



WebSphere MQ for UnixWare

Quick Beginnings

Version 5.2

Edition – October, 2003

Note

Before using this information and the product it supports, be sure to read the general information under Appendix D, "Notices".

First edition (October, 2003)

This edition applies to WebSphere MQ for UnixWare Version 5.2 and to any subsequent releases and modifications until otherwise indicated in new editions.

If you want to make comments regarding this publication please send them to one of the following:

Mail	email	Fax
Willow Technology, Inc. Publications Dept. 469 El Camino Real, Suite 220 Santa Clara, CA 95050-4372 U.S.A	info@willowtech.com	+1.408.296.7700

When you send information to Willow Technology, you grant Willow Technology a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

© 1998-2003 Copyright Willow Technology, Inc. and its Licensors. All rights reserved.

Note to U.S. government Users -- Documentation related to restricted rights -- Use, duplication or disclosure is subject to restrictions set forth in FARS and D-FARS.

Contents

About this manual	2
Who this manual is for?.....	2
What you need to know to understand this manual	2
Part 1. Guidance Section.....	3
Chapter 1. About WebSphere MQ	4
Message Queuing.....	4
MQI – a Common Application Programming Interface.....	4
Time-Independent Applications.....	4
Message-Driven Processing.....	4
Messages and Queues	4
What is a Message?	5
What is a Queue?	5
WebSphere MQ Objects	5
Queue Managers	5
Queues.....	6
Process Definitions.....	6
Channels.....	6
Namelists.....	7
Clients and Servers	7
Instrumentation Events.....	7
Types of Event.....	8
Queue manager events	8
Performance events.....	8
Channel events.....	8
Transactional Support.....	9
Part 2. Planning for and Installing WebSphere MQ for UnixWare	10
Chapter 2. Planning to Install the WebSphere MQ for UnixWare Server.....	11
Hardware Requirements.....	11
System.....	11
Disk Space Required.....	11
Software Requirements.....	12

Connectivity.....	12
Compilers Supported for WebSphere MQ for UnixWare Applications	12
Delivery	12
Installation	12
WebSphere MQ for UnixWare Components	12
WebSphere MQ server.....	13
Man pages.....	13
Man pages.....	13
Java Bindings.....	13
Publish/Subscribe programs	13
Spanish Message Catalogs.....	13
French Message Catalogs	13
German Message Catalogs.....	13
Italian Message Catalogs.....	13
Brazilian Portuguese Message Catalogs	13
Creating the System Default Objects	13
README file.....	13
Migrating from an Earlier Version of MQSeries for UnixWare.....	14
Chapter 3. Installing WebSphere MQ for UnixWare	15
Preparing for installation.....	15
Creating the system default objects.....	15
Before Installation	15
Creating Another File System for Product Code.....	16
Kernel configuration	17
Changes to signal handling.....	18
Installing WebSphere MQ for UnixWare.....	18
Installing Software From a Local CD-ROM Drive.....	19
Translated messages.....	19
Verifying your installation	19
Verification Procedure	20
Verifying a Local Installation	20
Verifying a Server-to-Server Installation	22
Sender Server:	22
Receiver Server	24
Establishing communication between the Servers:.....	25

Setting the Queue Manager CCSID on WebSphere MQ for UnixWare	27
Chapter 4. Uninstalling WebSphere MQ for UnixWare.....	28
Part 3. Using WebSphere MQ for UnixWare	29
Chapter 5 Using the WebSphere MQ Command Sets	30
Introducing Command Sets.....	30
Control Commands.....	30
Using Control Commands.....	30
crtmqcvx (data conversion)	31
crtmqm (create queue manager).....	31
dlmqm (delete queue manager).....	31
dmpmqlog (dump log).....	31
dspmqaut (display authority)	31
dspmqcsv (display command server).....	31
dspmqfls (display WebSphere MQ files)	31
dspmqtrc (display WebSphere MQ formatted trace output).....	31
dspmqtrn (display WebSphere MQ transactions)	31
endmqcsv (end command server).....	31
endmqslr	31
endmqm (end queue manager).....	31
endmqtrc (end WebSphere MQ trace).....	31
rcdmqimg (record media image)	31
rcrmqobj (recreate object).....	31
rsvmqtrn (resolve WebSphere MQ transactions)	31
runmqchi (run channel initiator).....	32
runmqchl (run channel).....	32
runmqdlq (run dead-letter queue handler).....	32
runmqslr (run listener).....	32
runmqsc (run WebSphere MQ commands).....	32
runmqtrm (start trigger monitor)	32
setmqaut (set/reset authority)	32
strmqcsv (start command server).....	32
strmqm (start queue manager).....	32
strmqtrc (start WebSphere MQ trace).....	32
WebSphere MQ (MQSC) Commands.....	32
Running MQSC Commands.....	32

PCF Commands.....	33
Working with Queue Managers.....	33
Creating a Default Queue Manager.....	33
Starting a Queue Manager	34
Stopping a Queue Manager	34
Quiesced Shutdown.....	34
Immediate Shutdown	34
Preemptive Shutdown	34
Restarting a Queue Manager	34
Deleting a Queue Manager.....	35
Working with WebSphere MQ Objects.....	35
Using the MQSC Facility Interactively	35
Feedback from MQSC Commands	35
Ending Interactive Input to MQSC.....	36
Defining a Local Queue.....	36
Displaying Default Object Attributes	37
Copying a Local Queue Definition	37
Changing Local Queue Attributes.....	38
Clearing a Local Queue.....	38
Deleting a Local Queue	38
Browsing Queues	39
Chapter 6. Obtaining Additional Information	40
Part 4. Appendixes.....	41
Appendix A. Installing the WebSphere MQ Product License	42
License Management	42
Obtaining a License	42
License Key Installation	42
Appendix B. Sample MQI programs and MQSC files.....	44
MQSC Command File Samples	44
C and COBOL Program Samples.....	44
Miscellaneous Tools.....	45
Appendix C. Support for different codesets on WebSphere MQ for UnixWare	46
Migrating to Euro Support	49
Appendix D. Notices	51
Trademarks.....	52

Index.....53

About this manual

This manual refers to the WebSphere MQ for UnixWare Version 5.2 product produced by Willow Technology.

This product is part of the WebSphere MQ family of products. These products provide application programming services that enable application programs to communicate with each other using *message queues*. This form of communication is referred to as *commercial messaging*. The applications involved can exist on different nodes on a wide variety of machine and operating system types. They use a common application programming interface, called the Message Queuing Interface or MQI, so that programs developed on one platform can readily be transferred to another.

This manual describes the system administration aspects of Willow Technology WebSphere MQ for UnixWare and the services it provides to support commercial messaging in a UnixWare environment. This includes managing the queues that applications use to receive their messages, and ensuring that applications have access to the queues that they require.

Who this manual is for?

Primarily, this manual is for system administrators, and system programmers who manage the configuration and administration tasks for WebSphere MQ. It is also useful to application programmers who must have some understanding of WebSphere MQ administration tasks.

What you need to know to understand this manual

To use this manual, you should have a good understanding of the UnixWare operating system, and utilities associated with it. You do not need to have worked with message queuing products before, but you should have an understanding of the basic concepts of message queuing.

Part 1. Guidance Section

Chapter 1. About WebSphere MQ

This chapter introduces WebSphere MQ and describes the basic concepts of WebSphere MQ and messaging. It contains basic explanations of the following topics:

- “Message Queuing”
- “Messages and Queues”
- “WebSphere MQ Objects”
- “Clients and Servers”
- “Instrumentation Events”
- “Transactional Support”

Message Queuing

WebSphere MQ enables applications to use message queuing to participate in message-driven processing. Applications can communicate across different platforms by using the appropriate message queuing software products. The applications are shielded from the mechanics of the underlying communications.

MQI – a Common Application Programming Interface

All WebSphere MQ products implement a common application programming interface (message queue interface or MQI), regardless of the platform on which the applications are run. The calls made by the applications and the messages they exchange are common. This makes it much easier to write and maintain applications than it is when using traditional methods. It also makes it easier to port applications from one platform to another.

The MQI is described in detail in the *WebSphere MQ Application Programming Reference manual*.

Time-Independent Applications

With message queuing, the exchange of messages between the sending and receiving programs is time independent. This means that the sending and receiving applications are decoupled so that the sender can continue processing without having to wait for the receiver to acknowledge the receipt of the message. In fact, the target application does not even have to be running when the message is sent. It can retrieve the message after it is started.

Message-Driven Processing

On arriving on a queue, messages can automatically start an application using a mechanism known as *triggering*. If necessary, the applications can be stopped when the message or messages have been processed.

Messages and Queues

Messages and queues are the basic components of a message queuing system.

What is a Message?

A *message* is a string of bytes that has meaning to the applications that use it. Messages are used for transferring information from one application to another (or to different parts of the same application). The applications can be running on the same platform, or on different platforms.

WebSphere MQ messages have two parts; the *application data* and a *message descriptor*. The content and structure of the application data is defined by the application programs that use the data. The message descriptor identifies the message and contains other control information, such as the type of message and the priority assigned to the message by the sending application.

What is a Queue?

A *queue* is a data structure that stores messages. The messages may be put on the queue by applications or by a queue manager as part of its normal operation.

Queues exist independently of the applications that use them. A queue can exist in main storage (if it is temporary), on disk or similar auxiliary storage (if it must be kept in case of recovery), or in both places (if it is currently being used, and must also be kept for recovery). Each queue belongs to a *queue manager*, which is responsible for maintaining it. The queue manager puts the messages it receives onto the appropriate queue.

