WebSphere MQ

IBM

Quick Beginnings for Solaris

Version 7.0

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Version 7.0

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This edition of the book applies to:

- IBM WebSphere MQ for Solaris, Version 7.0

and to any subsequent releases and modifications until otherwise indicated in new editions.

Contents

Tables

Chapter 1. Migrating to WebSphere MQ for Solaris Version 7.0

Follow this information to migrate from previous versions of WebSphere® MQ for Solaris to WebSphere MQ for Solaris Version 7.0.

About this task

If you want to migrate to WebSphere MQ Version 7.0 complete this task.

If you migrate from a previous level of this product without first backing up your system, you **cannot** revert to your previous level, so back up your system **before** you install WebSphere MQ Version 7.0. This will enable you to back out the upgrade if necessary. If you back out the upgrade, however, you cannot recover any work performed by WebSphere MQ Version 7.0.

1. Stop all MQ applications on the machine and the applications accessing remote machines.

2. End all WebSphere MQ activity.

   a. Log in as MQ administrator.

   b. Use the **endmqm** command to stop all running queue managers.

   c. Stop any listeners associated with the queue managers, using the command:

      ```
      endmqlsr -m QMgrName
      ```

   d. 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`.

3. Log in as root.

4. Function supplied by the SupportPacs in the table below has been superseded by function in WebSphere MQ Version 7.0. Remove these SupportPacs before installing WebSphere MQ Version 7.0.

   Table 1. SupportPacs superseded by WebSphere MQ Version 7.0

SupportPac™ Number	Description
MA0C	MQSeries® Publish/subscribe
MA0R	WebSphere MQ transport for SOAP
MA88	MQSeries Classes for Java™ and WebSphere MQ classes for Java Message Service
MACR	MQSeries Client libraries for Sun Solaris (64-bit)

   Review any other installed SupportPacs for their applicability to WebSphere MQ Version 7.0.

5. Uninstall any WebSphere MQ service updates and then uninstall WebSphere MQ.

6. Install WebSphere MQ Version 7.0 by following the tasks set out in *Quick Beginnings for SolarisQuick Beginnings for Solaris*.

Important information for Beta driver users

If you have previously installed a WebSphere MQ Version 7.0 Beta driver, you **must** uninstall this driver and clean up any remaining files **before** you install the GA version of WebSphere MQ Version 7.0.

After you have migrated to WebSphere MQ Version 7.0

Perform these tasks immediately after you migrate to WebSphere MQ Version 7.0.

About this task

Immediately after you migrate to WebSphere MQ Version 7.0, you must start your queue managers at least once to migrate your file system structure before you start any WebSphere MQ listeners. Otherwise, you will not be able to start WebSphere MQ listeners after migration.

If you cannot connect to a migrated queue manager using MQ Explorer and receive the error message "SYSTEM.MQEXPLORER.REPLY.MODEL not defined", run the following command on that queue manager:

```
strmqm -c
```

This command refreshes existing system objects with default values (for example, setting the MCAUSER attribute of a channel definition to blanks), and creates the queue required by the WebSphere MQ Explorer.

Chapter 2. Installing a WebSphere MQ server

Information describing how to install a WebSphere MQ Version 7.0 server.

This chapter describes how to install a WebSphere MQ Version 7.0 server. The information covers topics such as preparing for installation and verifying your installation, as well as installation itself. If you already have an installation of WebSphere MQ, and are migrating to WebSphere MQ Version 7.0 see Chapter 1, "Migrating to WebSphere MQ for Solaris Version 7.0," on page 1 before installing WebSphere MQ Version 7.0.

IBM® WebSphere MQ for Sun Solaris can be installed as a server or a client.

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

A WebSphere MQ client is a component that allows an application running on one system to communicate with a queue manager running on another system. The output from the call is sent back to the client, which passes it back to the application. To install a WebSphere MQ client see, Chapter 3, "Installing a WebSphere MQ client," on page 33.

It is possible to have both a server and a client installation on the same machine, for instructions on how to do this see, Chapter 4, "Installing a client on the same machine as a server," on page 51.

See the WebSphere MQ System Administration Guide for an introduction to WebSphere MQ concepts and objects.

For information on the components that can be included in the server and client installations see, "WebSphere MQ Components" on page 17.

The installation process is divided into the following set of tasks, complete all of these tasks in sequence:

Preparing to install

Before you install WebSphere MQ, complete the following tasks:

Checking hardware and software requirements

This section details the operating system requirements, the prerequisite software and optional software required for using WebSphere MQ Version 7.0.

Checking prerequisite hardware and software - SPARC platform

Check through this topic to identify which hardware and software is supported for use with WebSphere MQ for Sun Solaris as a server on the SPARC platform.

Checking the operating environment:

Before you install WebSphere MQ Version 7.0, you must check that your system meets the hardware and operating system software requirements set for this product and the particular components you intend to install on it.

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.

Hardware

WebSphere MQ for Sun Solaris, Version 7.0 runs on 64-bit Sun SPARC systems only, capable of running the required level of a compatible operating system.

Operating System

The operating systems supported by WebSphere MQ for Sun Solaris, Version 7.0 are:
- Sun Solaris 9
- Sun Solaris 10

Connectivity Requirements

Check that the system has 64-bit compatible communications hardware that supports at least one of the following:
- TCP/IP (IPv4 and IPv6, provided by the operating system)
- SNAP-IX Version 7.0 (SNA)

Storage Requirements

The storage requirements for the WebSphere MQ for Sun Solaris, Version 7.0 depend on which components you install, 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. The approximate amount of storage space required for a server installation is detailed below.

Table 2. Storage requirements for a WebSphere MQ server

Storage Requirements	Storage Requirement in MB in /usr	Storage Requirement in MB in /opt
WebSphere MQ Server installation	6	247
IBM Global Security Kit V7 (32-bit)	0	16
IBM Global Security Kit V7 (64-bit)	0	14

You can use the df -k command to determine the amount of free space on your system.

Disk storage is also required for
- Prerequisite software
- Optional software
- Your application programs

| If the WebSphere MQ Server installation storage requirements cannot be met then
| you can follow the process as described in: "Creating a file system for the product
| code" on page 11

Checking optional software:
Check through this topic to identify which additional software is supported for use
with WebSphere MQ Version 7.0.

Compilers

The following compilers are supported for WebSphere MQ for Sun Solaris
applications:

- Sun ONE Studio 9, Compiler Collection
- Sun Studio 10 Software for Solaris Platforms
- Sun ONE Studio 11 Enterprise Edition for Solaris

Figure 1. C/C++

- Micro Focus Server Express V4.0
| - Micro Focus Server Express V5.0

Figure 2. COBOL

| - 32-bit
| – Sun Solaris Java SDK V1.4 with JDK V1.4.2
| – Sun Solaris Java SDK V5 with JDK V5
| – Sun Solaris Java SDK V6 with JDK V6
| – IBM 32-bit SDK for Solaris, Java 2 Technology Edition V1.4.2
| – IBM 32-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
| – IBM 32-bit SDK for Solaris, Java 2 Technology Edition V6.0
| - 64-bit
| – Sun Java 2 SDK, Standard Edition V1.4.2
| – Sun Java 2 SDK, Standard Edition V5
| – Sun Java 2 SDK, Standard Edition V6
| – IBM® 64-bit SDK for Solaris, Java 2 Technology Edition, Version 1.4.2
| – IBM 64-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
| – IBM 64-bit SDK for Solaris, Java 2 Technology Edition V6.0

Figure 3. Java

Databases

The following databases are supported:
| - IBM DB2® V9.1 for Linux®, Unix and Windows®
| - IBM DB2 V9.5 for Linux, Unix and Windows
| - Informix® Dynamic Server (IDS) V10 with Client SDK V2.90
| - Informix Dynamic Server (IDS) V10.50 with Client SDK V2.91
| - Oracle 10g Release 2
| - Oracle 11g Release 1
| - Sybase Adaptive Server Enterprise (ASE), Version 15, plus Sybase SDK, Version
| 15

Transaction monitors

The following transaction processing monitors (coordination through X/Open XA interface) are supported:

- IBM TXSeries V6.0
- IBM TXSeries V6.1
- IBM TXSeries V6.2
- IBM WebSphere Application Server (WAS) V5.1
- IBM WebSphere Application Server (WAS) V6.0.2
- IBM WebSphere Application Server (WAS) V6.1
- BEA Tuxedo V9.1
- IBM WebLogic Server V9.1

Java Messaging and SOAP transport

If you want to use Java Messaging and SOAP (Simple Object Access Protocol) Support with WebSphere MQ, you need a Java Runtime Environment Version 1.4.2 or later.

For a list of supported JDKs, see http://www-01.ibm.com/software/integration/wmq/requirements/index.html

For further information about using Java with WebSphere MQ, see WebSphere MQ Using Java.

For further information about SOAP with WebSphere MQ, see WebSphere MQ Using Web Services .

If you use a JDK that is not in the list of supported JDKs you should be aware that:

- The JDK might not be FIPS level 140-2 compliant and by using it with WebSphere MQ, WebSphere MQ Version 7.0 will not comply with FIPS 140-2 standards.
- SOAP is not supported.

On Solaris, the 32-bit and 64-bit JDKs are typically installed to the same directory. To run a 64-bit JVM use the -d64 or -d32 parameters on the command line when running a Java application to ensure the correct JVM is used.

Secure Sockets Layer (SSL)

If you want to use the SSL support, you need IBM Global Security Kit V7. This is supplied with WebSphere MQ as one of the components available for installation. If you are migrating from WebSphere MQ Version 5.3 and have no other requirement for the IBM Global Security Kit V6, you can uninstall it using the following process:

1. Login as root.
2. Enter `pkgrm gsk6bas`

The IBM Global Security Kit V6 is uninstalled.

Checking hardware and software requirements - x86-64 platform

Check through this topic to identify which hardware and software is supported for use with WebSphere MQ for Sun Solaris as a server on the x86-64 platform.

Checking the operating environment:

Before you install WebSphere MQ Version 7.0, you must check that your system meets the hardware and operating system software requirements set for this product and the particular components you intend to install on it.

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.

Hardware

WebSphere MQ for Sun Solaris, Version 7.0 runs on all x86-64 (AMD64, EM64T, and compatible processors) systems capable of running the appropriate release of the Solaris operating environment.

Operating System

The operating system supported by WebSphere MQ for Sun Solaris on the x86-64 platform is Sun Solaris 10 with SunSolve recommended Patch Cluster level.

