

Unit 2. Installation and configuration of WebSphere MQ on Windows and UNIX

What this unit is about

This unit describes the installation and initial configuration of the WebSphere MQ system.

What you should be able to do

After completing this unit, you should be able to:

- Identify the steps required to install WebSphere MQ on Windows, AIX, or Solaris
- Find the hardware and software prerequisites for WebSphere MQ installation
- Use WebSphere MQ utilities to create, start, and stop a queue manager
- Configure basic WebSphere MQ objects
- Name several WebSphere MQ utilities that can be used to test a WebSphere MQ environment

How you will check your progress

Accountability:

- Checkpoint
- Machine exercises

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Unit objectives

After completing this unit, you should be able to:

- Identify the steps required to install WebSphere MQ on Windows, AIX, or Solaris
- Find the hardware and software prerequisites for WebSphere MQ installation
- Use WebSphere MQ utilities to create, start, and stop a queue manager
- Configure basic WebSphere MQ objects
- Name several WebSphere MQ utilities that can be used to test a WebSphere MQ environment

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Figure 2-1. Unit objectives

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Notes:

Naming WebSphere MQ objects

- Allowable character set
 - A-Z, a-z, 0-9, and . / _ %
- Maximum of 48 characters for the names of:
 - Queue managers
 - Queues
 - Process definitions
 - Namelists
 - Clusters
 - Listeners
 - Services
 - Authentication information objects
- Maximum of 20 characters for the names of channels
- No implied structure in a name

Note: Names in WebSphere MQ are case-sensitive

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Figure 2-3. Naming WebSphere MQ objects

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Notes:

The names of channels are limited to 20 characters but otherwise follow the standard rules for naming WebSphere MQ objects.

Agree on all names before you start, and remember that names in WebSphere MQ are case-sensitive.

Forward slash and percent are special characters. If you use either of these characters in a name, the name must be enclosed in double quotation marks. It is recommended not to use special characters. Many organizations use uppercase naming conventions, especially if z/OS queue managers are used within the WebSphere MQ environment.

Leading or embedded blanks are not allowed.

National language characters are not allowed.

Names can be enclosed in double quotation marks, but double quotation marks are essential only if special characters are included in the name.

Queue manager

- May have multiple queue managers per system
- Naming conventions
 - Typically short
 - TCP/IP host name
 - Windows system name
 - SNA LU alias
 - Node name
 - Should be unique within the network

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Figure 2-4. Queue manager

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Notes:

Queue manager names are case-sensitive.

After installation, the first WebSphere MQ object to be created is a queue manager.

Typically, you only need to create one queue manager per system, but you can create multiple queue managers based on various needs, such as security or separation of business units, testing, or development purposes.

Every queue manager has a name, which should be unique within a network of queue managers exchanging messages with each other. Unique naming is necessary because when a queue manager generates a unique message identifier for a message, it uses the first 12 characters of its name as part of the identifier.

Queue manager naming conventions should be planned. Using host names can lead to problems over time if host names change or frequent server reassignments occur. Some large IBM WebSphere organizations have used host names combined with Domain Name System (DNS) servers, which can decrease the configuration work required when queue managers move to different dedicated WebSphere MQ servers. However, as a rule, host

names should not be used. Most organizations successfully use geographic area, the application that the WebSphere MQ queue manager is serving, or a combination of the two.

Queues

- Only a local queue stores messages
- Other queue types
 - Alias queue
 - Local definition of a remote queue
 - Model queue (a template, from which dynamic queues are derived) and dynamic queue
- Queue type is transparent to the application
 - Model and dynamic queues are the exception
- Useful naming conventions
 - Name of a queue should describe its function, not its type or location
 - Common prefix for names of related queues simplifies administration

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Figure 2-5. Queues

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Notes:

Queue names are case-sensitive.

From WebSphere MQ Version 6.0, queues over 2 GB in size are supported.

There are some useful conventions for naming a queue.

- The name of a queue should not contain an indication of its type or location. In this way, if a queue changes from being a local queue to being a remote queue for example, you can still use the same name for the queue and applications referencing the queue require no change, not even a recompilation.

Instead, the name of a queue should describe its function.

- Using a common prefix for the names of related queues can aid administration, for example, searching for all queues related to an application.

