Table 5.

Set of client components	Directory on WebSphere MQ Client CD-ROM 2
Linux for Intel without the SSL support	/linux_intel/MQClient
Linux for Intel with the SSL support	/linux_intel/MQClientwithSSL
Linux for zSeries without the SSL support	/linux_zseries/MQClient
Linux for zSeries with the SSL support	/linux_zseries/MQClientwithSSL

4. Run the `mqlicense.sh` script.

The license is displayed. If you accept the license, the installation continues. If you decline, the message: **Product cannot be installed until the license agreement has been accepted...** is displayed, and the installation fails.

If you are performing a silent or remote install, you can run the `mqlicense.sh` script with the `-accept` option, so that the license is accepted without being displayed.

5. Use the `rpm -i` command to install each component that you require. For example:

On Intel, enter the following commands (in this order) for a minimum installation:

```
rpm -i MQSeriesRuntime-5.3.0-1.i386.rpm
rpm -i MQSeriesClient-5.3.0-1.i386.rpm
```

On zSeries, enter the following commands (in this order) for a minimum installation:

```
rpm -i MQSeriesRuntime-5.3.0-1.s390.rpm
rpm -i MQSeriesClient-5.3.0-1.s390.rpm
```

The WebSphere MQ license notice is shown when the first component is installed; it is not shown again for subsequent components.

6. Use the `rpm -i` command to install any other components that you want.

Note: Distributions that do not use the Red Hat Package Manager (RPM) installer by default might generate an error when you install the WebSphere MQ for Linux products.

Migrating to and from the WebSphere MQ SSL support

To upgrade a WebSphere MQ client without the SSL support to one with the SSL support, install the two additional file sets, IBM Global Security Kit (GSKit) V6 and WebSphere MQ support for iKeyman. To downgrade a WebSphere MQ client with the SSL support to one without the SSL support, simply remove these two components. You do not have to remove any other components.

Installing the client on the same machine as a server

To install a WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries client on a server machine, use the WebSphere MQ Server CD-ROM. Choose the Client component on the Server CD-ROM to install the client code on the server machine, and use the installation procedure described in “Installation procedure” on page 14. Do not use the WebSphere MQ Clients CD-ROM.

You might install components from the WebSphere MQ Clients CD-ROM onto a machine, and subsequently want to install the WebSphere MQ Server component on the same machine. If so, first remove from the machine any components that you installed from the WebSphere MQ Clients CD-ROM. Then use the WebSphere MQ Server CD-ROM to install the server, client, and any other components that you need.

If you install a WebSphere MQ client on the same machine as a WebSphere MQ server, the client is not connected to the server automatically. Configure the communication channel (an MQI channel) between the client and the server, as described in Chapter 6, “Verifying the client installation” on page 33.

Chapter 6. Verifying the client installation

This chapter describes how to verify that you have correctly installed and configured the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries client. To do this you use a client/server installation that includes communication links between a WebSphere MQ server machine and the WebSphere MQ client.

Verifying the installation

To verify your WebSphere MQ client installation, you need a workstation set up as a WebSphere MQ server, in addition to your client workstation. You can then use sample programs (which must be installed on the client) to test communications between the client and server.

The verification procedure assumes that:

- TCP/IP is configured and initialized on both the server and the client machines. If you are using SNA, refer to the *WebSphere MQ Intercommunication* manual.
- The WebSphere MQ server product is installed on a UNIX machine; if this is not the case, some of the commands will be different (for details, refer to the *WebSphere MQ Clients* book).

Note: WebSphere 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.

Setting up the server workstation

From a shell window, use these steps to set up the server workstation:

1. Create a default queue manager called `saturn.queue.manager` by entering the following command:

```
crtmqm -q saturn.queue.manager
```

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

2. To start the queue manager, type: `strmqm`
A message tells you when the queue manager has started.
3. Enable MQSC commands by typing: `runmqsc`
A message tells you that an MQSC session has started. MQSC has no command prompt.
4. Define a local queue called `QUEUE1` by entering the following command:

```
define qlocal(queue1)
```

A message tells you when the queue has been created.

5. Define a server-connection channel by entering the following command on one line:

Verifying a client installation

```
define channel(channel1) chltype(svrconn) \  
trptype(tcp) mcauser('mqm')
```

A message tells you when the channel has been created.

6. Stop MQSC by typing: `end`

Some messages are displayed, and the command prompt is displayed again.

7. Start a WebSphere MQ listener as a background task by entering the following command:

```
runmqlsr -t tcp &
```

You can use the `-p` parameter to specify the number of a port that the listener should listen on. If you do not specify it, the default of 1414 is used. The port number must be the same as the one that you specify when setting up the client.