Connectivity Requirements

Check that the system has 64-bit compatible communications hardware that supports TCP/IP. TCP/IP (IPv4 and IPv6) is supplied as part of the operating system.

Storage Requirements

The storage requirements for the WebSphere MQ for Sun Solaris, Version 7.0 depend on which components you install, 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. The approximate amount of storage space required for a server installation is detailed below.

Table 3. Storage requirements for a WebSphere MQ server

Storage Requirements	Storage Requirement in MB in /usr	Storage Requirement in MB in /opt
WebSphere MQ Server installation	6	247
IBM Global Security Kit V7 (32-bit)	0	16
IBM Global Security Kit V7 (64-bit)	0	14

You can use the df -k command to determine the amount of free space on your system.

Disk storage is also required for

- Prerequisite software
- Optional software
- Your application programs

If the WebSphere MQ Server installation storage requirements cannot be met then you can follow the process as described in: "Creating a file system for the product code" on page 11

Checking optional software:
Check through this topic to identify which additional software is supported for use with WebSphere MQ.

Compilers

The following compilers are supported for WebSphere MQ for Sun Solaris applications:

- Sun ONE Studio 10 Enterprise Edition for Solaris
- Sun ONE Studio 11 Enterprise Edition for Solaris

Figure 4. C/C++

- 32-bit
  - Sun Java 2 Platform Standard Edition, Version 1.4.2
  - Sun Java 2 Platform Standard Edition, Version 5.0
  - Sun Java 2 Platform Standard Edition, Version 6.0
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition, Version 1.4.2
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V6.0
- 64-bit
  - Sun Java 2 Platform Standard Edition, Version 5.0
  - Sun Java 2 Platform Standard Edition, Version 6.0
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V6.0

Figure 5. Java

For further information about using Java with WebSphere MQ, see WebSphere MQ Using Java.

Databases

The following databases are supported:
- IBM DB2 V9.1 for Linux, Unix and Windows
- IBM DB2 V9.5 for Linux, Unix and Windows
- Informix Dynamic Server (IDS) V10.50 with Client SDK V2.91
- Oracle 10g Release 2
- Oracle 11g Release 1
- Sybase Adaptive Server Enterprise (ASE) with V15 Sybase SDK V15

| **Transaction monitors**

| The following transaction processing monitors (coordination through X/Open XA
| interface) are supported:
| • IBM TXSeries V6.0
| • IBM TXSeries V6.1
| • IBM TXSeries V6.2
| • IBM WebSphere Application Server (WAS) V5.1
| • IBM WebSphere Application Server (WAS) V6.0.2
| • IBM WebSphere Application Server (WAS) V6.1
| • BEA Tuxedo V9.1
| • IBM WebLogic Server V9.1

Java Messaging and SOAP transport

If you want to use Java Messaging and SOAP (Simple Object Access Protocol)
Support with WebSphere MQ, you need a Java Runtime Environment Version 1.4.2
or later.

| For a list of supported JDKs, see http://www-01.ibm.com/software/integration/
| wmq/requirements/index.html

| For further information about using Java with WebSphere MQ, see WebSphere MQ
| Using Java.

| For further information about SOAP with WebSphere MQ, see WebSphere MQ
| Using Web Services .

| If you use a JDK that is not in the list of supported JDKs you should be aware
| that:
| • The JDK might not be FIPS level 140-2 compliant and by using it with
| WebSphere MQ, WebSphere MQ Version 7.0 will not comply with FIPS 140-2
| standards.
| • SOAP is not supported.

On Solaris, the 32-bit and 64-bit JDKs are typically installed to the same directory.
To run a 64-bit JVM use the -d64 or -d32 parameters on the command line when
running a Java application to ensure the correct JVM is used.

| **Secure Sockets Layer (SSL)**

| If you want to use the SSL support, you need IBM Global Security Kit V7. This is
| supplied with WebSphere MQ as one of the components available for installation.

Setting up the user ID and group ID

WebSphere MQ requires a user ID of the name mqm, with a primary group of mqm.
The mqm user ID owns the directories and files that contain the resources associated
with the product. Create the user ID and group IDs as described in the following
sections.
• "Creating the user ID and group" on page 10
• "Adding existing user IDs to the group" on page 10

Creating the user ID and group

Create the required user ID and group ID *before* you install WebSphere MQ. 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.

It is also suggested that you set the mqm user's home directory to /var/mqm.

Adding existing user IDs to the group

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.

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 locations. The IBM Global Security Kit (GSKit) must also be installed into its default location. (The GSKit enables you to use SSL security on Windows and UNIX® systems.)

WebSphere MQ also writes the following files to /usr during the installation:
- Soft-links are written to /usr/bin, linking to WebSphere MQ executable files in /opt/mqm/bin.
- Soft-links are written to /usr/include, linking to include files in /opt/mqm/inc.
- Soft-links are written to /usr/lib, linking to WebSphere MQ libraries in /opt/mqm/lib.
- Message catalogs are written to /usr/lib/locale.
- Man pages are written to /usr/share/man, if you choose to install them.

The topics contained in this section describe how to prepare your file system for installing WebSphere MQ. Perform these tasks before installation.

Working with Solaris 10 zones

This topic describes how to install WebSphere MQ into a Solaris 10 zone.

About this task

Solaris 10 introduces the concept of *zones* to the operating system. The main file system is known as the *global* zone. Within this zone, you can create one or more additional *non-global* zones. A zone that has its own self-contained file system (one that is not shared with that of the global zone) is known as a *whole root* non-global zone. A zone that shares part of its file system with the global zone is known as a *sparse root* non-global zone.

For more information on configuring zones on your system, see Sun's *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for your release of Solaris.

On Solaris 10, WebSphere MQ can be installed into the system's global zone, or into a whole root non-global zone. You cannot install WebSphere MQ into a sparse root non-global zone.

WebSphere MQ is accessible only from the zone you installed it in. If you install WebSphere MQ into the global zone, you cannot access it from any non-global zones configured on the system.

However, the IBM GSKit provided with WebSphere MQ **will** be installed into all non-global zones configured on the system if you install it into the global zone. If you do not want the GSKit to be installed into whole root non-global zones configured on your system, use the option `pkgadd -G` when installing WebSphere MQ. This option, however, will not stop the GSKit being accessible from sparse root non-global zones that share the `/usr` directory with the global zone.

To install WebSphere MQ into one or more whole root non-global zones, you must create the WebSphere MQ environment and perform the steps in the following topics for each zone.

What to do next

Creating a file system for the product code

This topic describes how to prepare the `/opt/mqm` file system into which the WebSphere MQ code will be installed should you not have enough storage space available in the file system.

About this task

The approximate amount of storage space required for a server installation is detailed below.

Table 4. Storage requirements for a WebSphere MQ server

Storage Requirements	Storage Requirement in MB in /usr	Storage Requirement in MB in /opt
WebSphere MQ Server installation	6	247
IBM Global Security Kit V7 (32-bit)	0	16
IBM Global Security Kit V7 (64-bit)	0	14

The WebSphere MQ product code is installed in `/opt`. If you cannot install the product code in `/opt` because the file system 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`. If you choose this option, the new file system must be created and mounted before installing the product code.
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
   ```

   If you choose this option, the new directory must be created, and the link created, 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 those which are **setuid** root, to run.

What to do next

Creating a file system for the working data

About this task

Before you install WebSphere MQ for Sun Solaris, create and mount a file system called /var/mqm which is owned by user and is of group mqm. If possible, 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.

The creation of the file system must be done before installing WebSphere MQ for Sun Solaris.

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 and 15 MB as a minimum for a WebSphere MQ client.

Creating separate file systems for working data:
About this task

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

If you create separate file systems:
* The /var/mqm/qmgrs and /var/mqm/log directories *must* be on a local file system.
* The /var/mqm/errors directory can be NFS mounted. However, if you choose to NFS-mount /var/mqm/errors, the error logs might be lost if the network fails.

If you are creating separate file systems, allow a minimum of 30 MB of storage for /var/mqm. Also allow 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 minimum sizes above are for circular logging using the default settings. For further information on log sizes see the *WebSphere MQ System Administration Guide*.

Implications of a 64-bit queue manager

When using the 64-bit queue manager, the use of the LIBPATH and
LD_LIBRARY_PATH environment variable is not advised. Setting these
environment variables might result in you not being able to run any WebSphere
MQ commands. By default, the installation will operate as in previous versions of
WebSphere MQ, with symbolic links being created from /usr/lib, /usr/bin and
/usr/include to the appropriate files within the WebSphere MQ tree structure. In
the case of /usr/lib the symbolic links will be to the 32-bit WebSphere MQ
libraries provided for customer 32-bit applications.

Note: No symbolic links are required for the 64-bit WebSphere MQ libraries
required by WebSphere MQ commands.

All WebSphere MQ commands are 64-bit and have a built in path to the
WebSphere MQ 64-bit libraries, however, this can be overridden by the use of
LIBPATH and thus can cause WebSphere MQ commands to fail to run. The typical
way of using WebSphere MQ commands and your applications is as follows:

- Unset LIBPATH and LD_LIBRARY_PATH and build your applications with a
  built in path to the appropriate WebSphere MQ libraries, this is detailed in the
  appropriate WebSphere MQ book for your type of WebSphere MQ application.
- If you need to set LIBPATH or LD_LIBRARY_PATH, consider not including
  /usr/lib in the path you specify in the variable. If you need to include /usr/lib
  in your LIBPATH or LD_LIBRARY_PATH then in order to avoid errors running
  64-bit WebSphere MQ applications or WebSphere MQ commands, consider
  removing the symbolic links from /usr/lib to the 32-bit WebSphere MQ libraries
  using the **dltmqlnk** command. The symbolic links can be restored with the
  crtmqlnk command. You also need to build your applications with a built in
  path to the appropriate WebSphere MQ libraries.

  Note that both the **dltmqlnk** command and the **crtmqlnk** command are scripts,
  and take no parameters.
- If you cannot use either of the first two options, then run your applications in a
  different environment to the one which issues any WebSphere MQ commands.

  Note: WebSphere MQ libraries are in the following locations: /opt/mqm/lib
  (32-bit libraries) and /opt/mqm/lib64 (64-bit libraries).

Resource limit configuration

Configure Solaris systems with the resource limits required by WebSphere MQ.

WebSphere MQ uses semaphores, shared memory, and file descriptors, and it is
probable that the default resource limits are not adequate.

The configuration required by WebSphere MQ depends on the version of Solaris
you are using.

If you are using Solaris 10:

You must change the default resource limits for each zone WebSphere MQ will be
installed in. To set new default limits for all users in the *mqm* group, set up a
project for the *mqm* group in each zone.

To find out if you already have a project for the *mqm* group, log in as root and
enter the following command:

```
projects -l
```

If you do not already have a *group.mqm* project defined, enter the following command:

```
projadd -c "WebSphere MQ default settings"
        -K "process.max-file-descriptor=(basic,10000,deny)"
        -K "project.max-shm-memory=(priv,4GB,deny)"
        -K "project.max-shm-ids=(priv,1024,deny)"
        -K "project.max-sem-ids=(priv,1024,deny)" group.mqm
```

If a project called *group.mqm* is listed, review the attributes for that project. The attributes must include the following minimum values:

```
process.max-file-descriptor=(basic,10000,deny)
project.max-sem-ids=(priv,1024,deny)
project.max-shm-ids=(priv,1024,deny)"
project.max-shm-memory=(priv,4294967296,deny)
```

If you need to change any of these values, enter the following command:

```
projmod -s -K "process.max-file-descriptor=(basic,10000,deny)"
           -K "project.max-shm-memory=(priv,4GB,deny)"
           -K "project.max-shm-ids=(priv,1024,deny)"
           -K "project.max-sem-ids=(priv,1024,deny)" group.mqm
```

Note that you can omit any attributes from this command that are already correct.

For example, to change only the number of file descriptors, enter the following command:

```
projmod -s -K "process.max-file-descriptor=(basic,10000,deny)" group.mqm
```

(To set only the limits for starting the queue manager under the mqm user, login as mqm and enter the command `projects`. The first listed project is likely to be `default`, and so you can use `default` instead of `group.mqm`, with the `projmod` command.)

You can find out what the file descriptor limits for the current project are, by compiling and running the following program:

```
#include <sys/types.h>
#include <sys/stat.h>
#include <fcntl.h>
#include <stdio.h>

int main () {
  int fd;
  for (;;) {
    fd = open ("./tryfd", O_RDONLY);
    printf ("fd is %d\n", fd);
    if (fd == -1)  break;
  }
}
```

To ensure that the attributes for the project *group.mqm* are used by a user session when running Websphere MQ, make sure that the primary group of that user ID is mqm. In the above examples, the *group.mqm* project ID will be used. For further information on how projects are associated with user sessions, see Sun's *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for your release of Solaris.

If you are using Solaris 9:

Review the system's current resource limit configuration.

As the root user, load the relevant kernel modules into the running system by typing the following commands:

```
modload -p sys/msgsys
modload -p sys/shmsys
modload -p sys/semsys
```

Then display your current settings by typing the following command:

```
sysdef
```

Check that the following parameters are set to the minimum values required by WebSphere MQ, or higher. The minimum values required by WebSphere MQ are documented in the tables below.

Table 5. Minimum values for semaphores required by WebSphere MQ

Parameter	Minimum value
SEMMNI	1024
SEMAEM	16384
SEMVMX	32767
SEMMNS	16384
SEMMSL	100
SEMOPM	100
SEMMNU	16384
SEMUME	256

Table 6. Minimum values for shared memory required by WebSphere MQ

Parameter	Minimum value
SHMMAX	4294967295
SHMMNI	1024

Table 7. Minimum values for file descriptors required by WebSphere MQ

Parameter	Minimum value
rlim_fd_cur	10000
rlim_fd_max	10000

To change any parameters that are lower than the minimum value required by WebSphere MQ, edit your /etc/system file to include the relevant lines from the following list:

```
set shmsys:shminfo_shmmax=4294967295
set shmsys:shminfo_shmmni=1024
set semsys:seminfo_semmni=1024
set semsys:seminfo_semaem=16384
set semsys:seminfo_semvmx=32767
set semsys:seminfo_semmns=16384
set semsys:seminfo_semmsl=100
set semsys:seminfo_semopm=100
set semsys:seminfo_semmnu=16384
```

```
set semsys:seminfo_semume=256
set shmsys:shminfo_shmseg=1024
set rlim_fd_cur=10000
set rlim_fd_max=10000
```

Note:

1. These values are suitable for running WebSphere MQ, other products on the system might require higher values.

2. Do not change the value of `shmmin` from the system default value.

3. Semaphore and swap usage does not vary significantly with message rate or persistence.

4. WebSphere MQ queue managers are generally independent of each other. Therefore system kernel parameters, for example `shmmni`, `semmni`, `semmns`, and `semmnu` need to allow for the number of queue managers in the system.

After saving the `/etc/system` file, you must restart your system.

Server installation procedure

This section tells you how to install the WebSphere MQ for Sun Solaris server. If you want to install the WebSphere MQ client see Chapter 3, "Installing a WebSphere MQ client," on page 33.

Before you start the installation procedure, make sure you have prepared your system as described in "Preparing to install" on page 3.

The installation method allows you to select which components you would like to install, for a list of the components and their corresponding filesets see "WebSphere MQ Components" on page 17.

See "Installation procedure" for the standard installation procedure.

Alternatively, see "Silent Installation" on page 17.

Installation procedure
Before you begin

Before you start the installation procedure, make sure that you have prepared your system as described in "Preparing to install" on page 3.

About this task

This section describes the installation of the WebSphere MQ for Solaris server, using the **pkgadd** program, enabling you to choose which components you want to install. The components are listed in "WebSphere MQ Components" on page 17; you must install at least the Server component.

Note: During the installation process you must select **yes** if you are prompted to choose whether to install certain WebSphere MQ files as `setuid`/`setgid` files.

1. Log in as root.

2. Insert the WebSphere MQ for Solaris Server CD-ROM, and make the mount point your current directory.

3. Run the `mqlicense.sh` script to accept the license:

   `./mqlicense.sh`

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. If you accept the license, the installation continues. If you do not accept the license, you cannot continue the installation process.

4. Enter the following command to start the installation process:

   ```
   pkgadd -d.
   ```

5. You are presented with a list of the packages that are available. Enter the number of the mqm package, if necessary also select the GSKit packages.

6. Enter the numbers of the components that you require, separated by spaces or commas, after the list of components is displayed.

7. Answer any questions appropriately for your system.

8. A message is issued when the installation is complete. Enter **q** to exit the **pkgadd** program.

Silent Installation

You can perform a silent installation of WebSphere MQ for Sun Solaris. A script file called silent.sh is supplied in the silent directory on the CD-ROM. This script allows you to perform a non-interactive installation that requires no input and displays no output on the screen and must be run as root.

The installation script silent.sh uses an admin file and a response file, both of which are supplied in the silent directory. You can use these files as supplied to perform a silent installation of all the components, including all the national language features.

By default, the silent.sh script assumes that the WebSphere MQ Server CD-ROM has been mounted at /cdrom and it writes all output and logs to the file /tmp/mq.install. If you want to alter these values, copy silent.sh and the admin and response files to a writable directory, make the necessary changes, and run the script from the modified location.

You also need to edit the response file if you want to change the components to install, for example, because you do not want all the national language features. A list of all the installable MQ components can be found at: "WebSphere MQ Components."

When you have checked the script files and made any changes required, run silent.sh to start the install. When the installation of WebSphere MQ for Sun Solaris is complete, check the log file for any errors.

WebSphere MQ Components

When you install WebSphere MQ for Sun Solaris, you can choose which components to install in addition to the mandatory runtime component.

Table 8 lists the installable WebSphere MQ components and other IBM products that comprise Websphere MQ.

Table 8. WebSphere MQ components

Component	Description	Class name	Server	Client

Table 8. WebSphere MQ components (continued)

Runtime	Libraries and other files that are common to the server and client. Must be installed on all WebSphere MQ systems.	runtime	X	X	
SDK	Required for compiling applications.	base	X	X	
Server	The server feature allows you to run queue managers on your computer and connect to other computers over a network. Provides messaging and queuing services to applications, and support for WebSphere MQ client connections.	server	X		
Client	The WebSphere MQ client is a small subset of WebSphere MQ, without a queue manager. 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.	sol_client	X	X	
Man pages	UNIX man pages, in U.S. English, for the following: • Control commands • Message Queue Interface (MQI) commands • MQSC commands	man	X	X	
Sample programs	Provides messaging and queuing services to applications, and support for WebSphere MQ client connections.	samples	X		
Java messaging	The files needed for messaging using Java (includes Java Messaging Service).	java	X	X	
Key management support	Support for the GSKit SSL key management program.	keyman	X	X	
Sun Java Runtime Environment (32-bit)	A Java Version 5.0 runtime that is used by those parts of WebSphere MQ that are written in Java.	jre	X		
Sun Java SDK	A Java software development kit that can be used to develop Java applications for WebSphere MQ.	javasdk	X	X	
Extended Transactional Client	WebSphere MQ component that allows a client application, within the same unit of work: • To put messages to, and get messages from, queues that are owned by the queue manager to which it is connected. • To update the resources of a resource manager other than a WebSphere MQ queue manager.	txclient	X		
Brazilian Portuguese Message catalogs	Brazilian Portuguese message catalogs	Pt_BR	X	X	
Czech Message Catalogs	Czech message catalogs	Cs_CZ	X	X	
French Message catalogs	French message catalogs	Fr_FR	X	X	

Table 8. WebSphere MQ components (continued)

	German Message catalogs	German message catalogs	De_DE	X	X
	Hungarian Message catalogs	Hungarian message catalogs	Hu_HU	X	X
	Italian Message catalogs	Italian message catalogs	It_IT	X	X
	Japanese Message catalogs	Japanese message catalogs	Ja_JP	X	X
	Korean Message catalogs	Korean message catalogs	Ko_KR	X	X
	Polish Message catalogs	Polish message catalogs	Pl_PL	X	X
	Russian Message catalogs	Russian message catalogs	Ru_RU	X	X
	Spanish Message catalogs	Spanish message catalogs	Es_ES	X	X
	Simplified Chinese Message catalogs	Simplified Chinese message catalogs	Zh_CN	X	X
	Traditional Chinese Message catalogs	Traditional Chinese message catalogs	Zh_TW	X	X

Table 9. Other products supplied with WebSphere MQ

Component	Description	Package name	Server	Client
IBM Global Security Kit V7	Certificate and SSL Base Runtime - 32 bit	gsk7bas	X	X
IBM Global Security Kit V7	Certificate and SSL Base Runtime - 64 bit.	gsk7bas64	X	X

Displaying messages in your national language

After installing WebSphere MQ you can configure the LANG environment variable to display messages from a different national language message catalog.

About this task

Messages in U.S. English are automatically installed with WebSphere MQ.

If you require messages in a different language, perform the following steps:

1. Install the appropriate message catalog (see "WebSphere MQ Components" on page 17).
2. To select messages in a different language, ensure the **LANG** environment variable is set to the identifier for the language you want to install:

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

Verifying the server installation

This is an overview of various methods for verifying a WebSphere MQ installation.

You must install the Samples programs component if you want to use these verification procedures. The following set of tasks describes how to verify that the WebSphere MQ for Sun Solaris server has been correctly installed and configured. You can verify a WebSphere MQ server installation at different levels:

- To verify a local (stand-alone) installation that has no communication links with other WebSphere MQ installations, do the following:
  - To verify the installation using a single queue manager with a single queue, see: "Verifying a local installation" on page 21.
  - To verify the installation using the Postcard application, see: "Using the Postcard application to verify a local installation" on page 26.
- To verify a server-to-server installation that includes communication links to other WebSphere MQ installations, do the following:
  - To verify the installation using two queue managers, two queues and both a sender channel and a receiver channel, see: "Verifying a server-to-server installation" on page 22.
  - To verify the installation using the Postcard application, see: "Using the Postcard application to verify a server-to-server installation" on page 28.

To verify a client/server installation that includes communication links between a server and a WebSphere MQ client, see "Verifying the client installation" on page 45.

Verifying a local installation

Before you begin

About this task

To verify a local installation using a simple configuration of one queue manager and one queue, complete the following steps. Once you have completed the steps below, you must test the installation as described in: "Testing the installation" on page 22.

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.

To verify your installation you must first perform this task. From a shell window, use these steps to create a queue manager and a queue:

1. Log in as a user in the `mqm` group
2. 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.
3. To start the queue manager, type:

   ```
   strmqm
   ```

   A message tells you when the queue manager has started.
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. Stop MQSC by typing:

   ```
   end
   ```

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

What to do next

You have now defined:
- A default queue manager called `venus.queue.manager`
- A queue called `ORANGE.QUEUE`

Now proceed to "Testing the installation" on page 22 to verify your installation.

Testing the installation
Before you begin

Before completing this task you must have created a queue manager called `venus.queue.manager` and a local queue called `ORANGE.QUEUE`. For instructions on how to do this see "Verifying a local installation" on page 21.

About this task

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

1. Log on as a user in group `mqm`, if you are not already.
2. Change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.
3. Put a message on the queue using the following command:

   ```
   ./amqsput ORANGE.QUEUE
   ```

   The following messages are displayed:

   ```
   Sample AMQSPUT0 start
   target queue is ORANGE.QUEUE
   ```

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

   ```
   Sample AMQSPUT0 end
   ```

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

5. 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.

What to do next

You have now successfully verified your local installation.

Verifying a server-to-server installation

To verify a server-to-server installation using two servers, one as a sender and one as a receiver, complete the following tasks.

To verify a server-to-server installation 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 Sun Solaris supports both TCP and SNA. The tasks in this section explain how to verify your installation and use TCP in the examples; if you are using an alternative protocol, refer to the WebSphere MQ Intercommunication manual.

The verification procedure assumes that both systems are UNIX machines; if this is not the case, some of the commands are different (for details, refer to the documentation for that system).

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 server
About this task

In order to verify a server-to-server installation you must first set up a sender server. From a shell window, follow these steps to set up the sender server.

1. Log in as a user in the `mqm` group.
2. 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.
3. To start the queue manager, type:

   ```
   strmqm
   ```

   A message tells you when the queue manager has started.
4. Start 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 `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.
6. 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).
7. Define a sender channel with the following command:

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

   The value *con-name* is the TCP address of the receiver workstation, and *port* is the port number, port 1414 is the default port number.
8. End MQSC by typing:

   ```
   end
   ```

   Some messages are displayed, followed by the command prompt.

Results

You have now defined the following objects:
- 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`

What to do next

Now to set up the receiver server so that you can verify your server-to-server installation, see "Setting up the receiver server."

Setting up the receiver server

About this task

After you have completed the task, "Setting up the sender server" on page 23, follow these steps to set up the receiver server:

1. Log in as a user in the `mqm` group.
2. 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.
3. To start the queue manager, type:

   `strmqm`

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

   Note: If you do not specify the port that the listener should listen on, the default of 1414 is used. If you specified a port other than 1414 in step 7 of "Setting up the sender server" on page 23, you must include the port parameter in the command, as shown below.

   `define listener (listener1) trptype (tcp) control (qmgr) port (port_number)`

   Where

   port_number
   > is the name of the port the listener should run on. This must be the same as the number used when defining your sender channel.
7. Start the listener by entering the following command:

```
start listener (listener1)
```

Note: It is not recommended to start the listener in the background from any shell that automatically lowers the priority of background processes.

8. 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.

9. End MQSC by typing:
```
end
```

Some messages are displayed, followed by the shell prompt.

Results

You have now defined the following objects:
- A default queue manager called venus.queue.manager
- A queue called ORANGE.QUEUE
- A listener called LISTENER1
- A receiver channel called FIRST.CHANNEL

What to do next

Now to test communications between your sender and receiver workstations, see "Testing communication between the servers."

Testing communication between the servers

About this task

After completing, "Setting up the sender server" on page 23, and "Setting up the receiver server" on page 24, use this topic to test communications between sender and receiver workstations using sample programs. Use the **amqsput** sample program to put a message from the sender server to a queue at the receiver server, and the **amqsget** sample program on the receiver server to get the message from the queue:

1. Log in to both servers as a user in the mqm group.
2. If the queue managers on the two servers have stopped, restart them now by typing the following on both servers:
```
strmqm
```
3. Enable MQSC commands by typing:
```
runmqsc
```

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

4. On the **sender** server, type runmqsc at the command line, then type:
```
START CHANNEL(FIRST.CHANNEL)
```

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

5. End MQSC by typing:
```
end
```

Some messages are displayed, followed by the command prompt.

6. On the **sender** server, change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.

7. 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:

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

   You will see the following messages:

   ```
   Sample amqsput0 start
   target queue is LOCAL.DEF.OF.REMOTE.QUEUE
   ```

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

   ```
    Sample amqsput0 end
   ```

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

9. On the **receiver** server, change into the `/opt/mqm/samp/bin` directory, which contains the sample programs.

10. 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.

Results

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

What to do next

Verifying the installation using the Postcard application

You can set up and use the Postcard application to verify a local installation or a server-to-server installation.

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

To use the Postcard application to verify a *local* installation (which does not have any communication links with other WebSphere MQ installations), see "Using the Postcard application to verify a local installation."

To use the Postcard application to verify communication between your server and the server of another named user, where that server is running WebSphere MQ and using TCP/IP, see "Using the Postcard application to verify a server-to-server installation" on page 28.

Using the Postcard application to verify a local installation

Sending messages successfully between two Postcard applications verifies a local installation.

About this task

To verify that the local installation is working, you can run two instances of the Postcard application on the same server and send messages between the applications. Successful sending and receiving of messages verifies that WebSphere MQ is installed and working correctly on the server.

Note:
- The Postcard application has a graphical interface. To view this interface, your system requires the ability to view a graphical display.
- Before you can run the Postcard application, you must ensure that you are a member of the WebSphere MQ administrators group (mqm).

1. Start the Postcard application:
   a. Log on as a user in group mqm.
   b. Change directory to `/opt/mqm/java/bin`
   c. Run the Postcard shell script: `./postcard`
2. At the Postcard - Sign On window, type in a nickname to use to send messages within the Postcard application (for example, `User1`).
3. Select the queue manager to use as the mailbox:
   - If the only queue manager on your server is the default queue manager that you created by running the Default Configuration wizard, this queue manager is used automatically as your mailbox for postcards.
   - 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 do not have any queue managers, you will be prompted to either launch the Default Configuration or close the Postcard application. Launching the Default Configuration will create a default queue manager.
   - 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 server, 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.
4. At the Postcard - Sign On window, type a nickname to use to send messages within the Postcard application (for example, `User1`).
5. Run the Postcard shell script again in a different shell window. This opens a second Postcard window.
6. The Postcard - Sign On panel is displayed again. Type 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 in step 3). The queue manager you select for this second Postcard must either be the same queue manager, be in the same cluster as the queue manager for the first postcard, or communication links must have been set up between them. You now have two Postcards, one with the nickname `User1` and one with the nickname `User2`.

8. In one of the Postcards (for example, `User1`), enter the nickname for the other Postcard application in the **To:** field and the queue manager it is using in the **On:** field.

9. Type a message in the **Message:** field and click **Send**.

10. 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*.

11. From the receiving postcard, double-click the message in the **Postcards sent and received** area to view it. When this message arrives, this verifies that WebSphere MQ is correctly installed.

Example

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

You can use two instances of the Postcard application to verify that a server-to-server installation is working correctly.

Before you begin

To verify that a server-to-server installation is working on two servers, the sender of the message and the receiver, you can use an instance of the Postcard application on the sender server, and an instance of the Postcard application on the receiver server, and send messages between the two Postcard applications. Successful sending and receiving of messages verifies that WebSphere MQ is successfully installed, and that communication between the two servers is working correctly. Both servers must use TCP/IP.

To use the Postcard application for this type of verification, one of the following must be true:

- Both queue managers must be in the same cluster; this is the simplest method. To ensure that both queue managers are in the same cluster, you can run the Postcard application before creating any local queue managers on each server. The Postcard application detects that there are no local queue managers defined for that server, and displays the Default Configuration wizard so that you can create the default queue managers and link them to the default cluster.

  You can use the Postcard application with existing queue managers, as long as both queue managers belong to the same cluster. If you have already completed the Default Configuration wizard but did not put the two queue managers into the same cluster you can create your own new queue managers on both servers, create a cluster, and ensure that the queue managers that you create on each server belong to the same cluster.

- Alternatively, if the queue managers are not in the same cluster, you can configure channels to communicate between the two servers. For instructions on how to set up the channels, see "Setting up the sender server" on page 23 and "Setting up the receiver server" on page 24. When you have set up communication, you can use the Postcard application..

Note:

- The Postcard application has a graphical interface. To view this interface, your systems require the ability to view a graphical display.

- Before you can run the Postcard application on each server, you must ensure that you are a member of the WebSphere MQ administrators group (mqm) on each server.

On the sender server:

1. Start the Postcard application:
   a. Log on as a user in group mqm.
   b. Change directory to `/opt/mqm/java/bin`
   c. Run the Postcard shell script: `./postcard`
2. At the Postcard - Sign On window, type in a nickname to use to send messages within the Postcard application (for example, `User 1`).
3. Select the queue manager to use as the mailbox (You can use the Postcard application with existing queue managers, as long as both queue managers belong to the same cluster. If your existing queue manager does not belong to the appropriate cluster refer to the introduction of this topic for information on how to proceed):
   - If the only queue manager on your server is the default queue manager that you created by running the Default Configuration wizard, this queue manager is used automatically as your mailbox for postcards.
   - 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 do not have any queue managers, you will be prompted to either launch the Default Configuration or close the Postcard application. Launching the Default Configuration will create a default queue manager.

     Work through the Default Configuration wizard. When you get to the option to join the queue manager to the default cluster, tick the checkbox. On the next screen select **yes, make it the repository for the cluster**. Once you have completed the wizard you are taken back to the Postcard - Sign On window.
   - 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 server, 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.

On the receiver server:

1. Start the Postcard application:
   a. Log on as a user in group mqm.
   b. Change directory to `/opt/mqm/java/bin`
   c. Run the Postcard shell script: `./postcard`
2. At the Postcard - Sign On window, type in a nickname to use to send messages within the Postcard application (for example, `User 2`).
3. Select the queue manager to use as the mailbox (You can use the Postcard application with existing queue managers, as long as both queue managers

belong to the same cluster. If your existing queue manager does not belong to the appropriate cluster refer to the introduction of this topic for information on how to proceed):

- If the only queue manager on your server is the default queue manager that you created by running the Default Configuration wizard, this queue manager is used automatically as your mailbox for postcards.
- 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 do not have any queue managers, you will be prompted to either launch the Default Configuration or close the Postcard application. Launching the Default Configuration will create a default queue manager.

  Work through the Default Configuration wizard. When you get to the option to join the queue manager to the default cluster, tick the checkbox. On the next screen select **yes, make it the repository for the cluster**. Once you have completed the wizard you are taken back to the Postcard - Sign On window.
- 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 server, 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 second Postcard window.
4. In one of the Postcards (for example, `User1`), type the nickname for the other Postcard application in the **To:** field and the queue manager it is using in the **On:** field.
5. Type a message in the **Message:** field and click **Send**.
6. 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*.
7. In the sent and received area of the Postcard, details of the new message are displayed. double-click the message in the **Postcards sent and received** area to view it. When this message arrives, this verifies that WebSphere MQ is correctly installed and that your communication link between the two servers is working correctly.

Results

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

Using the Postcard application to verify a local installation using further steps

Sending messages successfully between two Postcard applications verifies a local installation with these further optional steps.

About this task

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

- Install WebSphere MQ on other servers. Follow the same installation procedure that you used for the first server. Ensure that you use the Join Default Cluster window in the Default Configuration wizard to add the other servers to your first server's cluster.
- Install the WebSphere MQ client on other servers. See the Chapter 3, "Installing a WebSphere MQ client," on page 33.
- Continue with further administration tasks. See the *WebSphere MQ System Administration Guide*.

Chapter 3. Installing a WebSphere MQ client

Follow these steps to install a WebSphere MQ client.

This chapter describes how to install a WebSphere MQ Version 7.0 client. The information covers topics such as preparing for installation and verifying your installation, as well as installation itself. If you already have an installation of WebSphere MQ, and are migrating to WebSphere MQ Version 7.0 see Chapter 1, "Migrating to WebSphere MQ for Solaris Version 7.0," on page 1 before installing WebSphere MQ Version 7.0.

WebSphere MQ for Sun Solaris can be installed as a server or a client.

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

A WebSphere MQ server is an installation of one or more queue managers that provide queueing services to one or more clients. All the WebSphere MQ objects, for example queues, exist only on the queue manager machine (the WebSphere MQserver machine), and not the client. A WebSphere MQ server can also support local WebSphere MQ applications. To install a WebSphere MQ server see, Chapter 2, "Installing a WebSphere MQ server," on page 3.