Queues can exist either in your local system, in which case they are called *local queues*, or at another queue manager, in which case they are called *remote queues*.

Applications send and receive messages using MQI calls. For example, one application can put a message on a queue, and another application can retrieve the message from the same queue.

WebSphere MQ Objects

A WebSphere MQ object is a recoverable resource managed by WebSphere MQ. Many of the tasks described in this chapter involve manipulating the following types of WebSphere MQ object:

- Queue managers
- Queues
- Process definitions
- Channels
- Namelists

For system administrators, commands are available to manipulate objects. Default objects are created for you when you create a queue manager.

Each object has a *name* associated with it and can be referenced in WebSphere MQ commands and MQI calls by that name. Names must be unique within each of the object types. For example, you can have a queue and a process with the same name, but you cannot have two queues with the same name.

Queue Managers

A queue manager provides queuing services to applications, and manages the queues that belong to it. It ensures that:

- Object attributes are changed according to the commands received.
- Special events such as trigger events or instrumentation events are generated when the appropriate conditions are met.

- Messages are put on the correct queue, as requested by the application making the MQPUT call. The application is informed if this cannot be done, and an appropriate reason code is given.

Each queue belongs to a single queue manager and is said to be a *local queue* to that queue manager. The queue manager to which an application is connected is said to be the local queue manager for that application. For the application, the queues that belong to its local queue manager are local queues. A *remote queue* is simply a queue that belongs to another queue manager. A remote queue manager is any queue manager other than the local queue manager. A remote queue manager may exist on a remote machine across the network or it may exist on the same machine as the local queue manager. WebSphere MQ supports multiple queue managers on the same machine.

Queues

A queue is a WebSphere MQ object that can store messages. Each queue has *queue attributes* that determine what happens when applications reference the queue in MQI calls. The attributes indicate:

- Whether applications can retrieve messages from the queue (get enabled)
- Whether applications can put messages onto the queue (put enabled)
- Whether access to the queue is exclusive to one application or shared between applications
- The maximum number of messages that can be stored on the queue at the same time (maximum queue depth)
- The maximum size of messages that can be put on the queue (maximum message size)

Process Definitions

A *process definition* object defines an application that is to be started in response to a trigger event on a WebSphere MQ queue manager.

A trigger event is a logical combination of conditions that is detected by a queue manager. For example, a trigger event may be generated when the number of messages on a queue reaches a predefined level. This event causes the queue manager to put a trigger message on a specified initiation queue. This trigger message is retrieved by a *trigger monitor*, a special application that monitors an initiation queue. The trigger monitor then starts up the application program that was specified in the trigger message.

If a queue manager is to use triggering, at least one initiation queue must be defined for that queue manager.

See the *WebSphere MQ Application Programming Guide* for more information about triggering.

Channels

A channel provides a communication path. There are two types of channel: message channels and MQI channels.

A *message channel* provides a communication path between two queue managers on the same, or different, platforms. The message channel is used for the transmission of messages from one queue manager to another, and shields the application programs from the complexities of the underlying networking protocols.

A message channel can transmit messages in one direction only. If two-way communication is

required between two queue managers, two message channels are required.

An *MQI channel* connects a WebSphere MQ client to a queue manager on a server machine. It is for the transfer of MQI calls (for example, MQPUT) and responses only and is bidirectional. A channel definition exists for each end of the link. On some platforms, some types of MQI channel can be defined automatically.

For more information on channels and how to use them, see the *WebSphere MQ Intercommunication* manual.

Namelist

A namelist is a WebSphere MQ object that contains a list of other WebSphere MQ objects. Typically, namelists are used by applications such as trigger monitors, where they are used to identify a group of queues. The advantage of using a namelist is that it is maintained independently of applications; that is, it can be updated without stopping any of the applications that use it. Also, if one application fails, the namelist is not affected and other applications can continue using it.

Clients and Servers

WebSphere MQ supports client/server configurations for WebSphere MQ applications.

A WebSphere *MQ client* is a part of the WebSphere MQ product that is installed on a machine to accept MQI calls from applications and pass them to an *MQI server* machine. There they are processed by a queue manager. Typically, the client and server reside on different machines, but they can also exist on the same machine.

An *MQI server* is a queue manager that provides queuing services to one or more clients. All the WebSphere MQ objects, for example queues, exist only on the queue manager machine, that is, on the MQI server machine. A server can support local WebSphere MQ applications as well.

The difference between an MQI server and an ordinary queue manager is that the MQI server can support MQI clients, and each MQI client has a dedicated communications link with the MQI server. For more information about creating channels for clients and servers, see the *WebSphere MQ Intercommunication* manual. For information about client support in general, see the *WebSphere MQ Clients* manual.

Instrumentation Events

You can use WebSphere MQ instrumentation events to monitor the operation of queue managers.

Instrumentation events cause special messages, called *event messages*, to be generated whenever the queue manager detects a predefined set of conditions. For example, the following conditions give rise to a *Queue Full* event:

- Queue Full events are enabled for a specified queue, and
- An application issues an MQPUT call to put a message on that queue, but the call fails because the queue is full.

Other conditions that can give rise to instrumentation events include:

- A predefined limit for the number of messages on a queue being reached
- A queue not being serviced within a specified time
- A channel instance being started or stopped
- An application attempting to open a queue and specifying a user ID that is not authorized

If you define your event queues as remote queues, you can put all the event queues on a single queue manager (for those nodes that support instrumentation events). You can then use the events generated to monitor a network of queue managers from a single node.

Types of Event

WebSphere MQ events are categorized as follows:

Queue manager events

These events are related to the definitions of resources within queue managers. For example, if an application attempts to open a queue but the associated user ID is not authorized to perform that operation, a queue manager event is generated.

Performance events

These events are notifications that a threshold condition has been reached by a resource. For example, a queue depth limit has been reached or, following an MQGET request, a queue has not been serviced within a predefined period of time.

Channel events

These events are reported by channels as a result of conditions detected during their operation. For example, a channel event is generated when a channel instance is stopped.

Transactional Support

An application program can group a set of updates into a *unit of work*. These updates are usually logically related and must all be successful for data integrity to be preserved. If one update succeeded while another failed then data integrity would be lost.

A unit of work *commits* when it completes successfully. At this point all updates made within that unit of work are made permanent or irreversible. If the unit of work fails then all updates are instead *backed out*. *Syncpoint coordination* is the process by which units of work are either committed or backed out with integrity.

A *local* unit of work is one in which the only resources updated are those of the WebSphere MQ queue manager. Here syncpoint coordination is provided by the queue manager itself using a single-phase commit process.

A *global* unit of work is one in which resources belonging to other resource managers, such as XA-compliant databases, are also updated. Here, a two-phase commit procedure must be used and the unit of work may be coordinated by the queue manager itself, or externally by another XA-compliant transaction manager such as IBM CICS, Transarc Encina or BEA Tuxedo.

When the queue manager coordinates global units of work itself it becomes possible to integrate database updates within WebSphere MQ units of work. That is, a mixed MQI and SQL application can be written, and commands can be used to commit or roll back the changes to the queues and databases together.

The queue manager achieves this using a two-phase commit protocol. When a unit of work is to be committed, the queue manager first asks each participating database manager whether it is prepared to commit its updates. Only if all of the participants, including the queue manager itself, are prepared to commit, are all of the queue and database updates committed. If any participant cannot prepare its updates, the unit of work is backed out instead.

Full recovery support is provided if the queue manager loses contact with any of the database managers during the commit protocol. If a database manager becomes unavailable while it is in doubt, that is, it has been called to prepare but has yet to receive a commit or backout decision, the queue manager remembers the outcome of the unit of work until it has been successfully delivered. Similarly, if the queue manager terminates with incomplete commit operations outstanding, these are remembered over queue manager restart.

Part 2. Planning for and Installing WebSphere MQ for UnixWare

This part of the manual gives you advice on planning and preparing for the installation of WebSphere MQ on UnixWare. It also gives you step-by-step guidance on the installation process for WebSphere MQ on these platforms. It contains the following chapters:

- Chapter 2, “Planning to Install the WebSphere MQ for UnixWare Server”
 - Chapter 3, “Installing the WebSphere MQ for UnixWare Server”
-

Chapter 2. Planning to Install the WebSphere MQ for UnixWare Server

This chapter is a summary of the requirements to run WebSphere MQ for UnixWare, the network protocols and the compilers supported, the delivery media, and the various components of the product.

Hardware Requirements

System

- Any system capable of running UnixWare 7
- >128MB RAM

Disk Space Required

The installation requirements 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 or not. You also require archiving capacity on disk, tape, or other media.

Note

Use the df -k command to determine the amount of free space on your disk.
--

These are the approximate storage requirements:

- A minimum of 35 MB of disk space must be available for the product code and data in the filesystem containing the /opt directory.

Working data for WebSphere MQ for UnixWare is stored by default in /var/mqm.

Note

For added confidence in the integrity of your data, you are strongly advised to put your logs onto a <i>different</i> physical drive from the one that you use for the queues.
--

Software Requirements

Minimum supported levels are shown. Later compatible levels, if any, will be supported unless otherwise stated.