You have now defined the following objects on the server:

- A default queue manager called `saturn.queue.manager`
- A local queue called `QUEUE1`
- A server-connection channel called `CHANNEL1`

Setting up the client workstation

When a WebSphere MQ application is run on the WebSphere MQ client, the following information is required:

- The name of the MQI channel that connects the client to the server
- The communications protocol
- The address of the server

You provide this information by defining a client-connection channel with the name used for the server-connection channel defined on the server. This example uses the `MQSERVER` environment variable to define the client-connection channel.

Before starting, use the **ping** command to check that your TCP/IP software is correctly configured, and that your WebSphere MQ client and server TCP/IP sessions have been initialized. From the client, enter:

```
ping server-address  
or  
ping n.n.n.n
```

where:

server-address

Is the TCP/IP host name of the server

n.n.n.n

Is the network address of the server

Press `Ctrl-C` to stop the **ping** command.

To create a client-connection channel, set the `MQSERVER` environment variable as follows:

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

where:

CHANNEL1

Is the name of the server-connection channel already defined on the server

TCP Is the communications protocol.

server-address

Is the TCP/IP host name of the server.

port Is optional and is the TCP/IP port number that the server is listening on. If you do not give a port number, WebSphere MQ uses:

- The one specified in the QM.INI file.
- If no value is specified in the QM.INI file, WebSphere MQ uses the port number identified in the TCP/IP services file for the service name WebSphere MQ. If this entry in the services file does not exist, a default value of 1414 is used.

The client and server listener program must use the same port number.

Testing communication between the workstations

On the WebSphere MQ client workstation, use the **amqsputc** sample program to put a message on the queue at the server workstation, and the **amqsgetc** sample program to get the message from the queue back to the client:

1. Change into the /opt/mqm/samp/bin directory, which contains the sample programs.
2. Put a message on the queue at the server using the following command:

```
./amqsputc QUEUE1 saturn.queue.manager
```

This displays the following messages:

```
Sample amqspu0 start  
target queue is QUEUE1
```

3. Type some message text on one or more lines, followed by a blank line. This displays the following message:

```
Sample amqspu0 end
```

Your message is now on the queue and the command prompt is displayed again.

4. To get the message from the queue located on the server, enter the following command:

```
./amqsgetc QUEUE1 saturn.queue.manager
```

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

You have now successfully verified the client installation.

Chapter 7. Applying maintenance to the WebSphere MQ for Linux products

This chapter tells you how to apply maintenance to WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries. A maintenance update in the form of a Program Temporary Fix (PTF), also known as a CSD (Corrective Service Diskette), is supplied on CD-ROM.

PTFs can also be downloaded from:

<http://www.ibm.com/software/mqseries>

You must stop all WebSphere MQ activity, before installation of maintenance on the WebSphere MQ for Linux products, by carrying out the following procedure:

1. Log in as root.
2. Use the **endmqm** command to stop all running queue managers.
3. Stop any listeners associated with the queue managers, using this command:

```
endmqm lsr -m QMgrName
```

4. To check that you have stopped all of them, enter the following:

```
ps -ef | grep mq
```

Check that there are no processes listed that are running command lines beginning `amq` or `runmq`. Ignore any that start with `amqi`.

Installing a PTF

A PTF for WebSphere MQ is supplied in the form of RPM update images, which are applied using the RPM installation tool. Hard disk space is required for the installation, in addition to a similar amount of space to save the previous level (for example, a 16 MB PTF requires up to 32 MB of disk space). Files updated by a PTF installation are kept in the `/opt/mqm/ptf` directory, to allow a PTF to be removed and the previous level restored. Do not delete or move this directory or the files that it contains.

PTF updates are cumulative. You can install your chosen update directly, without installing any previous updates first. The PTF might contain updates for one or more WebSphere MQ filesets. You must install those parts of an update that correspond to the filesets that are installed on your machine.

Attention

When you apply maintenance, do not use the `rpm` command's `-F` option.

To apply a PTF:

1. Log in as root.
2. Mount the CD-ROM containing the PTF with the following command:

```
mount /dev/cdrom /mnt/cdrom
```

Applying maintenance

3. Change into the directory containing the chosen PTF (*ptfname*) with the following command:

```
cd /mnt/cdrom/mq_linux/mqm/ptfname
```
4. Use the `ls` command to list the available updates. For example, if there are level 3 updates for the Runtime, SDK, Server, and Client filesets, you will see the following:

```
MQSeriesRuntime-5.3.0-3.i386.rpm  
MQSeriesSDK-5.3.0-3.i386.rpm  
MQSeriesServer-5.3.0-3.i386.rpm  
MQSeriesClient-5.3.0-3.i386.rpm
```
5. To find out which filesets are installed on your machine, enter the following:

```
rpm -q -a | grep MQSeries
```