It is possible to have both a server and a client installation on the same machine, for instructions on how to do this see, Chapter 4, "Installing a client on the same machine as a server," on page 51.

See the WebSphere MQ System Administration Guide for an introduction to WebSphere MQ concepts and objects.

For information on the components that can be included in the server and client installations see, "WebSphere MQ Components" on page 17.

The following set of tasks take you through the process of installing a WebSphere MQ client, complete all of these tasks in sequence.
- "Checking hardware and software requirements" on page 34
- "Installing the client" on page 42
- "Verifying the client installation" on page 45

Preparing to install

Before you install WebSphere MQ, complete the following tasks.
- "Checking hardware and software requirements" on page 34
- "Creating WebSphere MQ file systems" on page 10
- "Setting up the user ID and group ID" on page 9

Additionally, if you require messages in a language other than U.S. English see, "Displaying messages in your national language" on page 19.

Checking hardware and software requirements

This section details the operating system requirements, the prerequisite software and optional software required for using WebSphere MQ Version 7.0.

- "Checking prerequisite hardware and software - SPARC platform"
- "Checking hardware and software requirements - x86-64 platform" on page 36

Checking prerequisite hardware and software - SPARC platform

Check through this topic to identify which hardware and software is supported for use with WebSphere MQ for Sun Solaris as a clienton the SPARC platform.

Checking the operating environment:

Before you install WebSphere MQ Version 7.0, you must check that your system meets the hardware and operating system software requirements set for this product and the particular components you intend to install on it.

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.

Hardware

WebSphere MQ for Sun Solaris, Version 7.0 runs on 64-bit Sun SPARC systems only, capable of running the required level of a compatible operating system.

Operating System

The operating systems supported by WebSphere MQ for Sun Solaris, Version 7.0 are:

- Sun Solaris 9
- Sun Solaris 10

Connectivity Requirements

Check that the system has 64-bit compatible communications hardware that supports at least one of the following:

- TCP/IP (IPv4 and IPv6, provided by the operating system)
- SNAP-IX Version 7.0 (SNA)

Storage Requirements

The storage requirements for the WebSphere MQ for Sun Solaris, Version 7.0 depend on which components you install, 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.

Table 10. Storage requirements for a WebSphere MQ client

Storage Requirements	Storage Requirement in MB in /usr	Storage Requirement in MB in /opt
Client installation	6	217
IBM Global Security Kit V7 (32-bit)	0	16

Table 10. Storage requirements for a WebSphere MQ client (continued)

IBM Global Security Kit V7 (64-bit)	0	14

You can use the df -k command to determine the amount of free space on your system.

Disk storage is also required for
- Prerequisite software
- Optional software
- Your application programs

Checking optional software:
Check through this topic to identify which additional software is supported for use with WebSphere MQ.

Compilers

The following compilers are supported for WebSphere MQ for Sun Solaris applications:

- Sun ONE Studio 9, Compiler Collection
- Sun Studio 10 Software for Solaris Platforms
- Sun ONE Studio 11 Enterprise Edition for Solaris

Figure 6. C/C++

- Micro Focus Server Express V4.0
- Micro Focus Server Express V5.0

Figure 7. COBOL

- 32-bit
  - Sun Solaris Java SDK V1.4 with JDK V1.4.2
  - Sun Solaris Java SDK V5 with JDK V5
  - Sun Solaris Java SDK V6 with JDK V6
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V1.4.2
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V6.0
- 64-bit
  - Sun Java 2 SDK, Standard Edition V1.4.2
  - Sun Java 2 SDK, Standard Edition V5
  - Sun Java 2 SDK, Standard Edition V6
  - IBM® 64-bit SDK for Solaris, Java 2 Technology Edition, Version 1.4.2
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V6.0

Figure 8. Java

Transaction monitors

The following transaction processing monitors (coordination through X/Open XA interface) are supported:
- IBM TXSeries® V6.0
- IBM TXSeries V6.1
- IBM TXSeries V6.2
- BEA Tuxedo V9.1

Java Messaging and SOAP transport

If you want to use Java Messaging and SOAP (Simple Object Access Protocol) Support with WebSphere MQ, you need a Java Runtime Environment Version 1.4.2 or later.

For a list of supported JDKs, see http://www-01.ibm.com/software/integration/wmq/requirements/index.html

For further information about using Java with WebSphere MQ, see WebSphere MQ Using Java.

For further information about SOAP with WebSphere MQ, see WebSphere MQ Using Web Services .

If you use a JDK that is not in the list of supported JDKs you should be aware that:
- The JDK might not be FIPS level 140-2 compliant and by using it with WebSphere MQ, WebSphere MQ Version 7.0 will not comply with FIPS 140-2 standards.
- SOAP is not supported.

On Solaris, the 32-bit and 64-bit JDKs are typically installed to the same directory. To run a 64-bit JVM use the -d64 or -d32 parameters on the command line when running a Java application to ensure the correct JVM is used.

Secure Sockets Layer (SSL)

If you want to use the SSL support, you need IBM Global Security Kit V7. This is supplied with WebSphere MQ as one of the components available for installation. If you are migrating from WebSphere MQ Version 5.3 and have no other requirement for the IBM Global Security Kit V6, you can uninstall it using the following process:
1. Login as root.
2. Enter `pkgrm gsk6bas`

The IBM Global Security Kit V6 is uninstalled.

Checking hardware and software requirements - x86-64 platform
Check through this topic to identify which hardware and software is supported for use with WebSphere MQ for Sun Solaris as a serveron the x86-64 platform.

Checking the operating environment:

Before you install WebSphere MQ Version 7.0, you must check that your system meets the hardware and operating system software requirements set for this product and the particular components you intend to install on it.

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.

Hardware

WebSphere MQ for Sun Solaris, Version 7.0 runs on all x86-64 (AMD64, EM64T, and compatible processors) systems capable of running the appropriate release of the Solaris operating environment.

Operating System

The operating system supported by WebSphere MQ for Sun Solaris on the x86-64 platform is Sun Solaris 10 with SunSolve recommended Patch Cluster level.

Connectivity Requirements

Check that the system has 64-bit compatible communications hardware that supports TCP/IP. TCP/IP (IPv4 and IPv6) is supplied as part of the operating system.

Storage Requirements

The storage requirements for the WebSphere MQ for Sun Solaris, Version 7.0 depend on which components you install, 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.

Table 11. Storage requirements for a WebSphere MQ client

Storage Requirements	Storage Requirement in MB in /usr	Storage Requirement in MB in /opt
Client installation	6	217
IBM Global Security Kit V7 (32-bit)	0	16
IBM Global Security Kit V7 (64-bit)	0	14

You can use the df -k command to determine the amount of free space on your system.

Disk storage is also required for
- Prerequisite software
- Optional software
- Your application programs

Checking optional software:
Check through this topic to identify which additional software is supported for use with WebSphere MQ.

Compilers

The following compilers are supported for WebSphere MQ for Sun Solaris applications:

- Sun ONE Studio 10 Enterprise Edition for Solaris
- Sun ONE Studio 11 Enterprise Edition for Solaris

Figure 9. C/C++

- 32-bit
  - Sun Java 2 Platform Standard Edition, Version 1.4.2
  - Sun Java 2 Platform Standard Edition, Version 5.0
  - Sun Java 2 Platform Standard Edition, Version 6.0
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition, Version 1.4.2
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 32-bit SDK for Solaris, Java 2 Technology Edition V6.0
- 64-bit
  - Sun Java 2 Platform Standard Edition, Version 5.0
  - Sun Java 2 Platform Standard Edition, Version 6.0
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V5.0 (SR1 or above)
  - IBM 64-bit SDK for Solaris, Java 2 Technology Edition V6.0

Figure 10. Java

For further information about using Java with WebSphere MQ, see WebSphere MQ Using Java.

Transaction monitors

The following transaction processing monitors (coordination through X/Open XA interface) are supported:

- IBM TXSeries V6.0
- IBM TXSeries V6.1
- IBM TXSeries V6.2
- IBM WebSphere Application Server (WAS) V5.1
- IBM WebSphere Application Server (WAS) V6.0.2
- IBM WebSphere Application Server (WAS) V6.1
- BEA Tuxedo V9.1
- IBM WebLogic Server V9.1

Java Messaging and SOAP transport

If you want to use Java Messaging and SOAP (Simple Object Access Protocol) Support with WebSphere MQ, you need a Java Runtime Environment Version 1.4.2 or later.

For a list of supported JDKs, see http://www-01.ibm.com/software/integration/wmq/requirements/index.html

For further information about using Java with WebSphere MQ, see WebSphere MQ Using Java.

For further information about SOAP with WebSphere MQ, see WebSphere MQ Using Web Services .

If you use a JDK that is not in the list of supported JDKs you should be aware that:

- The JDK might not be FIPS level 140-2 compliant and by using it with WebSphere MQ, WebSphere MQ Version 7.0 will not comply with FIPS 140-2 standards.
- SOAP is not supported.

On Solaris, the 32-bit and 64-bit JDKs are typically installed to the same directory. To run a 64-bit JVM use the -d64 or -d32 parameters on the command line when running a Java application to ensure the correct JVM is used.

Secure Sockets Layer (SSL)

If you want to use the SSL support, you need IBM Global Security Kit V7. This is supplied with WebSphere MQ as one of the components available for installation.

Setting up the user ID and group ID

WebSphere MQ requires a user ID of the name mqm, with a primary group of mqm. The mqm user ID owns the directories and files that contain the resources associated with the product. Create the user ID and group IDs as described in the following sections.

- "Creating the user ID and group" on page 10
- "Adding existing user IDs to the group" on page 10

Creating the user ID and group

Create the required user ID and group ID *before* you install WebSphere MQ. 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.

It is also suggested that you set the mqm user's home directory to /var/mqm.

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.

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 locations. The GSKit must also be installed into its default location. (The IBM Global Security Kit (GSKit) enables you to use SSL security on Windows and UNIX systems.)

WebSphere MQ also writes the following files to /usr during the installation:

- Soft-links are written to /usr/bin, linking to WebSphere MQ executable files in /opt/mqm/bin.
- Soft-links are written to /usr/include, linking to include files in /opt/mqm/inc.
- Soft-links are written to /usr/lib, linking to WebSphere MQ libraries in /opt/mqm/lib.
- A message catalog is written to /usr/lib/locale.
- Man pages are written to /usr/share/man, if you choose to install them.

The topics contained in this section describe how to prepare your file system for installing WebSphere MQ. Perform these tasks before installation.

Working with Solaris 10 zones

This topic describes how to install WebSphere MQ into a Solaris 10 zone.

About this task

Solaris 10 introduces the concept of *zones* to the operating system. The main file system is known as the *global* zone. Within this zone, you can create one or more additional *non-global* zones. A zone that has its own self-contained file system (one that is not shared with that of the global zone) is known as a *whole root* non-global zone. A zone that shares part of its file system with the global zone is known as a *sparse root* non-global zone.

For more information on configuring zones on your system, see Sun's *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for your release of Solaris.

On Solaris 10, WebSphere MQ can be installed into the system's global zone, or into a whole root non-global zone. You cannot install WebSphere MQ into a sparse root non-global zone.

WebSphere MQ is accessible only from the zone you installed it in. If you install WebSphere MQ into the global zone, you cannot access it from any non-global zones configured on the system.

However, the IBM GSKit provided with WebSphere MQ **will** be installed into all non-global zones configured on the system if you install it into the global zone. If you do not want the GSKit to be installed into whole root non-global zones configured on your system, use the option pkgadd -G when installing WebSphere MQ. This option, however, will not stop the GSKit being accessible from sparse root non-global zones that share the /usr directory with the global zone.

To install WebSphere MQ into one or more whole root non-global zones, you must create the WebSphere MQ environment and perform the steps in the following topics for each zone.

What to do next

Creating a file system for the product code

This topic describes how to prepare the /opt/mqm file system into which the WebSphere MQ code will be installed and what to do should you not have enough storage space available in the file system.

About this task

The WebSphere MQ product code is installed in /opt/mqm. If you cannot install the product code in the /opt/mqm file system because the file system 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. If you choose this option, the new file system must be created and mounted before installing the product code.

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
```