- UnixWare 7.1.1 with the following patches:
 - uw711mp3 – UnixWare 7.1.1 Maintenance Pack 3; plus
 - ptf7719a - UnixWare 7.1.1 Maintenance Pack 3 Supplement; plus
 - ptf7410j – libthread Supplement; plus
 - ptf7607e – libc Supplements; plus
 - ptf7689c – libc Shared Library Set.or
 - uw711mp4 – UnixWare 7.1.1 Maintenance Pack 4.
- Open Unix 8 (aka UnixWare 7.1.2) with patches:
 - ou800pk - Open Unix 8.0.0 Maintenance Pack 6; plus
 - ptf8008a - Open Unix 8.0.0 Maintenance Pack 6 Supplement.
- UnixWare 7.1.3 with the following patches:
 - MPack - Maintenance Pack 3.or
 - UP3 - Update 3.

Connectivity

TCP/IP is the only network protocol supported.

TCP/IP is part of the base operating system. In WebSphere MQ for UnixWare V5.2, enhancements are introduced that make it more practical to combine the use of DHCP with WebSphere MQ queue manager clusters.

Compilers Supported for WebSphere MQ for UnixWare Applications

- UnixWare and OpenServer Development Kit 7.1.1 or later

Delivery

WebSphere MQ for UnixWare V5.2 is supplied on CD-ROM. Support for Java bindings for WebSphere MQ are also supplied on the CD-ROM.

Installation

WebSphere MQ for UnixWare takes approximately 5 minutes to install using the UnixWare **pkgadd** program. The installation process is described in “Chapter 3: Installing WebSphere MQ for UnixWare”.

WebSphere MQ for UnixWare Components

When you install WebSphere MQ for UnixWare you can choose several components to install. The components are as follows:

WebSphere MQ server

Support to enable you to create and support your own applications as well as external applications, as well as supporting client connections. (equivalent to Base, Runtime and Server components on other platforms). Selected and installed by default. Required.

Man pages

Man pages for the following commands:

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

Man pages

Sample application programs.

Java Bindings

Java bindings mode.

Publish/Subscribe programs

PubSub components.

Spanish Message Catalogs

French Message Catalogs

German Message Catalogs

Italian Message Catalogs

Brazilian Portuguese Message Catalogs

Note
English language message catalogs are installed by default.

Creating the System Default Objects

When you use the **crtmqm** command to create a queue manager with this release of WebSphere MQ, the system default objects are automatically created. The sample MQSC definition file, `amqscoma.tst`, is no longer provided.

README file

Before starting to install WebSphere MQ for UnixWare, review the README file, which you will find in the root directory of the CD-ROM.

Migrating from an Earlier Version of MQSeries for UnixWare

If you want to migrate from MQSeries for UnixWare to WebSphere MQ for UnixWare V5.2, you should follow this procedure:

1. You are strongly recommended to backup all:
 - Queue manager data
 - Queue manager logs
 - Queue manager object definitions
2. End all queue manager activity. Do this with the **endmqm** command. See “Stopping a Queue Manager” for information on how to use the **endmqm** command.
3. Stop all MQSeries activity and remove any shared resources that MQSeries uses. Do this by shutting down the system and restarting it, or use the **ipcs -a** command to display shared memory segments or semaphore sets created by MQSeries, and remove them using the **ipcrm** command. You do not have to recreate your MQSeries objects.
4. Uninstall the old MQSeries for UnixWare using either the **pkgm** program. Do not delete the `/var/mqm` directory tree if you want to retain your own MQSeries information, for example your queue manager data.

You are now ready to install MQSeries for UnixWare V5.2.

Chapter 3. Installing WebSphere MQ for UnixWare

This chapter tells you how to install WebSphere MQ for UnixWare and how to verify that your installation has been successful.

The WebSphere MQ product is installed into the `/opt/mqm` directory. This *cannot* be changed. However, if you do not have enough space in the `/opt/mqm` file system, follow the procedure given in “Creating Another File System for Product Code” below.

Note

The WebSphere MQ product is contained in the <code>/</code> (root) directory of the CD-ROM.

Preparing for installation

This section guides you through some of the steps you must perform before you install WebSphere MQ for UnixWare.

If you have a previous version of WebSphere MQ for UnixWare already installed, make sure you refer to “Migrating from an earlier version of WebSphere MQ for UnixWare” before installing WebSphere MQ for UnixWare V5.2.

Creating the system default objects

When you use the `crtmqm` command to create a queue manager with this release of WebSphere MQ, the system default objects are automatically created. The sample MQSC definition file, `amqscoma.tst`, is no longer provided.

If you used `amqscoma.tst` to customize your settings for V5.0, and you want to use the same settings with V5.2 of the product:

1. Save your copy of `amqscoma.tst`
2. Install WebSphere MQ V5.2
3. Load your copy of `amqscoma.tst` and use the file to recreate your default objects

Before Installation

Before you can install WebSphere MQ for UnixWare you:

- Must install any patches listed in the README
- Must create a group with the name `mqm`.
- Must create a user ID with the name `mqm`.
- Must add `root` to the `mqm` group.
- Are recommended to create and mount a `/var/mqm` file system, or `/var/mqm/`, `/var/mqm/log`, and `/var/mqm/errors` file systems.

You should allow a minimum of 30 MB of storage for `/var/mqm`, 2 MB of storage for `/var/mqm/errors`, and 20 MB of storage for `/var/mqm/log` if you are creating separate file

systems.

If you are using a single file system, use the sum of these figures as a guide.

Notes

1. To determine the size of the `/var/mqm` file system, you should consider.
 - The maximum number of messages in the system at one time
 - Contingency for message build-ups, if there is a system problem
 - The average size of the message data plus 500 bytes for the message header
 - The number of queues
2. It is better to use all the space available, monitor the usage for a few weeks and, if appropriate, reduce the amount of space allocated. If the initial file system is too small, this can cause problems later.
3. If you create separate partitions, the following directories **must** be on a local file system:
`/var/mqm`
`/var/mqm/log`
You can choose to NFS mount the `/var/mqm/errors` and `/var/mqm/trace` directories to conserve space on your local system.
4. The size of the log file depends upon the log settings that you use. The size recommended is for circular logging using the default settings. For further information on log sizes see “Calculating the size of the log” in the WebSphere MQ *System Administration* manual.

After installation, this user ID (`mqm`) owns the directories and files that contain the resources associated with the product. This group and user must be defined for any machine on which the WebSphere MQ software is to be installed.

If you want to run any administration commands, for example, `crtmqm` (create queue manager) or `strmqm` (start queue manager), your user ID must be a member of group `mqm`.

For stand-alone machines, you can create the new user and group IDs locally. For machines administered in a network information services (NIS) domain, you can create the user and group IDs on the NIS master server machine.

Creating Another File System for Product Code

If you do not want to have the product code installed in the `/opt/mqm` file system, for example, if that file system is too small to contain the product, you can do one of two things:

1. Create a new file system and mount it as `/opt/mqm`
2. Create a new directory anywhere on your machine that is large enough to contain the product, and create a symbolic link from `/opt/mqm` to this new directory. For example:

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

Notes

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

Kernel configuration

WebSphere MQ makes use of semaphores and shared memory. The default kernel configuration on UnixWare is not adequate. In particular, the **default** number of semaphores and shared memory segments defined in the kernel are **not** sufficient to support WebSphere MQ.

If the value of **SHMMAX** is too low, the error “Invalid argument’ from shmget” will be received.

If the value of **shmseg** is too low, the error “Too many open files’ from shmat” will be received. The maximum number of shared segments per process (**SHMSEG**) defined in UnixWare is 15. This number must be increased. To modify the maximum value of **SHMSEG**, edit the value in **/etc/conf/mtune.d/ipc** and change **15** to at least **60**.

The maximum number of operations per semop call (**SEMOPM**) defined in UnixWare is 20. This number must be increased. To modify the maximum value of **SEMOPM**, edit the value in **/etc/conf/mtune.d/ipc** and change **20** to at least **60**.

The maximum number of undo entries per process (**SEMUME**) defined in UnixWare is 20. This number must be increased. To modify the maximum value of **SEMUME**, edit the value in **/etc/conf/mtune.d/ipc** and change **20** to at least **40**.

The minimum recommended values of the kernel parameters are given below.

```
MSGMAX 16500
MSGMNB 65532
MSGSSZ 16384
SEMOPM 60
SEMUME 60
SHMMAX 4000000
SHMMNI 600
SHMSEG 60
```

Note

These values may need to be increased if you obtain any First Failure Support Technology™ (FFST) records.

The following script will set the parameters and rebuild your kernel:

```
#!/bin/ksh
/etc/conf/bin/idtune MSGMAX 16500
/etc/conf/bin/idtune MSGMNB 65532
/etc/conf/bin/idtune MSGSSZ 16384
/etc/conf/bin/idtune SEMMSL 150
/etc/conf/bin/idtune SEMOPM 60
/etc/conf/bin/idtune SEMUME 60
```

```
/etc/conf/bin/idtune SHMMAX 4000000
/etc/conf/bin/idtune SHMMNI 600
/etc/conf/bin/idtune SHMSEG 60
/etc/conf/bin/idtune SFNOLIM 2048
/etc/conf/bin/idbuild -B
```

After installation, you should review the machine's configuration and increase the values if necessary. See the UnixWare documentation for information about changing these values.

Notes

1. Shared memory usage does not vary with message rate or persistence.
2. Semaphore and swap usage does not vary with message size, message rate, or message persistence.
3. WebSphere MQ queue managers are independent of each other. Therefore system kernel parameters, for example **shmmni**, **semopm** and **shmseg** need to allow for the number of queue managers in the system.

Once you have made any changes to the kernel parameters, you must restart the system.

Note

When running a multi threaded process, you might reach the soft limit for file descriptors. This will give you the WebSphere MQ reason code MQRC_UNEXPECTED_ERROR (2195) and, **if there are enough** file descriptors, a WebSphere MQ FFST™ file.