For example, if you have the Runtime and Server filesets at level 2, and the SDK and Man filesets at level 1, this will return:

- ```
MQSeriesRuntime-5.3.0-2.i386.rpm
MQSeriesSDK-5.3.0-1.i386.rpm
MQSeriesServer-5.3.0-2.i386.rpm
MQSeriesMan-5.3.0-1.i386.rpm
```
6. Now install all available updates for these filesets:  

```
rpm -i MQSeriesRuntime-5.3.0-3.i386.rpm
rpm -i MQSeriesSDK-5.3.0-3.i386.rpm
rpm -i MQSeriesServer-5.3.0-3.i386.rpm
```
  7. Repeat step 5, and you will see that the Runtime, SDK and Server filesets are now at level 3 (the Man fileset remains at level 1):  

```
MQSeriesRuntime-5.3.0-2.i386.rpm
MQSeriesRuntime-5.3.0-3.i386.rpm
MQSeriesSDK-5.3.0-1.i386.rpm
MQSeriesSDK-5.3.0-3.i386.rpm
MQSeriesServer-5.3.0-2.i386.rpm
MQSeriesServer-5.3.0-3.i386.rpm
MQSeriesMan-5.3.0-1.i386.rpm
```

To update the IBM Global Security Kit, enter the following:

```
rpm -U gsk6bas-6.0-n.nn.<arch>.rpm
```

See the file in the `/opt/mqm/ptf` directory for the actual value represented by `n.nn`. Replace `<arch>` with `i386` (Linux for Intel) or `s390` (Linux for zSeries).

For further information on using RPM to install software packages, see your Linux documentation.

---

## Restoring the previous service level

When a PTF is installed, the original versions of replaced files are saved to allow the updates to be removed if necessary. To restore the previous service level, issue an RPM uninstall for all the filesets that were updated by the PTF as follows:

1. Log in as root.
2. To find out which filesets are installed on your machine, enter the following:  

```
rpm -q -a | grep MQSeries
```

Using the example given in “Installing a PTF” on page 37, returns:

```
MQSeriesRuntime-5.3.0-3.i386.rpm
MQSeriesSDK-5.3.0-3.i386.rpm
MQSeriesServer-5.3.0-3.i386.rpm
MQSeriesMan-5.3.0-1.i386.rpm
```



## Applying maintenance

3. Remove all the updates applied at level 3, with the following commands:  

```
rpm -e MQSeriesRuntime-5.3.0-3.i386.rpm
rpm -e MQSeriesSDK-5.3.0-3.i386.rpm
rpm -e MQSeriesServer-5.3.0-3.i386.rpm
```
4. Repeat step 2 to check that the filesets have been returned to their original levels:  

```
MQSeriesRuntime-5.3.0-2.i386.rpm
MQSeriesSDK-5.3.0-1.i386.rpm
MQSeriesServer-5.3.0-2.i386.rpm
MQSeriesMan-5.3.0-1.i386.rpm
```

For further information on using RPM to install software packages, see your Linux documentation.



---

## Chapter 8. Uninstalling the WebSphere MQ for Linux products

This chapter tells you how to remove WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries from your system.

Before starting to uninstall, end all WebSphere MQ activity.

1. Log in as root.
2. Use the **dspmqr** command to display the state of all the queue managers on the system.
3. Use the **endmqm** command to stop all running queue managers.
4. Stop any listeners associated with the queue managers, using the command:

```
endmqm | sr -m QMgrName
```

5. To check that you have stopped all of them, enter the following:

```
ps -ef | grep mq
```

Check that there are no processes listed that are running command lines beginning amq or runmq. Ignore any that start with amqi.

---

### Uninstallation procedure

Before you can uninstall WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries you must find out the names of the WebSphere MQ packages (components) currently installed on your system. To list all the packages with their version information, enter the following:

```
rpm -q -a | grep MQ
rpm -q -a | grep gsk
```

To list all the installed packages using only their WebSphere MQ names, enter the following:

```
rpm -q -a --queryformat "%{NAME}\n" | grep MQ
rpm -q -a --queryformat "%{NAME}\n" | grep gsk
```

To remove a package (for example MQSeriesSamples), enter the following:

```
rpm -e MQSeriesSamples
```

Some of the installed WebSphere MQ packages are dependent on others. The **rpm** command will not remove a package if others are dependent on it. For this reason, you must uninstall the WebSphere MQ packages in such an order that each one you uninstall has no dependencies from other packages.

To list all the WebSphere MQ packages on which a named package (for example MQSeriesServer) depends, enter the following:

```
rpm -q --requires MQSeriesServer
```

Alternatively, remove the components in the order shown below (remove only those packages that have been installed on your machine).