If you choose this option, the new directory must be created, and the link created, 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 those which are **setuid** root, to run.

What to do next

Creating a file system for the working data
About this task

Before you install WebSphere MQ for Sun Solaris, create and mount a file system called /var/mqm. For a client installation, the file system can be mounted on a remote network device, for example NFS.

To determine the size of the /var/mqm file system for a client installation, consider:
- The size of the error log files written to the /var/mqm/errors directory
- The amount of trace that is written to the /var/mqm/trace directory

If you are performing both a client and a server installation, the requirements of the server installation take precedence over the requirements of the client installation. For details about the requirements of the server installation, see "Creating a file system for the working data" on page 12.

Allow 50 MB as a minimum for a WebSphere MQ server and 15 MB as a minimum for a WebSphere MQ client.

A new sample WebSphere MQ client configuration file is created in the var/mqm directory, by the C client package, during installation, but only if this file does not already exist. This file contains the ClientExitPath stanza. An example mqclient.ini file is shown in WebSphere MQ client configuration file *System Administration Guide*.

Note, that if you are using a common configuration file for multiple clients, either in the WebSphere MQ installation directory or in another location using the MQCLNTCF environment variable, you should grant read access to all user identifiers under which the WebSphere MQ client applications run. If, for any reason, the file cannot be read, the failure is traced and the search logic continues as if the file had not existed.

Displaying messages in your national language

This describes how to display messages from a different national language message catalog.

About this task

Messages in U.S. English are automatically installed with WebSphere MQ.

If you require messages in a different language, perform the following steps:
1. Install the appropriate message catalog (see "WebSphere MQ Components" on page 17).
2. To select messages in a different language, use the following command with the identifier for the language you want to install:

   ```
   export LANG=message identifier
   ```

   The message identifiers for the message catalogs are as follows:
   - cs_CZ (Czech)
   - de_DE (German)
   - es_ES (Spanish)
   - fr_FR (French)
   - hu_HU (Hungarian)
   - it_IT (Italian)
   - ja_JP (Japanese)
   - ko_KR (Korean)
   - pl_PL (Polish)
   - pt_BR (Brazilian Portuguese)
   - ru_RU (Russian)
   - zh_CN (Simplified Chinese)
   - zh_TW (Traditional Chinese)

Installing the client

This chapter tells you how to install the WebSphere MQ for Sun Solaris client. If you want to install the WebSphere MQ server see Chapter 2, "Installing a WebSphere MQ server," on page 3.

Before you start the installation procedure, make sure you have prepared your system as described in "Preparing to install" on page 3.

There are two types of WebSphere MQ clients:

Client with SSL
> This is the standard WebSphere MQ client with additional code for SSL support. You can install the client with SSL from either the client or the server CD.

Extended Transactional Client
> This is additional code to allow a client application within the same unit of work to:
> - To put messages to, and get messages from, queues that are owned by the queue manager to which it is connected.

- To update the resources of a resource manager other than a WebSphere MQ queue manager.

  You can only install this from the server CD.

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

To install a WebSphere MQ server, see "Installation procedure" on page 16.

If you want to install the client on the same machine as a WebSphere MQ server, see Chapter 4, "Installing a client on the same machine as a server," on page 51.

Installation procedure
Before you begin

Before you start the installation procedure, make sure that you have prepared your system as described in "Preparing to install" on page 3.

About this task

This installation procedure uses the **pkgadd** program, enabling you to choose which components you want to install. The components (or filesets) are listed in "WebSphere MQ Components" on page 17; you must install at least the Client component.

1. Log in as root.
2. Insert the WebSphere MQ Client CD-ROM, and make the mount point your current directory.
3. Run the `mqlicense.sh` script to accept the license:

   ```
   ./mqlicense.sh
   ```

   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. If you accept the license, the installation continues. If you do not accept the license, you cannot continue the installation process.
4. To start the installation process, enter the following, for example for a WebSphere MQ client:

   ```
   pkgadd -d mqclient.img
   ```
5. You are presented with a list of the packages that are available. Enter the number of the `mqm` package, if necessary also select the GSKit packages
6. You receive a number of messages, after which a list of components is displayed. Enter the numbers of the components that you require separated by spaces or commas.
7. Answer any questions appropriately for your system.
8. A message tells you when installation is complete. Enter **q** to exit the **pkgadd** program.

WebSphere MQ Components

This lists all of the installable MQ components and other IBM products that comprise Websphere MQ.

When you install WebSphere MQ for Sun Solaris, you can choose which
components to install.