To avoid this problem you can increase the system soft limit, SFNOLIM for the number of file descriptors to match the system hard limit (2048).

Changes to signal handling

In WebSphere MQ for UnixWare, V5.2, the way in which signals are handled has changed. These changes, and their effects on your existing applications, are described in the *WebSphere MQ V5.2 Release Guide*.

Installing WebSphere MQ for UnixWare

This section describes the installation of the WebSphere MQ for UnixWare server.

Notes

1. If you have previously installed WebSphere MQ on your system, you need to remove the product using either the `pkggrm` program. See “Migrating from an Earlier Version of WebSphere MQ for UnixWare” for more information.
2. If the product is present, but not installed correctly, you may need to manually delete the files and directories contained in:
`/var/mqm`
`/opt/mqm`

The WebSphere MQ product is contained in the / (root) directory of the CD-ROM, and the product documentation (Adobe Acrobat) files are contained in the `/docs` subdirectory.

Note

The manuals take up considerable disk space and are therefore not installed by the installation program. The user should copy required documentation files as needed.

To install, carry out the following procedure:

Installing Software From a Local CD-ROM Drive

1. mount the CD-ROM as the `/CD-ROM_1` directory.
2. use the `pkgadd` program, and carry out the following procedure:
 - a) Perform a `pkgadd -d /CD-ROM_1/uw7_520.img`.
 - b) When you are prompted for which packages are to be installed, select the ones you require. If you want to install the entire WebSphere MQ product, select **all**.
 - c) Press the **Enter** key.

Translated messages

Messages in US English are always available. If you require another of the languages that is supported by WebSphere MQ for UnixWare Version 5, you *must* ensure that your `NLSPATH` environment variable includes the appropriate directory.

For example:

```
export LANG=german
export NLSPATH=/usr/lib/locale/%L/LC_MESSAGES/%N
```

Verifying your installation

Note

Before you can start using WebSphere MQ for UnixWare, you must install a license key. Refer to Appendix A of this document, and the README file in /opt/mqm for assistance with obtaining a license key.

This section describes how to verify that WebSphere MQ for UnixWare has been correctly installed and configured. You do this by following the steps outlined in “Verification Procedure.”

If you want to verify a communications link between multiple WebSphere MQ installations (for example between two servers or between a client and a server), you must ensure that the required communications protocols have been installed (and configured) on **both** machines.

The only supported protocol is TCP.

However, you can also verify a local installation (which has no communications links with other WebSphere MQ installations) without any communications protocols installed.

Verification Procedure

You can verify a WebSphere MQ installation at three levels:

- A local (standalone) installation, involving no communication links to other WebSphere MQ machines
- A server-to-server installation, involving communication links with other WebSphere MQ Servers
- A client/server installation, involving communication links between a server machine and a WebSphere MQ client

Verification of local and server-to-server installations is described in “Verifying a Local Installation,” and in “Verifying a Server-to-Server Installation”. For information on verifying a client/server installation, see the *WebSphere MQ Clients* manual.

Verifying a Local Installation

Follow these steps to install and test a simple configuration of one queue manager and one queue, using sample applications to put a message onto the queue and to read the message from the queue:

Install WebSphere MQ for UnixWare on the server .

Create a default queue manager (in this example called *venus.queue.manager*):

- At the command prompt in the window type:
`crtmqm -q venus.queue.manager`
- Press Enter.
- Messages are displayed telling you that the queue manager has been created, and that the default WebSphere MQ objects have been created.

Note

In prior releases of WebSphere MQ it was necessary to run a script file called

`amqscoma.tst` to define the WebSphere MQ default objects. This step is not required in this release of the product.

Start the default queue manager:

- Type the following and then press Enter:
`strmqm`
- A message tells you when the queue manager has started.

Enable MQSC commands by typing the following command and then pressing Enter:

`runmqsc`

Note

MQSC has started when the following message is displayed: Starting WebSphere MQ Commands.

MQSC has no command prompt.

Define a local queue (in this example, called `ORANGE.QUEUE`):

- Type the following and press Enter:
`define qlocal (orange.queue)`

Note

Any text entered in MQSC in lowercase is converted automatically to uppercase unless you enclose it in single quotation marks. This means that if you create a queue with the name `orange.queue`, you must remember to refer to it in any commands outside MQSC as `ORANGE.QUEUE`.

- The message **WebSphere MQ queue created** is displayed when the queue has been created.

You have now defined:

A default queue manager called `venus.queue.manager`

A queue called `ORANGE.QUEUE`

Stop MQSC by typing `end` or by pressing Ctrl-D, and pressing Enter.

The following message is displayed:

**One MQSC commands read.
No commands have a syntax error.
All valid MQSC commands were processed.**

The command prompt is now displayed again.

To test the queue and queue manager, use the samples `amqsput` (to put a message on the queue)

and **amqsget** (to get the message from the queue):

1. Change into the following directory:

```
/opt/mqm/samp/bin
```

2. To put a message on the queue, type the following command and press Enter:

```
amqsput ORANGE.QUEUE
```

The following message is displayed:

```
Sample amqsput0 start  
target queue is ORANGE.QUEUE
```

3. Type some message text and then press Enter **twice**.

The following message is displayed:

```
Sample amqsput0 end
```

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

4. If you are not already in the following directory, change to it now:

```
/opt/mqm/samp/bin
```

5. To get the message from the queue, type the following command and press Enter:

```
amqsget ORANGE.QUEUE
```

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

The verification is complete.

Verifying a Server-to-Server Installation

The steps involved in verifying a server-to-server installation are more complex, because the communications link between the two machines must be checked.

Follow these steps to set up two servers, one as a sender and one as a receiver.

Sender Server:

1. Create a default queue manager called *saturn.queue.manager*:
 - At a command prompt in a window, type:

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

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

Note

In prior releases of WebSphere MQ it was necessary to run a script file called **amqscoma.tst** to define the WebSphere MQ default objects. This step is not required in this release of the product.

2. Start the queue manager:
 - Type the following and then press Enter:
 - **strmqm**
 - A message tells you when the queue manager has started.
3. Enable WebSphere MQ Commands (MQSC) by typing the following command and then pressing Enter:

```
runmqsc
```

Note

MQSC has started when the following message is displayed: Starting WebSphere MQ Commands.

MQSC has no command prompt.

4. Define a local queue to be used as a transmission queue, called *TRANSMIT1.QUEUE*:
 - Type the following and press Enter:

```
define qlocal (transmit1.queue) usage (xmitq)
```
 - The message WebSphere MQ queue created is displayed when the queue has been created.
5. Create a local definition of the remote queue:

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

Note

The RNAME parameter specifies the name of the queue on the remote machine to which the message is being sent. Therefore, the name specified by the RNAME parameter (*ORANGE.QUEUE*) must be the same as the name of the queue to which the message is being sent (*ORANGE.QUEUE* on the receiver server).

6. Define a sender channel:

```
define channel (first.channel) chltype (sdr) conname (32.64.128.255) +  
xmitq (transmit1.queue) trptype (tcp)
```

where *32.68.128.255* is the TCP address of the receiver server.

You have now defined the following objects:

- A default queue manager called *saturn.queue.manager*
 - A transmission queue called *TRANSMIT1.QUEUE*
 - A remote queue called *LOCAL.DEF.OF.REMOTE.QUEUE*
 - A sender channel called *FIRST.CHANNEL*
7. Stop MQSC by pressing Ctrl-D, or typing **end**, and pressing Enter.

Now set up the receiver server.

Receiver Server

Note

You must be logged in as a superuser, or as root, to perform step 1 to step 4.

1. Edit the file **/etc/services**. If you do not have the following line in that file, add it as shown:

```
MQSeries 1414/tcp      # WebSphere MQ channel listener
```

2. Edit the file **/etc/inetd.conf**. If you do not have the following line in that file, add it as shown:

```
MQSeries stream tcp nowait mqm /opt/mqm/bin/amqcrsta amqcrsta
```

Note

If you are not creating *venus.queue.manager* as the default queue manager on this server, you need to add **-m venus.queue.manager** to the end of this line.

3. Find the process ID of the inetd with the command:

```
ps -ef | grep inetd
```

4. Restart inetd by running the command:

```
kill -1 <inetd processed>
```

5. Create a default queue manager (in this example called *venus.queue.manager*):

- At the command prompt, type:

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

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

Note

In prior releases of WebSphere MQ it was necessary to run a script file called **amqscoma.tst** to define the WebSphere MQ default objects. This step is not required in this release of the product.

6. Start the queue manager:

- Type the following and then press Enter::
- **strmqm**

A message tells you when the queue manager has started.

7. Enable MQSC by typing the following command and then pressing Enter:

```
runmqsc
```

Note
MQSC has started when the following message is displayed: Starting WebSphere MQ Commands.

MQSC has no command prompt.

8. Define a local queue (in this example, called *ORANGE.QUEUE*):

- Type the following and press Enter:
- **define qlocal (orange.queue)**
- The message WebSphere MQ queue created is displayed when the queue has been created.

9. Create a receiver channel:

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

You have now defined the following objects:

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

10. Stop MQSC by pressing Ctrl-D or typing **end** and pressing Enter.

Establishing communication between the Servers:

1. If the queue managers on the two servers have been stopped for any reason, restart them now (using the **strmqm** command).
2. On the **Sender** server start the sender channel:

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

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

3. On the **Sender** server, use the **amqspout** sample program to send a message to the queue on the receiver server:

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

Note

You put the message to the local definition of the remote queue, which in turn specifies the name of the remote queue.
--

4. Type the text of the message and press Enter **twice**.
5. On the **Receiver** server, use the **amqsget** sample program to get the message from the queue:

```
amqsget ORANGE.QUEUE
```

The message is displayed.