## Uninstalling WebSphere MQ

Table 6. Removing WebSphere MQ components

| Component                                                | Package name         |
|----------------------------------------------------------|----------------------|
| Man pages                                                | MQSeriesMan          |
| Message catalog                                          | MQSeriesMsg_xx       |
| Sample programs                                          | MQSeriesSamples      |
| Client                                                   | MQSeriesClient       |
| Server                                                   | MQSeriesServer       |
| SDK                                                      | MQSeriesSDK          |
| Runtime                                                  | MQSeriesRuntime      |
| Support for Global Security kit                          | MQSeriesKeyMan       |
| Global Security kit                                      | gsk6bas <sup>1</sup> |
| Java support                                             | MQSeriesJava         |
| <b>Notes:</b>                                            |                      |
| 1. Other products may also have dependencies on gsk6bas. |                      |

After uninstalling WebSphere MQ, delete the /var/mqm and /opt/mqm directory trees (unless you are migrating to a later version of WebSphere MQ).

---

## Chapter 9. WebSphere MQ documentation

This chapter describes the documentation for the WebSphere MQ for Linux products. It starts with a list of the publications, including their PDF filenames, and then discusses:

- “Hardcopy books”
- “Online information” on page 44
- “SupportPacs” on page 45
- “WebSphere MQ newsgroups” on page 45

If there is similar information in this book and any of the books in the following list, the information in this book should take precedence.

WebSphere MQ is described in the following books:

*Table 7. WebSphere MQ family books*

| PDF file name | Order Number | Title                                                                         |
|---------------|--------------|-------------------------------------------------------------------------------|
| CSQZAE07      | SC34-6059    | <i>WebSphere MQ Intercommunication</i>                                        |
| CSQZAH05      | SC34-6061    | <i>WebSphere MQ Queue Manager Clusters</i>                                    |
| CSQZAF07      | GC34-6058    | <i>WebSphere MQ Clients</i>                                                   |
| AMQZAG03      | SC34-6068    | <i>WebSphere MQ System Administration Guide</i>                               |
| CSQZAJ07      | SC34-6055    | <i>WebSphere MQ Script (MQSC) Command Reference</i>                           |
| CSQZAX03      | SC34-6069    | <i>WebSphere MQ Event Monitoring</i>                                          |
| CSQZAI01      | SC34-6060    | <i>WebSphere MQ Programmable Command Formats and Administration Interface</i> |
| AMQZA004      | GC34-6057    | <i>WebSphere MQ Messages</i>                                                  |
| CSQZAL07      | SC34-6064    | <i>WebSphere MQ Application Programming Guide</i>                             |
| CSQZAK07      | SC34-6062    | <i>WebSphere MQ Application Programming Reference</i>                         |
| AMQZAN07      | SC34-6067    | <i>WebSphere MQ Using C++</i>                                                 |
| CSQZAW11      | SC34-6066    | <i>WebSphere MQ Using Java</i>                                                |
| AMTYAK08      | SC34-6065    | <i>WebSphere MQ Application Messaging Interface</i>                           |
| CSQZAS01      | SC34-6079    | <i>WebSphere MQ Security</i>                                                  |
| CSQZAY01      | SC34-6113    | <i>WebSphere MQ Bibliography and Glossary</i>                                 |

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### Hardcopy books

This book, and all the books listed in Table 7 , are available for you to order or print.

You can order publications from the IBMLink™ Web site at:

<http://www.ibm.com/ibmlink>

In the United States, you can also order publications by dialing **1-800-879-2755**.

In Canada, you can order publications by dialing **1-800-IBM-4YOU (1-800-426-4968)**.

## Hardcopy books

For further information about ordering publications, contact your IBM authorized dealer or marketing representative.

For information about printing books, see “PDF”.

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## Online information

This section describes:

- “Publications supplied with the product”
- “HTML and PDF books on the World Wide Web” on page 45
- “Online help” on page 45

## Publications supplied with the product

The WebSphere MQ documentation is supplied separately on a CD-ROM alongside the product. You can either view the documents directly from CD, or you can install them on your computer (either before or after installing the WebSphere MQ product).

The WebSphere MQ online documentation is delivered in HTML, Microsoft® Compiled HTML Help (.CHM), and PDF formats on CD-ROM.

### HTML

You can view the WebSphere MQ online documentation in HTML format directly from the documentation CD-ROM. All books are available in U.S. English and also in some or all of the following national languages:

- Brazilian Portuguese
- French
- German
- Italian
- Japanese
- Korean
- Spanish
- Simplified Chinese
- Traditional Chinese

When you read the books in HTML, you can follow hypertext links from one book to another. If you are reading translated books and link to a book that is not available in your national language, the U.S. English version of the book is opened instead.

### PDF

A PDF (Portable Document Format), corresponding to each hardcopy book, is available on the documentation CD-ROM. You can read PDFs using Adobe Acrobat Reader. Also, you can download them to your own file system, or you can print them on a PostScript printer.

The PDFs are available in U.S. English in the *en\_US* directory, and also in some or all of the following national languages. To find out which ones are available in your language, look for the appropriate directory on the CD-ROM. The PDFs are in a subdirectory called *ll\_LL*, where *ll\_LL* is one of the following:

- *de\_DE* (German)
- *es\_ES* (Spanish)
- *fr\_FR* (French)
- *it\_IT* (Italian)
- *ja\_JP* (Japanese)
- *ko\_KR* (Korean)

- pt\_BR (Brazilian Portuguese)
- zh\_CN (Simplified Chinese)
- zh\_TW (Traditional Chinese)

Within these directories, you can find the complete set of PDFs that are available. Table 7 on page 43 shows the file names used for the PDF files.