Table 12. WebSphere MQ components

Component	Description	Server	Client
Client	The WebSphere MQ client is a small subset of WebSphere MQ, without a queue manager. 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.	X	X
Man pages	UNIX man pages, in U.S. English, for the following: • Control commands • Message Queue Interface (MQI) commands • MQSC commands	X	X
Sample programs	Provides messaging and queuing services to applications, and support for WebSphere MQ client connections.	X	
WebSphere MQ Client Libraries	Client libraries. The files needed for messaging using Java (includes Java Messaging Service). Support for SSL key management	X	X
Brazilian Portuguese Message catalogs	Brazilian Portuguese message catalogs	X	X
Czech Message Catalogs	Czech message catalogs	X	X
French Message catalogs	French message catalogs	X	X
German Message catalogs	German message catalogs	X	X
Hungarian Message catalogs	Hungarian message catalogs	X	X
Italian Message catalogs	Italian message catalogs	X	X
Japanese Message catalogs	Japanese message catalogs	X	X
Korean Message catalogs	Korean message catalogs	X	X
Polish Message catalogs	Polish message catalogs	X	X
Russian Message catalogs	Russian message catalogs	X	X
Spanish Message catalogs	Spanish message catalogs	X	X
Simplified Chinese Message catalogs	Simplified Chinese message catalogs	X	X
Traditional Chinese Message catalogs	Traditional Chinese message catalogs	X	X

Table 13. Other products supplied with WebSphere MQ

Component	Description	Fileset	Server	Client

| *Table 13. Other products supplied with WebSphere MQ (continued)* | | | | |

| IBM Global Security Kit V7 | Certificate and SSL Base Runtime - 32 bit | gsk7bas | X | X |
| IBM Global Security Kit V7 | Certificate and SSL Base Runtime - 64 bit. | gsk7bas64 | X | X |

Verifying the client installation

The following set of tasks describes how to verify that the WebSphere MQ for Sun Solaris client has been correctly installed and configured.

To verify your WebSphere MQ client installation, you need a WebSphere MQ server with communication links with your client workstation. You can then complete the following tasks in order:

- "Setting up the server workstation"
- "Setting up the client workstation" on page 46
- "Testing communication between workstations" on page 48

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 is installed on a Linux or 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

Before you begin

About this task

In order to verify your installation you must first perform this task. From a shell window, use these steps to install a queue manager and a queue on the server:

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

   ```
   crtmqm -q saturn.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.

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:

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

Note: Once you have set the **mcauser** attribute to mqm, you MUST set the attribute back to its default value after you have verified the installation to prevent any security vulnerabilities, as described in: "Testing communication between workstations" on page 48.
A message tells you when the channel has been created.

6. Define a listener by entering the following command:

Note: If you do not specify the port that the listener should listen on, by omitting the port parameter from the command below, the default of 1414 is used. If you want to specify a port other than 1414, you must include the port parameter in the command, as shown.

```
define listener (listener1) trptype (tcp) control (qmgr) port (port_number)
```

Where

port_number
    is the name of the port the listener should run on. This must be the same as the number used when defining your client-connection channel in "Setting up the client workstation."

7. Start the listener by entering the following command:

```
start listener (listener1)
```

8. Stop MQSC by typing:

```
end
```

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

Results

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

What to do next

To continue with the verification process, see "Setting up the client workstation."

Setting up the client workstation
Before you begin

Before you complete this task you must have completed, "Setting up the server workstation" on page 45.

About this task

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.

1. 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-hostname
   or
     ping n.n.n.n
   ```

   where

   server-hostname
   > Is the host name of the server

   n.n.n.n
   > Is the network address of the server

2. Press `Ctrl-C` to stop the **ping** command.
3. To create a client-connection channel, set the MQSERVER environment variable as follows:

   ```
     export MQSERVER='CHANNEL1/TCP/server-hostname(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 port number that the server is listening on, you specified this in step 6 of "Setting up the server workstation" on page 45. 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-connection channel and server listener program must use the same port number.

What to do next

To continue with the verification process, see "Testing communication between workstations" on page 48.

Testing communication between workstations
Before you begin

Before you complete this task you must have completed, "Setting up the client workstation" on page 46.

About this task

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 amqsput0 start
   target queue is QUEUE1
   ```
3. Type some message text on one or more lines, followed by a blank line. You will see the following message:
   ```
    Sample amqsput0 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.

Results

You have now successfully verified the client installation.
About this task

Note: You must now set the **mcauser** attribute back to its default value:

1. Start MQSC commands by entering the following command:
   ```
   runmqsc
   ```

   A message tells you that an MQSC session has started. MQSC has no command prompt.
2. In the MQSC window, set the **mcauser** attribute to its default value by entering the following command:
   ```
   alter channel(channel1) chltype (svrconn) mcauser(' ')
   ```
3. Stop MQSC by typing:
   ```
   end
   ```

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

Results

You have now set the **mcauser** attribute back to its default value.

Chapter 4. Installing a client on the same machine as a server

To install a WebSphere MQ for Sun Solaris 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 16.

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 "Verifying the client installation" on page 45.

Chapter 5. Applying maintenance

How to maintain WebSphere MQ for Sun Solaris.

This section describes how to maintain WebSphere MQ for Sun Solaris.

- "Applying service" describes the process of how to install service updates.
- "Restoring the previous service level" on page 54 details how to restore the previous service level.

This information applies to both server and client installations of WebSphere MQ Version 7.0.

The latest information about service updates and downloads can be found on the Internet, at:

```
http://www.ibm.com/software/integration/mqfamily/support/
```

Applying service

About this task

Service updates require hard disk space for installation. In addition, the installation process requires an identical amount of disk space to save the previous level. For example, a 16 MB service update requires 32 MB of space. This allows a service level to be removed, and the previous level to be restored automatically.

To apply service named *patchname*:

1. Stop all WebSphere MQ MQ applications on the machine and the applications accessing remote machines.
2. End all WebSphere MQ activity:
   a. Log in as a user in `group mqm`.
   b. Use the **endmqm** command to stop all running queue managers.
   c. Stop any listeners associated with the queue managers, using the command:

      ```
      endmqlsr -m QMgrName
      ```

   d. 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 beginnings `amq` or `runmq`. Ignore any that start with `amqi`.

3. Log in as root
4. Change into the directory containing the maintenance packages.
5. Enter the following:

   ```
    pkgadd -d packagename
   ```

   where `packagename` corresponds to the image file name, for example,

   ```
   mqm-U1234.img
   ```

   For further information on using **pkgadd** to install software packages, refer to the Solaris documentation.
6. Follow the on screen instructions.

Restoring the previous service level

About this task

To restore the previous service level:

1. Stop all WebSphere MQ MQ applications on the machine and the applications accessing remote machines.
2. End all WebSphere MQ activity:
   a. Log in as MQ administrator.
   b. Use the **endmqm** command to stop all running queue managers.
   c. Stop any listeners associated with the queue managers, using the command:

      ```
      endmqlsr -m QMgrName
      ```

   d. 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 beginnings `amq` or `runmq`. Ignore any that start with `amqi`.
3. Log in as root.
4. Use the pkgrm command to remove the latest service update from the system:

   ```
   pkgrm packagename
   ```

   where *packagename* is the name of the package that you want to remove for example: `mqm-V1234.img`.

   Note: Ignore any error messages of the form `<shared pathname not removed>`.

   Details of the pkgrm command can be found in the Solaris documentation, or by using the man pkgrm command.
5. If you have installed a WebSphere MQ client, and the client was updated after installing the service level that is being removed, you must specifically update your WebSphere MQ client installation again, after the service level has been removed.

Chapter 6. Uninstalling WebSphere MQ

About this task

To uninstall WebSphere MQ (server or client), use the Solaris **pkgrm** program.

Note: If any updates have been applied, remove them first.

1. Stop all WebSphere MQ MQ applications on the machine and the applications accessing remote machines.
2. End all WebSphere MQ activity:
   a. Log in as a user in `group mqm`.
   b. Use the **dspmq** command to display the state of all the queue managers on the system.
   c. Use the **endmqm** command to stop all running queue managers.
   d. Stop any listeners associated with the queue managers, using the command:

      `endmqlsr -m QMgrName`
   e. To check that you have stopped all of them, enter the following:

      `ps -ef | grep mq`
   f. Check that there are no processes listed that are running command lines beginning `amq` or `runmq`. Ignore any that start with `amqi`.
3. Log in as root.
4. Enter `pkgrm mqm` to uninstall the `mqm` package.

   Note: If the product was successfully uninstalled, you can delete the files and directories contained in`/opt/mqm`. If for any reason the product was not properly uninstalled, files might still exist in the package.
5. After uninstalling WebSphere MQ, you can delete the `/var/mqm` directory tree, (this will destroy all queue managers and their associated data).
6. If no other products require the Global Security Kit Version 7, you can uninstall packages `gsk7bas` and `gsk7bas64`.

Chapter 7. WebSphere MQ Documentation

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

- Publications supplied with the product
- Hardcopy books
- Online information

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 14. WebSphere MQ family books

PDF file name	Order Number	Title
AMQTAC07	GC34-6920	*WebSphere MQ for Windows Quick Beginnings*
AMQDAC10	GC34-6921	*WebSphere MQ for Solaris Quick Beginnings*
AMQAAC10	GC34-6922	*WebSphere MQ for AIX Quick Beginnings*
AMQCAC09	GC34-6923	*WebSphere MQ for HP-UX Quick Beginnings*
AMQ1AC07	GC34-6924	*WebSphere MQ for Linux Quick Beginnings*
AMQWAC04	GC34-6925	*WebSphere MQ for i5/OS Quick Beginnings*
CSQZAE10	SC34-6931	*WebSphere MQ Intercommunications*
CSQZAH08	SC34-6933	*WebSphere MQ Queue Manager Clusters*
CSQZAF10	GC34-6934	*WebSphere MQ Clients*
AMQZAG10	SC34-6928	*WebSphere MQ System Administration Guide*
CSQZAJ11	SC34-6941	*WebSphere MQ Script (MQSC) Command Reference*
CSQZAX06	SC34-6937	*WebSphere MQ*
CSQZAC06	SC34-6942	*WebSphere MQ Programmable Command Formats and Administration Interface*
AMQZAO06	GC34-6945	*WebSphere MQ Messages*
CSQZAL12	SC34-6939	*WebSphere MQ Application Programming Guide*
CSQZAK11	SC34-6940	
AMQZAN10	SC34-6936	*WebSphere MQ Using C++*
CSQZAW16	SC34-6935	*WebSphere MQ Using Java*
CSQZAC06	SC34-6942	*WebSphere MQ Programmable Command Formats and Administration Interface*
CSQZAS04	SC34-6932	*WebSphere MQ Security*
CSQSAT04	GC34-6926	*WebSphere MQ for z/OS Concepts and Planning Guide*
CSQSAV05	SC34-6927	*WebSphere MQ for z/OS System Setup Guide*
CSQSAW04	SC34-6929	*WebSphere MQ for z/OS System Administration Guide*
AMQWAG04	SC34-6930	*WebSphere MQ for i5/OS System Administration Guide*
AMQTAN04	SC34-6938	*WebSphere MQ Using the Component Object Model Interface*
AMQWAK02	SC34-6943	*WebSphere MQ for i5/OS Application Programming Reference*

Table 14. WebSphere MQ family books (continued)

PDF file name	Order Number	Title
CSQSAQ04	GC34-6944	*WebSphere MQ for z/OS Problem Determination Guide*
CSQSA006	GC34-6946	*WebSphere MQ for z/OS Messages and Codes*
CSQZA001	GC34-6948	*WebSphere MQ Migration Information*
CSQZAV06	GC34-6949	*WebSphere MQ Using .NET*
CSQSAD04	GI10-2584	*WebSphere MQ for z/OS*
AMQNAR11	SC34-6950	*WebSphere MQ Publish/Subscribe User's Guide*
CSQZAQ01	SC34-6951	*WebSphere MQ Constants*
CSQZAY04	SC34-6947	*WebSphere MQ Glossary*

Using the WebSphere MQ information center

The WebSphere MQ information center is built on the IBM Eclipse Help System. The WebSphere MQ information center can be launched in two modes: Standalone mode and Information Center mode. During the information center installation, chose whether the information center will run in either one, or both of these modes.

Viewing the information center in Standalone mode

In Standalone mode, only the user that launched the help system can view the help.

About this task

When the IBM Eclipse Help System is launched in Standalone mode, the help system's embedded web application server uses a random port to avoid port conflicts between applications, and a new browser window or tab is automatically opened, with the information center home page displayed. There might be a slight delay before the browser window or tab opens, while the application server initializes.

Launching the information center in Standalone mode
About this task

To launch the Help System in Standalone mode from the Start Menu select **Start** → **All Programs** → **IBM WebSphere 7.0.0 Information Center** → **Start Help**.

Stopping the information center in Standalone mode

To stop the information center when it is running in Standalone mode, from the Start Menu select **Start** → **All Programs** → **IBM WebSphere 7.0.0 Information Center** → **Stop Help**.

Displaying the documentation in different languages

To view the information center in another language in Standalone mode, change the regional settings of your operating system to the locale and language of your choice. When you are viewing documentation in your chosen language, topics that have not been translated into your chosen language are displayed in English.

Viewing the information center in Information Center mode

In Information Center mode, the information center is available from other machines on the same network as the machine on which the help system is running.

About this task

When the information center is launched in Information Center mode, the IBM Eclipse Help System's embedded web application server uses port 8888, unless the installation wizard detected that port was already in use by another application, in which case it uses the port that was specified when the help system was installed. A new browser tab or window is not automatically opened.

When you launch the information center in Information Center mode from the Start Menu, a Windows service is started. You can use this service to make the information center available across a network: when the service is started, you do not need to be logged into the machine that is running the help system.

Launching the information center in Information Center mode
About this task

To launch the information center in Information Center mode from the Start Menu select **Start** → **All Programs** → **IBM WebSphere 7.0.0 Information Center** → **Start Information Center**.

Results

In Information Center mode, the information center is available from the local machine at the following URL:

  http://127.0.0.1:*<port>*/help/index.jsp

For example, if the default port is used, the URL is http://127.0.0.1:8888/help/index.jsp.

In Information Center mode, the information center is available from other machines on the same network as the machine on which the information center is running, at the following URL:

  http://*<ip address>*:*<port>*/help/index.jsp

Where *<ip address>* is the IP address of the machine on which the information center is running.

Stopping the information center in Information Center mode

To stop the information center when it is running in Information Center mode, from the Start Menu select **Start** → **All Programs** → **IBM WebSphere 7.0.0 Information Center** → **Stop Information Center**.

Displaying the documentation in different languages

To view the information center in another language in Information Center mode, set the language option in your browser so that your desired language is the first one that is specified, clear the browser cache, and refresh your browser view.

When you are viewing documentation in your chosen language, topics that have not been translated into your chosen language are displayed in English.

Configuring to allow all users to launch the information center

When an administrator installs the IBM WebSphere MQ Version 7.0.0 Information Center from the WebSphere MQ 7 Information Center CD on Windows or Linux, only users with administrator privileges on Windows and the root user on Linux are initially able to launch the information center.

About this task

When the information center is launched, it attempts to create or update the following folders, or files and subfolders of these folders:

- *<install directory>*/eclipse/configuration
- *<install directory>*/eclipse/workspace

These folders contain information specific to the installed instance of the information center, such as search indexes, and information that the IBM Eclipse Help System uses to identify the help plug-ins that are installed. To allow users who do not have administrator authority on Windows, or root access on Linux, to launch the information center, allow write access to these folders (on Windows), or change the location of these folders (on Linux).

Use the following instructions to configure the information center for use by all users on both Windows and Linux.

Configuring to allow all users to launch the information center on Windows
About this task

To allow all users to launch the information center on Windows systems, you need to allow users write access to the *<install directory>*/eclipse directory. To do this:

1. Log in as a member of the administrators group.
2. In Windows Explorer, navigate to *<install directory>*.
3. Right-click the 'eclipse' directory, and select 'Properties'.
4. Select the Security tab.
5. In the Group or User Names panel, Select the 'Users' group.
6. In the Permissions for Users panel, make sure the checkbox in the 'Allow' column and the 'Write' row is selected.
7. Click OK.

Results

The information center is now set up so that all users can run the information center in Standalone mode.

Only a member of the administrators group can launch the information center in Information Center mode from the Start Menu, because launching the information center in this way starts a Windows service, which a user who is not a member of the administrators group does not have sufficient authority to do.

Configuring to allow all users to launch the information center on Linux

About this task

On Linux systems you can allow all users to launch the information center in both modes by carrying out the following steps:

1. Install the IBM WebSphere MQ Version 7.0.0 Information Center from the WebSphere MQ 7 Documentation CD to the default installation path.
2. Modify the scripts used to start and stop the information center.
   - <install directory>/Help_start.sh
   - <install directory>Help_end.sh
   - <install directory>IC_start.sh
   - <install directory>IC_end.sh

   Add the following text to each file before '-command...':

   ```
   -data $HOME/.mqdata/MQ70Info/workspace
   -configuration $HOME/.mqdata/MQ70Info/configuration
   ```

   These parameters instruct the information center to use configuration and workspace folders in the user's home directory. Each user will have a separate configuration and workspace folder.

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 on the documentation CD-ROM as PDFs on all platforms and as an Information Center on Linux and Windows only.

Information Center

For information on how to view and install the Information Center, see Information Center in *WebSphere MQ for Windows Quick Beginnings*.

PDF

A PDF (Portable Document Format), corresponding to each book, is available on the documentation CD. You can read PDFs using Adobe Acrobat Reader. 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 \docs\pdf*en_US* directory on the Documentation CD, and also in some or all of the following national languages. After you have installed the PDFs, you can find the files in the directory in which you installed the Information Center. To find out which ones are available in your language, look for the appropriate directory on the CD in the form \docs\pdf*ll_LL*, where *ll_LL* is one of the following:
- cs_CZ (Czech)
- de_DE (German)

- es_ES (Spanish)
- fr_FR (French)
- hu_HU (Hungarian)
- it_IT (Italian)
- ja_JP (Japanese)
- ko_KR (Korean)
- pl_PL (Polish)
- pt_BR (Brazilian Portuguese)
- ru_RU (Russian)
- zh_CN (Simplified Chinese)
- zh_TW (Traditional Chinese)

Within these directories, you can find the complete set of PDFs that are available. Table 14 on page 57 shows the file names used for the PDF files.

Hardcopy books

This book, and all the books listed in Table 14 on page 57, 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).**

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

For information about printing books, see "Publications supplied with the product" on page 61.

Online information

This section describes the sources of information available online about WebSphere MQ Version 7.0

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/integration/wmqfamily

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/integration/websphere/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/integration/wmq/support/community.html
```

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/integration/websphere/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/integration/wmq/support/
```

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Index

A
amqsputc sample program   48

B
bibliography   57
books
 ordering   62
 printing   61

C
capacity units   45
checking installation
 server   26
client setup, example   46
client-connection channel, example   47
configuration
 resource limit   13
creating
 file system for working data   12, 41
 groups on server   9, 39
 users   9, 39

D
documentation   57

E
environment variable
 LANG   19, 42
 MQSERVER   47
 NLSPATH   19, 42
example
 client setup   46
 client-connection channel,
  defining   47
 MQSC, stopping   46
 putting a message on the queue   48
 queue manager
  starting   45
 server-connection channel,
  creating   46

F
file system
 creating for working data   12, 41

G
groups, creating   9, 39

H
Hypertext Markup Language
 (HTML)   62

I
information, ordering publications   62
installation
 components   17, 44
 file systems required   10, 39
 filesets   17, 44
 of client   42
 resource limit configuration   13
 server verification procedure   20
 verification   26
  of local installation   21
  of server to server installation   22
installation verification
 local installation   27, 31
 server-to-server   28
 using Postcard application   27, 28, 31

L
LANG environment variable   19, 42

M
maintenance   53
manuals, ordering   62
message, translated   19, 42
MQSERVER environment variable   47

N
national language
 support   19, 42
NLSPATH environment variable   19, 42

O
online books   62
ordering publications   62

P
PDF (Portable Document Format)   61
Portable Document Format (PDF)   61
Postcard
 introduction   26
printing books   61
processor units   45
publications
 list   57
 ordering   62

Q
queue manager
 starting   45

R
receiver server, verification of   24
resource limit configuration   13

S
server-connection channel, example   46
setting up the server, example   45
softcopy information   62
space requirements for maintenance   53

T
translated
 messages   19, 42

U
user ID, creating on server   9, 39
users, creating   9, 39

V
verification
 communication between servers   25
 local installation   27, 31
 of local installation   21
 of server to server installation   22
 on receiver server   24
 server-to-server   28
 using Postcard application   27, 28, 31
verifying installation
 server   26

W
WebSphere MQ for Linux
 client installation   42
 components and filesets   17, 44
WebSphere MQ for Sun solaris
 restoring previous service level   53
WebSphere MQ for Sun Solaris
 applying maintenance   53
 documentation   57
 publications   57

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