The verification is complete.

Setting the Queue Manager CCSID on WebSphere MQ for UnixWare

The coded character set identifier (CCSID) is fixed when the queue manager is created. The CCSID used is the one for the code set of the locale that you are using to run the **crtmqm** command.

Examples of setting the CCSID:

```
export LANG=en_US.ISO8859-1
```

uses the code set ISO8859-1 and will set a CCSID of 819.

```
export LANG=en_US.ISO8859-2
```

uses the code set ISO8859-2 and will set a CCSID of 912.

```
export LANG=C (this is the default locale)
```

uses the code set ISO8859-1 and will set a CCSID of 819.

You can display the queue manager CCSID by using the **dis qmgr** command from within **runmqsc**.

See Appendix C, “Support for Different Code Sets on WebSphere MQ for UnixWare” for further information about supported code sets.

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

1. Record the existing queue manager CCSID, using the WebSphere MQ (MQSC) command:

```
DISplay QMGR CCSID
```

2. Change the CCSID to the new CCSID, with the MQSC command:

```
ALTER QMGR CCSID
```

3. Stop the queue manager.
4. Restart the queue manager and any channels it uses.

Note

The ALTER QMGR CCSID command is a new command supplied with WebSphere MQ for UnixWare V5.2. See Appendix C, “Support for Different Code Sets on WebSphere MQ for UnixWare” on for further information about supported code sets. See “Migration to Euro Support”, also in Appendix C for information on migrating to a CCSID that supports the euro character.

Chapter 4. Uninstalling WebSphere MQ for UnixWare

Part 3. Using WebSphere MQ for UnixWare

This part of the manual shows you how to use WebSphere MQ for UnixWare. It contains the following chapters:

- Chapter 5, “Using the WebSphere MQ Command Sets”
- Chapter 6, “Obtaining Additional Information”

Chapter 5 Using the WebSphere MQ Command Sets

This chapter introduces the command sets that can be used to perform system administration tasks on WebSphere MQ objects.

Administration tasks include creating, starting, altering, viewing, stopping, and deleting WebSphere MQ objects such as queue managers, queues, processes, channels, and namelists. To perform these tasks, you must select the appropriate command from one of the supplied command sets (see “Introducing Command Sets”).

Introducing Command Sets

WebSphere MQ provides three command sets for performing administration tasks:

- Control commands
- MQSC commands
- PCF commands

This section describes the command sets that are available. Some tasks can be performed using either a control command or an MQSC command, whilst other tasks can be performed using only one type of command. For a comparison of the facilities provided by the different types of command set, see the *WebSphere MQ System Administration* manual.

Control Commands

Control commands fall into three categories:

- *Queue manager commands*, including commands for creating, starting, stopping, and deleting queue managers and command servers.
- *Channel commands*, including commands for starting and ending channels and channel initiators.
- *Utility commands*, including commands associated with authority management and conversion exits.

Using Control Commands

In WebSphere MQ in UNIX environments, you enter control commands in a shell window. In these environments, control commands, including the command name itself, the flags, and any arguments, are case sensitive. For example, in the command:

```
crtmqm -u SYSTEM.DEAD.LETTER.QUEUE jupiter.queue.manager
```

- The command name must be **crtmqm**, not **CRTMQM**.
- The flag must be **-u**, not **-U**.
- The dead-letter queue is **SYSTEM.DEAD.LETTER.QUEUE**.
- The argument is specified as **jupiter.queue.manager**, which is different from **JUPITER.queue.manager**.

Therefore, take care to type the commands exactly as you see them in the examples.

The following list contains a brief description of each of the control commands. You can obtain help for the syntax of any of the commands by entering the command followed by a question mark.

WebSphere MQ responds by listing the syntax required for the selected command.

crtmqcvx (data conversion)

Creates a fragment of code that performs data conversion on data type structures.

crtmqm (create queue manager)

Creates a local queue manager and defines the default and system objects.

dltmqm (delete queue manager)

Deletes a specified queue manager.

dmpmqlog (dump log)

Dumps a formatted version of the WebSphere MQ system log.

dspmqaut (display authority)

Displays the current authorizations to a specified object.

dspmqcsv (display command server)

Displays the status of the command server for the specified queue manager.

dspmqfls (display WebSphere MQ files)

Displays the real file system name for all WebSphere MQ objects that match a specified criterion.

dspmqtrc (display WebSphere MQ formatted trace output)

Displays WebSphere MQ formatted trace output.

dspmqtrn (display WebSphere MQ transactions)

Displays details of in-doubt transactions.

endmqcsv (end command server)

Stops the command server on the specified queue manager.

endmqlsr

Ends a listener process.

endmqm (end queue manager)

Stops a specified local queue manager.

endmqtrc (end WebSphere MQ trace)

Ends tracing for the specified entity or all entities.

rcdmqimg (record media image)

Writes an image of a WebSphere MQ object, or group of objects, to the log for use in media recovery.

rcrmqobj (recreate object)

Recreates an object, or group of objects, from their images contained in the log.

rsvmqtrn (resolve WebSphere MQ transactions)

Commits or backs-out internally or externally coordinated in-doubt transactions.

runmqchi (run channel initiator)

Runs a channel initiator process.

runmqchl (run channel)

Runs either a Sender (SDR) or a Requester (RQSTR) channel.

runmqdlq (run dead-letter queue handler)

Starts the dead-letter queue (DLQ) handler, a utility that you can run to monitor and handle messages on a dead-letter queue.

runmqlsr (run listener)

Runs a listener process.

runmqsc (run WebSphere MQ commands)

Issues MQSC commands to a queue manager.

runmqtrm (start trigger monitor)

Invokes a trigger monitor.

setmqaut (set/reset authority)

Changes the authorizations to an object or to a class of objects.

strmqcsv (start command server)

Starts the command server for the specified queue manager.

strmqm (start queue manager)

Starts a local queue manager.

strmqtrc (start WebSphere MQ trace)

Enables tracing.

For more information about the syntax and purpose of control commands, see the *WebSphere MQ System Administration* manual.

WebSphere MQ (MQSC) Commands

You use the WebSphere MQ (MQSC) commands to manage queue manager objects, including the queue manager itself, channels, queues, and process definitions. For example, there are commands to define, alter, display, and delete a specified queue.

When you display a queue, using the **DISPLAY QUEUE** command, you display the queue *attributes*. For example, the **MAXMSGL** attribute specifies the maximum length of a message that can be put on the queue. The command does not show you the messages on the queue.

For detailed information about each MQSC command, see the *WebSphere MQ Command Reference*.

Running MQSC Commands

You run MQSC commands by invoking the control command **runmqsc**. You can run MQSC commands:

- Interactively by typing them at the keyboard
- As a sequence of commands from a text file

For more information about using MQSC commands, the *WebSphere MQ System Administration* manual.

PCF Commands

WebSphere MQ programmable command format (PCF) commands allow administration tasks to be programmed into an administration program. In this way you can create queues and process definitions, and change queue managers, from a program. PCF commands cover the same range of functions that are provided by the MQSC facility. You can therefore write a program to issue PCF commands to any queue manager in the network from a single node. In this way, you can both centralize and automate administration tasks.

Note

Unlike MQSC commands, PCF commands and their replies are not in a text format that you can read.

For a complete description of the PCF data structures and how to implement them, see the *WebSphere MQ Programmable System Management* manual.

Working with Queue Managers

This section describes how you can perform operations on queue managers, such as creating, starting, stopping, and deleting them. WebSphere MQ provides control commands for performing these tasks.

Before you can do anything with messages and queues, you must create at least one queue manager.

Creating a Default Queue Manager

The following command:

Creates a default queue manager called **saturn.queue.manager**.

Creates the default and system objects automatically.

Specifies the names of both a default transmission queue and a dead-letter queue.

```
crtmqm -q -d MY.DEFAULT.XMIT.QUEUE -u  
SYSTEM.DEAD.LETTER.QUEUE saturn.queue.manager
```

where:

-q Indicates that this queue manager is the default queue manager.

-d MY.DEFAULT.XMIT.QUEUE Is the name of the default transmission queue.

-u SYSTEM.DEAD.LETTER.QUEUE Is the name of the dead-letter queue.

saturn.queue.manager Is the name of this queue manager. This must be the last parameter specified on the **crtmqm** command.

For more information about these attributes, see the *WebSphere MQ System Administration* manual.

Starting a Queue Manager

Although you have created a queue manager, it cannot process commands or MQI calls until it has been started. Start the queue manager by typing in this command:

```
strmqm saturn.queue.manager
```

The **strmqm** command does not return control until the queue manager has started and is ready to accept connect requests.

Stopping a Queue Manager

To stop a queue manager, use the **endmqm** command. For example, to stop a queue manager called **saturn.queue.manager** use this command:

```
endmqm saturn.queue.manager
```

Quiesced Shutdown

By default, the above command performs a *quiesced shutdown* of the specified queue manager. This may take a while to complete—a quiesced shutdown waits until all connected applications have disconnected.

Use this type of shutdown to notify applications to stop; you are not told when they have stopped.

You can specify the **-w** flag if you require confirmation that the queue manager has stopped. For example: **endmqm -w saturn.queue.manager**. The command prompt does not return until the queue manager has stopped.

Immediate Shutdown

An *immediate shutdown* allows any current MQI calls to complete, but any new calls fail. This type of shutdown does not wait for applications to disconnect from the queue manager.