## HTML and PDF books on the World Wide Web

The WebSphere MQ books are available on the World Wide Web as well as on the product CD-ROM. They are available in PDF and HTML format. The WebSphere MQ product family Web site is at:

<http://www.ibm.com/software/mqseries>

By following links from this Web site you can:

- Obtain latest information about the WebSphere MQ product family.
- Access the WebSphere MQ books in HTML and PDF formats.

## Online help

Man pages are provided for all API calls, MQSC commands, and relevant control commands including **crtmqm**, **strmqm**, and **endmqm**.

## SupportPacs

SupportPacs contain material that complements the WebSphere MQ family products, for example, there are a number of SupportPacs to help you with performance and capacity planning. Many SupportPacs are freely available for download, others can be purchased as a fee-based service. SupportPacs can be obtained from the following Web site:

<http://www.ibm.com/software/mqseries/support>

## WebSphere MQ newsgroups

WebSphere MQ support provides a number of newsgroups where members share their knowledge and experience with others. A list of the newsgroups can be found at:

<http://www.ibm.com/software/mqseries/support/newsgroups>

## Whitepapers and migration documents

IBM produces a number whitepapers that contain other useful information about WebSphere MQ. These can be found at:

<http://www.ibm.com/software/mqseries/library>

## Service support summary (PTF readmes)

The service support summary gives a summary of the support information and end of service dates for in-service MQSeries products. This can be found at:

<http://www.ibm.com/software/mqseries/support/summary>

## Online information



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## Chapter 10. Code sets supported by the WebSphere MQ for Linux products

WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries support most of the code sets used by the Linux locales. They support the subsets of the user's environment that define the conventions for a specific culture, provided as standard on Linux.

The CCSID (Coded Character Set Identifier) used in WebSphere MQ to identify the code set used for the message and message header data is obtained by analyzing the code-set value returned by the locale.

If the locale is not set, CCSID 819 (the ISO-8859-1 code set) is used.

Table 8 shows the locales and the CCSIDs that are registered for the code set used by the locale. Note that not all the locales listed below are supported by all versions of Linux.

*Table 8. Locales and CCSIDs for Linux*

| Locale            | Language                    | Code Set       | CCSID |
|-------------------|-----------------------------|----------------|-------|
| *_*@euro          | Any locale with this suffix | ISO-8859-15    | 923   |
| *_*.utf8          | Any locale with this suffix | UTF-8          | 1208  |
| *_*.utf8@euro     | Any locale with this suffix | UTF-8          | 1208  |
| C                 | English                     | ANSI_X3.4-1968 | 819   |
| POSIX             | English                     | ANSI_X3.4-1968 | 819   |
| af_ZA             | Afrikaans                   | ISO-8859-1     | 819   |
| ar_* <sup>1</sup> | Arabic                      | ISO-8859-6     | 1089  |
| ar_IN             | Arabic                      | UTF-8          | 1208  |
| be_BY             | Byelorussian                | CP1251         | 1251  |
| bg_BG             | Bulgarian                   | CP1251         | 1251  |
| bokmal            | Norwegian                   | ISO-8859-1     | 819   |
| bokmål            | Norwegian                   | ISO-8859-1     | 819   |
| br_FR             | Breton                      | ISO-8859-1     | 819   |
| bs_BA             | Bosnian                     | ISO-8859-2     | 912   |
| ca_ES             | Catalan                     | ISO-8859-1     | 819   |
| catalan           | Catalan                     | ISO-8859-1     | 819   |
| croatian          | Croatian                    | ISO-8859-2     | 912   |
| cs_CZ             | Czech                       | ISO-8859-2     | 912   |
| czech             | Czech                       | ISO-8859-2     | 912   |
| da_DK             | Danish                      | ISO-8859-1     | 819   |
| danish            | Danish                      | ISO-8859-1     | 819   |
| dansk             | Danish                      | ISO-8859-1     | 819   |
| de_* <sup>1</sup> | German                      | ISO-8859-1     | 819   |
| deutsch           | German                      | ISO-8859-1     | 819   |