Use this as the normal way to stop the queue manager, optionally after a quiesce period. For an immediate shutdown, the command is:

```
endmqm -i saturn.queue.manager
```

Preemptive Shutdown

Note

Do not use this method unless all other attempts to stop the queue manager using the **endmqm** command have failed. This method can have unpredictable consequences for connected applications. *After a preemptive shutdown, you must manually clean up the ipc shared memory segments and semaphores before restarting the queue manager.*

If an immediate shutdown does not work, you must resort to a *preemptive shutdown*, specifying the **-p** flag. For example:

```
endmqm -i saturn.queue.manager
```

This stops all queue manager code immediately.

Restarting a Queue Manager

To restart a queue manager called **saturn.queue.manager**, use the command:

```
strmqm saturn.queue.manager
```


Deleting a Queue Manager

To delete a queue manager called `saturn.queue.manager`, first stop it, then use the following command:

```
dltmqm saturn.queue.manager
```

Note

Deleting a queue manager is a serious step, because you also delete all resources associated with that queue manager, including all queues and their messages, and all object definitions.

Working with WebSphere MQ Objects

This section describes briefly how to use MQSC commands to create, display, change, copy, and delete WebSphere MQ objects.

You can use the MQSC facility interactively (by entering commands at the keyboard) or you can redirect the standard input device (stdin) to run a sequence of commands from a text file. The format of the commands is the same in both cases. The examples included here assume that you will be using the interactive method.

For more information about using MQSC commands, see the *WebSphere MQ System Administration* manual. For a complete description of the MQSC commands, see the *WebSphere MQ Command Reference*.

Before you can run MQSC commands, you must have created and started the queue manager that is going to run the commands. For more information see “Creating a Default Queue Manager”.

Using the MQSC Facility Interactively

To start using the MQSC facility interactively, use the `runmqsc` command. Open a shell and enter:

```
runmqsc
```

A queue manager name has not been specified, therefore the MQSC commands will be processed by the default queue manager. Now type in any MQSC commands, as required. For example:

```
DEFINE QLOCAL (ORANGE.LOCAL.QUEUE)
```

Continuation characters must be used to indicate that a command is continued on the following line:

- A minus sign (-) indicates that the command is to be continued from the start of the following line.
- A plus sign (+) indicates that the command is to be continued from the first nonblank character on the following line.

Command input terminates with the final character of a nonblank line that is not a continuation character. You can also terminate command input explicitly by entering a semicolon (;). (This is especially useful if you accidentally enter a continuation character at the end of the final line of command input.)

Feedback from MQSC Commands

When you issue commands from the MQSC facility, the queue manager returns operator messages that confirm your actions or tell you about the errors you have made. For example:

AMQ8006: WebSphere MQ queue created

.
. .

AMQ8405: Syntax error detected at or near end of command segment below:-Z

The first message confirms that a queue has been created; the second indicates that you have made a syntax error.

These messages are sent to the standard output device. If you have not entered the command correctly, refer to the *WebSphere MQ Command Reference* manual for the correct syntax.

Ending Interactive Input to MQSC

To end interactive input of MQSC commands, enter the MQSC END command:

END

Alternatively, you can use the EOF character **CTRL+D**

If you are redirecting input from other sources, such as a text file, you do not have to do this.

Defining a Local Queue

For an application, the local queue manager is the queue manager to which the application is connected. Queues that are managed by the local queue manager are said to be local to that queue manager.

Use the MQSC command **DEFINE QLOCAL** to create a definition of a local queue and also to create the data structure that is called a queue. You can also modify the queue characteristics from those of the default local queue.

In this example, the queue we define, **ORANGE.LOCAL.QUEUE**, is specified to have these characteristics:

- It is enabled for gets, disabled for puts, and operates on a first-in-first-out (FIFO) basis.
- It is an 'ordinary' queue, that is, it is not an initiation queue or a transmission queue, and it does not generate trigger messages.
- The maximum queue depth is 1000 messages; the maximum message length is 2000 bytes.

The following MQSC command does this:

```
DEFINE QLOCAL (ORANGE.LOCAL.QUEUE) +  
DESCR('Queue for messages from other systems') +  
PUT (DISABLED) +  
GET (ENABLED) +  
NOTRIGGER +  
MSGDLVSQ (FIFO) +  
MAXDEPTH (1000) +  
MAXMSGL (2000) +  
USAGE (NORMAL);
```

Notes

1. Most of these attributes are the defaults as supplied with the product. However, they are shown here for purposes of illustration. You can omit them if you are sure that the defaults are what you want or have not been changed. See also "Displaying Default Object

Attributes”.

2. **USAGE (NORMAL)** indicates that this queue is not an initiation queue or a transmission queue.
3. If you already have a local queue on the same queue manager with the name **ORANGE.LOCAL.QUEUE**, this command fails. Use the **REPLACE** attribute if you want to overwrite the existing definition of a queue, but see also “Changing Local Queue Attributes”.

Displaying Default Object Attributes

When you define a WebSphere MQ object, it takes any attributes that you do not specify from the default object. For example, when you define a local queue, the queue inherits any attributes that you omit in the definition from the default local queue, which is called **SYSTEM.DEFAULT.LOCAL.QUEUE**. The default local queue is created automatically when you create the default queue manager. To see exactly what these attributes are, use the following command:

```
DISPLAY QUEUE (SYSTEM.DEFAULT.LOCAL.QUEUE)
```

Note

The syntax of this command is different from that of the corresponding **DEFINE** command.

You can selectively display attributes by specifying them individually. For example:

This command displays the three specified attributes as follows:

```
AMQ8409: Display Queue details.  
QUEUE (ORANGE.LOCAL.QUEUE)  
MAXDEPTH (1000)  
MAXMSGL (2000)  
CURDEPTH (0)
```

CURDEPTH is the current queue depth, that is, the number of messages on the queue. This is a useful attribute to display, because by monitoring the queue depth you can ensure that the queue does not become full.

Copying a Local Queue Definition

You can copy a queue definition using the **LIKE** attribute on the **DEFINE** command.

For example:

```
DEFINE QLOCAL (MAGENTA.QUEUE) +  
LIKE (ORANGE.LOCAL.QUEUE)
```

This command creates a queue with the same attributes as our original queue **ORANGE.LOCAL.QUEUE**, rather than those of the system default local queue.

You can also use this form of the **DEFINE** command to copy a queue definition, but substituting one or more changes to the attributes of the original. For example:

```
DEFINE QLOCAL (THIRD.QUEUE) +  
LIKE (ORANGE.LOCAL.QUEUE) +  
MAXMSGL(1024);
```

This command copies the attributes of the queue **ORANGE.LOCAL.QUEUE** to the queue

THIRD.QUEUE, but specifies that the maximum message length on the new queue is to be 1024 bytes, rather than 2000.

Notes

1. When you use the **LIKE** attribute on a **DEFINE** command, you are copying the queue attributes only. You are not copying the messages on the queue.
2. If you define a local queue, without specifying **LIKE**, it is the same as **DEFINE LIKE(SYSTEM.DEFAULT.LOCAL.QUEUE)**.

Changing Local Queue Attributes

You can change queue attributes in two ways, using either the **ALTER QLOCAL** command or the **DEFINE QLOCAL** command with the **REPLACE** attribute. In “Defining a Local Queue”, we defined the queue **RANGE.LOCAL.QUEUE**. Suppose, for example, you wanted to increase the maximum message length on this queue to 10,000 bytes.

- Using the **ALTER** command:

```
ALTER QLOCAL (ORANGE.LOCAL.QUEUE) MAXMSGL(10000)
```

This command changes a single attribute, that of the maximum message length; all the other attributes remain the same.

- Using the **DEFINE** command with the **REPLACE** option, for example:

```
DEFINE QLOCAL (ORANGE.LOCAL.QUEUE) MAXMSGL(10000) REPLACE
```

This command changes not only the maximum message length, but all the other attributes, which are given their default values. The queue is now put enabled whereas previously it was put inhibited. Put enabled is the default, as specified by the queue **SYSTEM.DEFAULT.LOCAL.QUEUE**, unless you have changed it.

If you decrease the maximum message length on an existing queue, existing messages are not affected. Any new messages, however, must meet the new criteria.

Clearing a Local Queue

To delete all the messages from a local queue called **MAGENTA.QUEUE**, use the following command:

```
CLEAR QLOCAL (MAGENTA.QUEUE)
```

You cannot clear a queue if:

- There are uncommitted messages that have been put on the queue under syncpoint.
- An application currently has the queue open.

Deleting a Local Queue

Use the MQSC command **DELETE QLOCAL** to delete a local queue. A queue cannot be deleted if it has uncommitted messages on it. However, if the queue has one or more committed messages, and no uncommitted messages, it can be deleted only if you specify the **PURGE** option. For example:

```
DELETE QLOCAL (PINK.QUEUE) PURGE
```

Specifying **NOPURGE** instead of **PURGE** ensures that the queue is not deleted if it contains any committed messages.

Browsing Queues

WebSphere MQ provides a sample queue browser that you can use to look at the contents of the messages on a queue. The browser is supplied in both source and executable formats.

The default file names and paths are:

Source `/opt/mqm/samp/amqsbcg0.c`

Executable `/opt/mqm/samp/bin/amqsbcg`

The sample requires two input parameters, the queue manager name and the queue name. For example:

`amqsbcg ORANGE.LOCAL.QUEUE saturn.queue.manager`

There are no defaults; both parameters are required.