## Supported code sets

Table 8. Locales and CCSIDs for Linux (continued)

| Locale            | Language      | Code Set   | CCSID |
|-------------------|---------------|------------|-------|
| dutch             | Dutch         | ISO-8859-1 | 819   |
| eesti             | Eesti         | ISO-8859-1 | 819   |
| el                | Greek         | ISO-8859-7 | 813   |
| el_GR             | Greek         | ISO-8859-7 | 813   |
| en_* <sup>1</sup> | English       | ISO-8859-1 | 819   |
| es_* <sup>1</sup> | Spanish       | ISO-8859-1 | 819   |
| estonian          | Estonian      | ISO-8859-1 | 819   |
| et_EE             | Estonian      | ISO-8859-1 | 819   |
| eu_ES             | Basque        | ISO-8859-1 | 819   |
| fa_IR             | Farsi         | UTF-8      | 1208  |
| fi_FI             | Finnish       | ISO-8859-1 | 819   |
| finnish           | Finnish       | ISO-8859-1 | 819   |
| fo_FO             | Faeroese      | ISO-8859-1 | 819   |
| fr_* <sup>1</sup> | French        | ISO-8859-1 | 819   |
| français          | French        | ISO-8859-1 | 819   |
| french            | French        | ISO-8859-1 | 819   |
| ga_IE             | Gaelic        | ISO-8859-1 | 819   |
| galego            | Galego        | ISO-8859-1 | 819   |
| galician          | Galician      | ISO-8859-1 | 819   |
| german            | German        | ISO-8859-1 | 819   |
| gl_ES             | Galician      | ISO-8859-1 | 819   |
| greek             | Greek         | ISO-8859-7 | 813   |
| gv_GB             | Gaelic (Manx) | ISO-8859-1 | 819   |
| hebrew            | Hebrew        | ISO-8859-8 | 916   |
| he_IL             | Hebrew        | ISO-8859-8 | 916   |
| hi_IN             | Hindi         | UTF-8      | 1208  |
| hr_HR             | Croatian      | ISO-8859-2 | 912   |
| hrvatski          | Hrvatski      | ISO-8859-2 | 912   |
| hu_HU             | Hungarian     | ISO-8859-2 | 912   |
| hungarian         | Hungarian     | ISO-8859-2 | 912   |
| icelandic         | Icelandic     | ISO-8859-1 | 819   |
| id_ID             | Indonesian    | ISO-8859-1 | 819   |
| it_* <sup>1</sup> | Italian       | ISO-8859-1 | 819   |
| italian           | Italian       | ISO-8859-1 | 819   |
| iw_IL             | Hebrew        | ISO-8859-8 | 916   |
| ja_JP             | Japanese      | EUC-JP     | 5050  |
| ja_JP.PCK         | Japanese      | PCK        | 943   |
| ja_JP.eucjp       | Japanese      | EUC-JP     | 5050  |
| ja_JP.sjis        | Japanese      | SHIFT_JIS  | 943   |
| ja_JP.ujis        | Japanese      | EUC-JP     | 5050  |

Table 8. Locales and CCSIDs for Linux (continued)

| Locale            | Language            | Code Set    | CCSID |
|-------------------|---------------------|-------------|-------|
| japanese          | Japanese            | EUC-JP      | 5050  |
| japanese.euc      | Japanese            | EUC-JP      | 5050  |
| japanese.sjis     | Japanese            | SHIFT_JIS   | 943   |
| kl_GL             | Greenlandic         | ISO-8859-1  | 819   |
| ko_KR             | Korean              | EUC-KR      | 970   |
| ko_KR.euckr       | Korean              | EUC-KR      | 970   |
| korean            | Korean              | EUC-KR      | 970   |
| korean.euc        | Korean              | EUC-KR      | 970   |
| kw_GB             | Cornish             | ISO-8859-1  | 819   |
| lithuanian        | Lithuanian          | ISO-8859-13 | 921   |
| lt_LT             | Lithuanian          | ISO-8859-13 | 921   |
| lv_LV             | Latvian, Lettish    | ISO-8859-13 | 921   |
| mi_NZ             | Maori               | ISO-8859-13 | 921   |
| mk_MK             | Macedonian          | ISO-8859-5  | 915   |
| mr_IN             | Marathi             | UTF-8       | 1208  |
| ms_MY             | Malay               | ISO-8859-1  | 819   |
| mt_MT             | Maltese             | ISO-8859-3  | 913   |
| nb_NO             | Norwegian - Bokmål  | ISO-8859-1  | 819   |
| nl_* <sup>1</sup> | Dutch               | ISO-8859-1  | 819   |
| nn_NO             | Norwegian - Nynorsk | ISO-8859-1  | 819   |
| no_NO             | Norwegian           | ISO-8859-1  | 819   |
| norwegian         | Norwegian           | ISO-8859-1  | 819   |
| nynorsk           | Norwegian           | ISO-8859-1  | 819   |
| oc_FR             | Ocitan              | ISO-8859-1  | 819   |
| pl_PL             | Polish              | ISO-8859-2  | 912   |
| polish            | Polish              | ISO-8859-2  | 912   |
| portuguese        | Portuguese          | ISO-8859-1  | 819   |
| pt_* <sup>1</sup> | Portuguese          | ISO-8859-1  | 819   |
| ro_RO             | Romanian            | ISO-8859-2  | 912   |
| romanian          | Romanian            | ISO-8859-2  | 912   |
| ru_RU             | Russian             | ISO-8859-5  | 915   |
| russian           | Russian             | ISO-8859-5  | 915   |
| sk_SK             | Slovak              | ISO-8859-2  | 912   |
| slovak            | Slovak              | ISO-8859-2  | 912   |
| sl_SI             | Slovenian           | ISO-8859-2  | 912   |
| slovene           | Slovene             | ISO-8859-2  | 912   |
| slovenian         | Slovene             | ISO-8859-2  | 912   |
| spanish           | Spanish             | ISO-8859-1  | 819   |
| sq_AL             | Albanian            | ISO-8859-1  | 819   |
| sr_YU             | Serbian             | ISO-8859-2  | 912   |

## Supported code sets

Table 8. Locales and CCSIDs for Linux (continued)

| Locale                                                                                                                                                                       | Language            | Code Set   | CCSID |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|-------|
| sr_YU@cyrillic                                                                                                                                                               | Serbian             | ISO-8859-5 | 915   |
| sr_YU.utf8@cyrillic                                                                                                                                                          | Serbian             | UTF-8      | 1208  |
| sv_* <sup>1</sup>                                                                                                                                                            | Swedish             | ISO-8859-1 | 819   |
| swedish                                                                                                                                                                      | Swedish             | ISO-8859-1 | 819   |
| ta_IN                                                                                                                                                                        | Tamil               | UTF-8      | 1208  |
| te_IN                                                                                                                                                                        | Telugu              | UTF-8      | 1208  |
| th_TH                                                                                                                                                                        | Thai                | TIS-620    | 874   |
| thai                                                                                                                                                                         | Thai                | TIS-620    | 874   |
| tl_PH                                                                                                                                                                        | Tagalog             | ISO-8859-1 | 819   |
| tr_TR                                                                                                                                                                        | Turkish             | ISO-8859-9 | 920   |
| turkish                                                                                                                                                                      | Turkish             | ISO-8859-9 | 920   |
| ur_PK                                                                                                                                                                        | Urdu                | UTF-8      | 1208  |
| uz_UZ                                                                                                                                                                        | Uzbek               | ISO-8859-1 | 819   |
| vi_VN                                                                                                                                                                        | Vietnamese          | UTF-8      | 1208  |
| yi_US                                                                                                                                                                        | Yiddish             | cp1255     | 1255  |
| zh_CN                                                                                                                                                                        | Simplified Chinese  | GB2312     | 1381  |
| zh_CN.gb18030                                                                                                                                                                | Simplified Chinese  | GB18030    | 5488  |
| zh_CN.gbk                                                                                                                                                                    | Simplified Chinese  | GBK        | 1383  |
| zh_TW                                                                                                                                                                        | Traditional Chinese | BIG5       | 950   |
| zh_TW.euctw                                                                                                                                                                  | Traditional Chinese | eucTW      | 964   |
| <b>Notes:</b><br>1. The WebSphere MQ for Linux products support all country or territory locale variants of this language that are built for the codeset shown in the table. |                     |            |       |

For further information about interplatform support for these locales, see the *WebSphere MQ Application Programming Reference*.

---

## Migrating to euro support

To use the *euro* character with WebSphere MQ, first install any operating system updates necessary to display the euro character.

Now modify your WebSphere MQ system:

- Edit the existing CCSID.TBL file, in `/var/mqm/conv/table/`, to enable the new euro version of the coded character set identifier (CCSID). To do this, remove the first # symbol from the required line of the **CCSID Mapping** section of the CCSID.TBL file. When you have done this, all new queue managers you create will adopt the new euro CCSID.

**Note:** If you want to create a new queue manager with a CCSID that supports the euro character, select a euro-supporting locale. For more information refer to the WebSphere MQ Web site at: <http://www.ibm.com/software/mqseries>

- To modify any existing queue managers that do not support the euro character, follow this procedure:
  1. Enable MQSC commands by typing: `runmqsc`
  2. To record the existing queue manager CCSID, enter the following:

```
display qmgr ccsid
```

3. To change the CCSID to the euro support CCSID, enter the following:

```
alter qmgr ccsid (no. of ccsid)
```

4. Stop the MQSC commands by typing: `end`
5. Stop the queue manager.
6. Restart the queue manager and any channels that it uses by typing: `strmqm`

Now any new message issued using the queue manager CCSID uses the new euro CCSID. All messages now received using MQGET with conversion, and requesting the queue manager CCSID to be used, are converted into the euro CCSID. CCSIDs and object text (for example descriptions, definitions, and exit names) from existing messages are not changed.

Now modify your applications to support the euro character. If these use hard coded CCSIDs, ensure that they now use the new euro CCSID.



---

## Chapter 11. Building applications on Linux

This appendix provides information specific to the WebSphere MQ for Linux products about:

- “Preparing C programs”
- “Preparing C++ programs”
- “Linking libraries” on page 54

If you want to build user exits, see “User exits” on page 17.