Chapter 6. Obtaining Additional Information

This chapter describes the documentation related to WebSphere MQ for UnixWare V5.2: WebSphere MQ for UnixWare is described in the following books:

Table 3. *WebSphere MQ for UnixWare books*

Order Number	Title
UnixWare Specific Book	
	<i>WebSphere MQ for UnixWare Quick Beginnings</i>
WebSphere MQ Family Books	
GC34-5761	<i>WebSphere MQ V5.2 Release Guide</i>
SC33-1872	<i>WebSphere MQ Intercommunication</i>
SC34-5349	<i>WebSphere MQ Queue Manager Clusters</i>
GC33-1632	<i>WebSphere MQ Clients</i>
SC33-1873	<i>WebSphere MQ System Administration</i>
SC33-1369	<i>WebSphere MQ MQSC Command Reference</i>
SC33-1482	<i>WebSphere MQ Programmable System Management</i>
SC34-5390	<i>WebSphere MQ Administration Interface Programming Guide and Reference</i>
GC33-1876	<i>WebSphere MQ Messages</i>
SC33-0807	<i>WebSphere MQ Application Programming Guide</i>
SC33-1673	<i>WebSphere MQ Application Programming Reference</i>
SX33-6095	<i>WebSphere MQ Programming Interfaces Reference Summary</i>
SC33-1877	<i>WebSphere MQ Using C++</i>

Part 4. Appendixes

Appendix A. Installing the WebSphere MQ Product License

License Management

WebSphere MQ for UnixWare is nodelocked to a specific machine. Before you can run WebSphere MQ for UnixWare, you must first install a license key.

Obtaining a License

When you received the software, you should also have received a user name and password allowing access to Willow's online technical support site at: <http://www.willowtech.com/support.htm>. (If you have not received your technical support user name and password, please request one from info@willowtech.com).

Once you have installed the software, please contact Willow Technology for a license key. To receive a license key (and/or access to Willow's online technical support), you must send us the following information:

- a) Your name;
- b) Company name;
- c) Company mailing address;
- d) Your telephone number;
- e) Your email address;
- f) Your Proof of Entitlement ID that came with your software (not required for evaluation licenses);
- g) The output from the "uname -X" command.

Note

If you are running UnixWare 7.x on an Avaya Conversant machine, please be aware that there are two different versions of the uname command. If "uname -X" returns an error, please try <code>"/bin/uname -X"</code>

- h) The output from the "ifconfig -a" command.

License Key Installation

We will then send you either the evaluation, temporary or permanent license key named "keyfile". This file must be ftp'd as binary to the system and placed in the `/usr/local/licenses` directory before you can create a Queue Manager (`crtmqm` command) or start WebSphere MQ (`strmqm` command).

Notes

You might have to create the <code>/usr/local/flexlm/licenses</code> directories if it does not already exist.
--

If you wish to rename the license file, or place it in another location, set the environment variable, LM_LICENSE_FILE, to the correct location/file name.

e.g: to use a license file named "mylicense.lic" placed in the /opt/mqm directory:

```
set LM_LICENSE_FILE=/opt/mqm/mylicense.lic
export LM_LICENSE_FILE
```

1. You might have to create the **/usr/local/flexlm/licenses** directories if it does not already exist.
2. If you wish to rename the license file, or place it in another location, set the environment variable, LM_LICENSE_FILE, to the correct location/file name
e.g: to use a license file named "mylicense.lic" placed in the /opt/mqm directory:

```
set LM_LICENSE_FILE=/opt/mqm/mylicense.lic
export LM_LICENSE_FILE.
```

If your license expires, you will no longer be able to run WebSphere MQ for UnixWare. Contact Willow Technology for a replacement license. As soon as a valid license is installed, WebSphere MQ will again be fully operational.

Appendix B. Sample MQI programs and MQSC files

WebSphere MQ for UnixWare provides a set of short sample MQI programs and MQSC command files. You can use these directly or modify them for experimental purposes.

MQSC Command File Samples

Table B-1 lists the MQSC command file samples. These are simply ASCII text files containing MQSC commands. You can invoke the `runmqsc` command against each file in turn to create the objects specified in the file.

By default, these files are located in directory `/opt/mqm/samp`

Table B-1. MQSC command files	
File name	Purpose
amqscic0.tst	Defines objects for use in the sample CICS transaction.
amqscos0.tst	Creates a set of MQI objects for use with the C and COBOL program samples.
amqmdefs.tst	Defines objects for the administration application sample.

C and COBOL Program Samples

Table B-2 lists the sample MQI source files. By default, the source files are in directory `/opt/mqm/samp` and the compiled versions in directory `/opt/mqm/samp/bin`. To find out more about what the programs do and how to use them, see the *WebSphere MQ Application Programming Guide*.

Table B-2. Sample programs - source files		
C	COBOL	Purpose
amqsbcg0.c	--	Reads and then outputs both the message descriptor and message context fields of all the messages on a specified queue.
amqsecha.c	amqmechx.cbl	Echoes a message from a message queue to the reply-to queue. Can be run as a triggered application program.
amqsgbr0.c	amq0gbr0.cbl	Writes messages from a queue to stdout, leaving the messages on the queue. Uses MQGET with the browse option.
amqsget0.c	amq0get0.cbl	Removes the messages from the named queue (using MQGET) and writes them to stdout.

amqsinqa.c	amqminqx.cbl	Reads the triggered queue; each request read as a queue name; responds with information about that queue.
amqsput0.c	amq0put0.cbl	Copies stdin to a message and then puts this message on a specified queue.
amqsreq0.c	amq0req0.cbl	Puts request messages on a specified queue and then displays the reply messages.
amqsseta.c	amqmsetx.cbl	Inhibits puts on a named queue and responds with a statement of the result. Runs as a triggered application.
amqstrg0.c	--	A trigger monitor that reads a named initiation queue and then starts the program associated with each trigger message. Provides a subset of the full triggering function of the supplied runmqtrm command.
amqsvfcx.c	--	A sample C skeleton of a Data Conversion exit routine.
amqsptl0.c	--	Putting messages to a distribution list.
amqsprma.c	--	Putting reference messages to a queue.
amqsgrma.c	--	Getting reference messages from a queue.
amqsxrma.c	--	Reference message channel exit.
Note: You can create the objects required by these samples using the MQSC command file amqscos0.tst.		

Miscellaneous Tools

These tool files are provided to support the formatter and code conversion.

Table B-3. Miscellaneous files		
File name	Location	Purpose
amqtrc.fmt	/opt/mqm/lib	Defines WebSphere MQ trace formats.
ccsid.tbl	/var/mqm/conv/table	Edit this file to add any newly supported CSSID values to your WebSphere MQ system.

Appendix C. Support for different codesets on WebSphere MQ for UnixWare

WebSphere MQ for UnixWare supports many of the codesets used by the locales - that is, the subsets of the user's environment which define the conventions for a specific culture - that are provided as standard on WebSphere MQ for UnixWare.

Note that to install most of these locales on a WebSphere MQ for UnixWare system the Language Supplement (LS) for the operating system must be installed. If the locale is not set, the value of the LANG environment variable is used. If neither the locale nor LANG environment variable is set the CCSID used is 819 - the ISO 8859-1 codeset.

See "Migration to Euro Support" for information on support for the euro character.

The CCSID (Coded Character Set Identifier) used in WebSphere MQ to identify the codeset used for the message and message header data is obtained by analyzing the LC_CTYPE environment variable.

Table C-1 shows the locales and the CCSIDs that are registered for the codeset used by the locale.

Locale	Language	Codeset	CCSID
C	English	ISO 8859-1	819
Ar	Arabic	ISO 8859-6	1089
Ar_AA	Arabic	ISO 8859-6	1089
bu	Bulgarian	ISO 8859-5	915
bu_BG	Bulgarian	ISO 8859-5	915
cs	Czech	ISO 8859-2	912
cs_CZ	Czech	ISO 8859-2	912
Da	Danish	ISO 8859-1	819
Da_DK	Danish	ISO 8859-1	819
De	German	ISO 8859-1	819
De_DE	German	ISO 8859-1	819
De_AT	German - Austria	ISO 8859-1	819
De_CH	German - Switzerland	ISO 8859-1	819

el	Greek	ISO 8859-7	813
el_GR	Greek	ISO 8859-7	813
en	English - United Kingdom	ISO 8859-1	819
en_GB	English - United Kingdom	ISO 8859-1	819
en_UK	English - United Kingdom	ISO 8859-1	819
en_AU	English - Australia	ISO 8859-1	819
en_CA	English - Canada	ISO 8859-1	819
en_US	English - USA	ISO 8859-1	819
es	Spanish	ISO 8859-1	819
es_ES	Spanish	ISO 8859-1	819
fi	Finnish	ISO 8859-1	819
fi_FI	Finnish	ISO 8859-1	819
fr	French - France	ISO 8859-1	819
fr_FR	French - France	ISO 8859-1	819
fr_BE	French - Belgium	ISO 8859-1	819
fr_CA	French - Canada	ISO 8859-1	819
fr_CH	French - Switzerland	ISO 8859-1	819
hr	Croatian	ISO 8859-2	912
hr_HR	Croatian	ISO 8859-2	912
hu	Hungarian	ISO 8859-2	912
hu_HR	Hungarian	ISO 8859-2	912
is	Icelandic	ISO 8859-1	819
it	Italian - Italy	ISO 8859-1	819
it_IT	Italian - Italy	ISO 8859-1	819
it_CH	Italian - Switzerland	ISO 8859-1	819
iw	Hebrew	ISO 8859-8	916