---

### Preparing C programs

The WebSphere MQ C include files are listed in Table 9. They are installed in the directory `/opt/mqm/inc/`. The include files are symbolically linked into `/usr/include`.

Table 9. C include files for WebSphere MQ

| File name                                                                                              | Contents                                                             |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <code>&lt;cmqc.h&gt;</code>                                                                            | Call prototypes, data types, structures, return codes, and constants |
| <code>&lt;cmqcfh.h&gt;</code>                                                                          | Definitions for programmable command formats (PCFs)                  |
| <code>&lt;cmqxc.h&gt;</code>                                                                           | Definitions for channel exits and data-conversion exits              |
| <code>&lt;cmqzc.h&gt;</code>                                                                           | Definitions for installable services                                 |
| <b>Note:</b> The files are protected against multiple declaration, so you can include them many times. |                                                                      |

### Compiling C programs

Precompiled C programs are supplied in the `/opt/mqm/samp/bin` directory. To build a sample from source code, use the `gcc` compiler.

For example, to compile the sample program **amqspu0**:

```
gcc -o amqspu0 amqspu0.c -lmqm
```

If you want to use the programs on a machine that has only the WebSphere MQ for Linux for Intel or WebSphere MQ for Linux for zSeries client installed, recompile the programs to link them with the client library instead. That is, for single-threaded applications:

```
gcc -o amqspu0 amqspu0.c -lmqic
```

---

### Preparing C++ programs

For information about using C++, see the *WebSphere MQ Using C++* book. Please use the following information in conjunction with the information in that book.

## Building applications

### Compilers for the WebSphere MQ for Linux products

| Platform | Compiler  | Libraries                                                                                 |
|----------|-----------|-------------------------------------------------------------------------------------------|
| Linux    | g++ (GNU) | -lmqb23gl -lmqc23gl<br>libmqb23gl_r.so libmqc23gl_r.so<br>libmqb23gl_r.so libmqc23gl_r.so |

## Linking libraries

You must link with the WebSphere MQ libraries that are appropriate for your application type: if you want to run multi-threaded applications, you must link with a multi-threaded version of the WebSphere MQ libraries.

| Program type   | Single-threaded library files   | Multi-threaded library files        |
|----------------|---------------------------------|-------------------------------------|
| Server for C   | libmqm.so                       | libmqm_r.so                         |
| Client for C   | libmqic.so                      | libmqic_r.so                        |
| Server for C++ | libmqb23gl.so,<br>libmqc23gl.so | libmqb23gl_r.so,<br>libmqc23gl_r.so |
| Client for C++ | libmqb23gl.so,<br>libmqc23gl.so | libmqb23gl_r.so,<br>libmqc23gl_r.so |

**Note:** If you are writing an installable service (as described in the *WebSphere MQ System Administration Guide*) link to the `libmqmzf_r.so` library. If you build a client application that might use an SSL client channel to connect to the queue manager, you must link your application with the threaded versions of the WebSphere MQ client libraries even if your application itself is not going to use threads.

## Selecting the libraries to match your compiler (Intel only)

When you are using the GNU C++ compiler you must make sure that any libraries containing C++ functions are built using the same version of the C++ compiler as your application. To give you as much flexibility as possible, and to adhere to this condition, WebSphere MQ contains three versions of the WebSphere MQ C++ interface libraries. Each one matches a supported level of the GNU compiler.

The supported versions of the compiler are:

- 2.95.2
- 3.0.3 (the default)

Libraries that match these versions are in the `/opt/mqm/lib/<version>` directory. Links are created from the default version to the `/opt/mqm/lib` directory.

To verify the version of the compiler that you are using, enter the command

```
g++ --version
```

If your chosen compiler version does not match the default version selected by WebSphere MQ, you must reconfigure the compiler to use the correct libraries by linking the C++ libraries in the WebSphere MQ lib directory to those that match your compiler. To do this, issue the following commands replacing `<version>` with the version of your compiler.



## Selecting libraries to match the compiler

```
ln -s -f /opt/mqm/lib/<version>/libimqb23gl.so /opt/mqm/lib/libimqb23gl.so
ln -s -f /opt/mqm/lib/<version>/libimqs23gl.so /opt/mqm/lib/libimqs23gl.so
ln -s -f /opt/mqm/lib/<version>/libimqc23gl.so /opt/mqm/lib/libimqc23gl.so
ln -s -f /opt/mqm/lib/<version>/libimqb23gl_r.so /opt/mqm/lib/libimqb23gl_r.so
ln -s -f /opt/mqm/lib/<version>/libimqs23gl_r.so /opt/mqm/lib/libimqs23gl_r.so
ln -s -f /opt/mqm/lib/<version>/libimqc23gl_r.so /opt/mqm/lib/libimqc23gl_r.so
```



---

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