iw_IL	Hebrew	ISO 8859-8	916
ja	Japanese	euJP	5050
ja_JP	Japanese	euJP	5050
ja_JP.PCK	Japanese	PCK	943
mk	Macedonian	ISO 8859-5	915
mk_MK	Macedonian	ISO 8859-5	915
nl	Dutch - Netherlands	ISO 8859-1	819
nl_NL	Dutch - Netherlands	ISO 8859-1	819
nl_BE	Dutch - Belgium	ISO 8859-1	819
no	Norwegian	ISO 8859-1	819
no_NO	Norwegian	ISO 8859-1	819
pl	Polish	ISO 8859-2	912
pl_PL	Polish	ISO 8859-2	912
POSIX	English	ISO 8859-1	819
pt	Portuguese	ISO 8859-1	819
pt_PT	Portuguese	ISO 8859-1	819
ro	Romanian	ISO 8859-2	912
ro_RO	Romanian	ISO 8859-2	912
ru	Russian	ISO 8859-5	915
ru_RU	Russian	ISO 8859-5	915
ru_SU	Russian	ISO 8859-5	915
sh	Serbocroatian	ISO 8859-2	912
sh_SP	Serbocroatian	ISO 8859-2	912
sh_YU	Serbocroatian	ISO 8859-2	912
sl	Slovene	ISO 8859-2	912
sl_SL	Slovene	ISO 8859-2	912

sk	Slovak	ISO 8859-2	912
sk_SK	Slovak	ISO 8859-2	912
sr	Serbian Cyrillic	ISO 8859-5	915
sr_SP	Serbian Cyrillic	ISO 8859-5	915
tr	Turkish	ISO 8859-9	920
tr_TR	Turkish ISO	8859-9	920
sv	Swedish	ISO 8859-1	819
sv_SE	Swedish	ISO 8859-1	819
tr	Turkish	ISO 8859-9	920
tr_TR	Turkish ISO	8859-9	920
zh	Simplified Chinese	eucCN	1383
zh_TW	Traditional Chinese	eucTW	964
zh_TW.BIG5	Traditional Chinese	BIG5	950

For further information listing inter-platform support for these locales, see the *WebSphere MQ Distributed Queuing Guide*.

Migrating to Euro Support

If you want to use the euro character with WebSphere MQ, you should first install any operating system updates necessary to display the euro character.

Now modify your WebSphere MQ system:

- Edit the existing CCSID.TBL file to enable the new euro version of the coded character set identifier (CCSID). To do this, remove the # symbol from the required line of the **CCSID Mapping** section of the CCSID.TBL file. When you have done this, all new queue managers

you create will adopt the new euro CCSID.

Note:

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

- To modify any existing queue managers that do not support the euro character, follow this procedure:
 1. Record the existing queue manager CCSID, with the WebSphere MQ (MQSC) command:
DISplay QMGR CCSID
 2. Change the CCSID to the euro support CCSID, with the MQSC command:
ALTer QMGR CCSID
 3. Stop the queue manager.
 4. Restart the queue manager and any channels it uses.

Note:

The ALTer QMGR CCSID command is a new command supplied with WebSphere MQ for UnixWare V5.2. Now any new message issued using the queue manager CCSID uses the new euro CCSID. All messages now received using MQGET with conversion and requesting the queue manager CCSID to be used are converted into the euro CCSID. CCSIDs and object text (for example descriptions, definitions, and exit names), from existing messages are not changed.

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

Appendix D. Notices

References in this publication to Willow Technology products, programs, or services do not imply that Willow Technology intends to make these available in all countries in which Willow Technology operates.

Any reference to a Willow Technology product, program, or service is not intended to state or imply that only that Willow Technology product, program, or service may be used.

The following paragraph does not apply to any country where such provisions are inconsistent with local law:

WILLOW TECHNOLOGY, INC PROVIDES THIS PUBLICATION “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore this statement may not apply to you.

Any functionally equivalent product, program, or service that does not infringe any of the intellectual property rights of Willow Technology and its Licensors may be used instead of the Willow Technology product, program, or service. The evaluation and verification of operation in conjunction with other products, except those expressly designated by Willow Technology and its Licensors, are the responsibility of the user.

Willow Technology and its Licensors may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents.

Trademarks

Willow Technology, the Willow logo and willowtech.com are trademarks of Willow Technology, Inc.

The following terms are trademarks of the IBM Corporation in the United States, or other countries, or both:

AS/400	IBM	AIX
CICS	DB2	FFST
IBM	MQSeries	WebSphere
MVS	MVS/ESA	OS/400

UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

FLEXlm is a registered trademark of Globetrotter, Inc.

UnixWare is a registered trademark of The SCO Group, Inc.

Other company, product and service names may be trademarks or service marks of others.

Index

Table B-1. MQSC command files.....	44
Table B-2. Sample programs - source files	44
Table B-3. Miscellaneous files	45
Table C-1. Locales and CCSIDs.....	46

Administration Command Sets		Performance events	8
control commands.....	31, 32, 34, 35	Queue manager events	8
ALTER	40	group	9, 15, 16, 33
Attributes		Hardware Requirements	11
changing.....	18	idbuild	18
default....	11, 14, 16, 17, 21, 22, 23, 24, 25, 26, 28, 32,	idtune.....	18
35, 36, 37, 38, 39, 40, 41, 46		Installation	
C 28, 46, 47, 48		pkgadd	19
case sensitive.....	31	pkgrm.....	14, 19
CCSID.....	28, 48	instrumentation events.....	6, 8
changing	18	Kernel Configuration	
CHANNEL.....	24, 26	idbuild.....	18
Channel events	8	MSGMAX.....	17, 18
CLEAR.....	41	MSGMNB.....	17, 18
COBOL.....	46	MSGSSZ.....	17, 18
code set.....	28	mtune.....	17
Compilers		semop.....	17
C 28, 46, 47, 48		SEMOPM.....	17, 18
COBOL	46	SEMUME.....	17, 18
control commands	31, 32, 34, 35	SFNOLIM	18
crtmqcvx.....	32	shmat.....	17
crtmqm	14, 16, 21, 23, 25, 28, 31, 32, 35, 44	SHMMAX.....	17, 18
default... 11, 14, 16, 17, 21, 22, 23, 24, 25, 26, 28, 32, 35,		SHMMNI	17, 18
36, 37, 38, 39, 40, 41, 46		SHMSEG.....	17, 18
DEFINE	37, 38, 39, 40	LANG	20, 28, 48
DELETE	41	License Key Installation.....	44
disk space	11	Licensing	
DISPLAY.....	34, 39	License Key Installation.....	44
dltmqm	32, 36	Permanent License.....	44
dmpmqlog.....	32	Product License.....	44
dspmqaout.....	32	Locale	48
dspmqcsv.....	32	MQSC Commands	
dspmqls.....	32	ALTER	40
dspmqtcr.....	32	CLEAR.....	41
dspmqtrn	32	DEFINE	37, 38, 39, 40
END	38	DELETE	41
endmqcsvg	32	DISPLAY.....	34, 39
endmqlsr.....	32	END	38
endmqm.....	32, 35, 36	MSGMAX	17, 18
endmqtrc	33	MSGMNB	17, 18
Environment Variables		MSGSSZ.....	17, 18
LANG	20, 28, 48	mtune	17
Events		NLSPATH.....	20
Channel events.....	8	PCF.....	31, 34

Performance events	8
Permanent License	44
pkgadd	19
pkgrm	14, 19
<i>preemptive shutdown</i>	36
Product License	44
Programmable Command Format	
PCF	31, 34
QLOCAL	37, 38, 39, 40, 41
QUEUE21, 22, 23, 24, 26, 27, 31, 34, 35, 37, 38, 39, 40, 41	
Queue manager events	8
rcdmqimg	33
rcrmqobj	33
rsvmqtrn	33
runmqchi	33
runmqchl	26, 33
runmqdlq	33
runmqlsr	33
runmqsc	21, 23, 26, 28, 33, 34, 37, 46
runmqtrm	33, 47
Security	
user ID	8, 15, 16
semop	17
SEMOPM	17, 18
SEMUME	17, 18
setmqaut	33
SFNOLIM	18
shmat	17
SHMMAX	17, 18
SHMMNI	17, 18
SHMSEG	17, 18
Software Requirements	12
strmqcsv	33
strmqm	16, 21, 23, 25, 26, 33, 35, 36, 44
strmqtrc	34
TCP/IP	12

trigger events	6
user ID	8, 15, 16
WebSphere MQ Control Commands	
case sensitive	31
crtmqcvx	32
crtmqm	14, 16, 21, 23, 25, 28, 31, 32, 35, 44
dlmqm	32, 36
dmpmqlog	32
dspmqaut	32
dspmqcsv	32
dspmqfls	32
dspmqtrc	32
dspmqtrn	32
endmqcsv	32
endmqlsr	32
endmqm	32, 35, 36
endmqtrc	33
rcdmqimg	33
rcrmqobj	33
rsvmqtrn	33
runmqchi	33
runmqchl	26, 33
runmqdlq	33
runmqlsr	33
runmqsc	21, 23, 26, 28, 33, 34, 37, 46
runmqtrm	33, 47
setmqaut	33
strmqcsv	33
strmqm	16, 21, 23, 25, 26, 33, 35, 36, 44
strmqtrc	34
WebSphere MQ Objects	
CHANNEL	24, 26
QLOCAL	37, 38, 39, 40, 41
QUEUE	21, 22, 23, 24, 26, 27, 31, 34, 35, 37, 38, 39, 40, 41