Special local queues

- Dead letter queue
 - One per queue manager
 - Designated queue for messages that cannot be delivered
 - Always set up a dead letter queue
- Initiation queues
 - Used for triggering
- Transmission queues
- Command queue
- Event queues
- Default queues

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Figure 2-6. Special local queues

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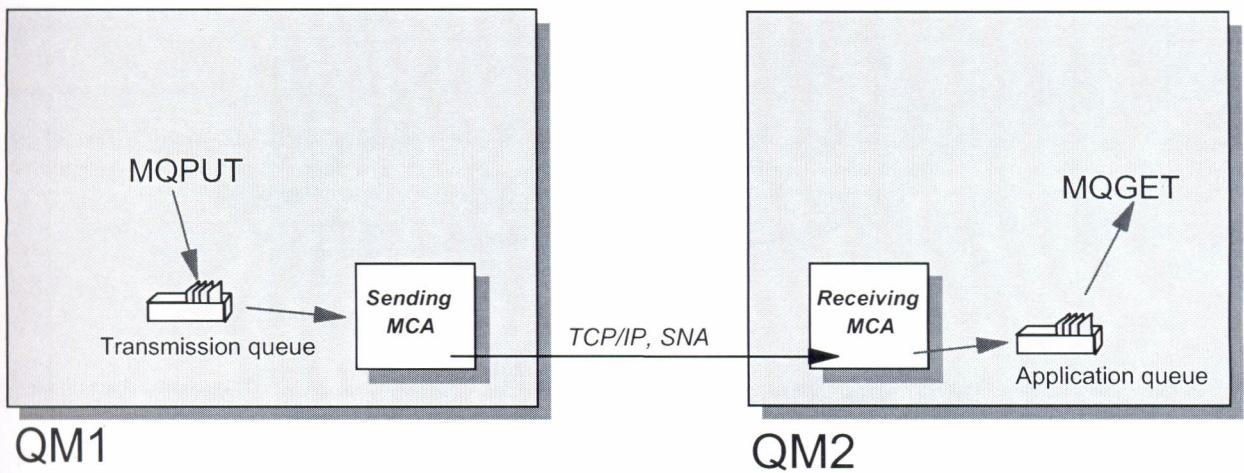
Notes:

There are some local queues which have special purposes in WebSphere MQ.

- A *dead letter queue* is a designated queue where a queue manager puts messages that cannot otherwise be delivered. It is not mandatory for a queue manager to have a dead letter queue, but it is recommended.
- An *initiation queue* is a queue that is used to implement triggering. Triggering is discussed in more detail later in the course.
- Transmission queues are queues that temporarily store messages that are destined for remote queue managers.
- The command queue, SYSTEM.ADMIN.COMMAND.QUEUE, is a local queue to which suitably authorized applications can send MQSC commands for processing. These commands are then retrieved by a WebSphere MQ component called the command server. The command server validates the commands, passes the valid ones on for processing by the queue manager, and returns any responses to the appropriate reply-to queue.

- When a queue manager detects an instrumentation event, which can either be a channel, queue manager, performance, or logger event, the queue manager puts a message describing that event on an event queue. An event queue can be monitored by a system management application which can get the messages put on these queues and take appropriate action.
- The purpose of the *default queues* is to identify the default values of the attributes of any new queue you create. There is one default queue for each of the four types of queues, *namely*, local, alias, remote, and model. Thus, you only need to include in the definition of a queue those attributes whose values are different from the default values when creating a queue. You can change the default value of an attribute by redefining the appropriate default queue.

Message channel



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Figure 2-7. Message channel

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Notes:

Channels are objects that provide a communication path from one queue manager to another. A *message channel* is a one-way link between two queue managers for the transmission of messages. It consists of an MCA (message channel agent) at the sending end, an MCA at the receiving end, and a communications connection between the two. The communications connection might be an SNA LU6.2 conversation, a TCP connection, and so on.

Each end of a message channel has a separate definition. Both definitions contain the name of the message channel. Among other things, the definition at each end of a message channel also indicates:

- Whether it is the sending end or the receiving end of the channel
- The communications protocol to be used

A *transmission queue* is required for each message channel.

A transmission queue is a local queue, that has a usage attribute whose value indicates its special role to transmit.

A transmission queue is located at the sending end of a message channel. As a result, only the definition of the message channel at the sending end contains the name of the transmission queue.

Any message destined for a remote queue is put by the queue manager onto a transmission queue. But how does the queue manager know which transmission queue to use? One way is to give the transmission queue the same name as the name of the destination queue manager.

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Administration interfaces

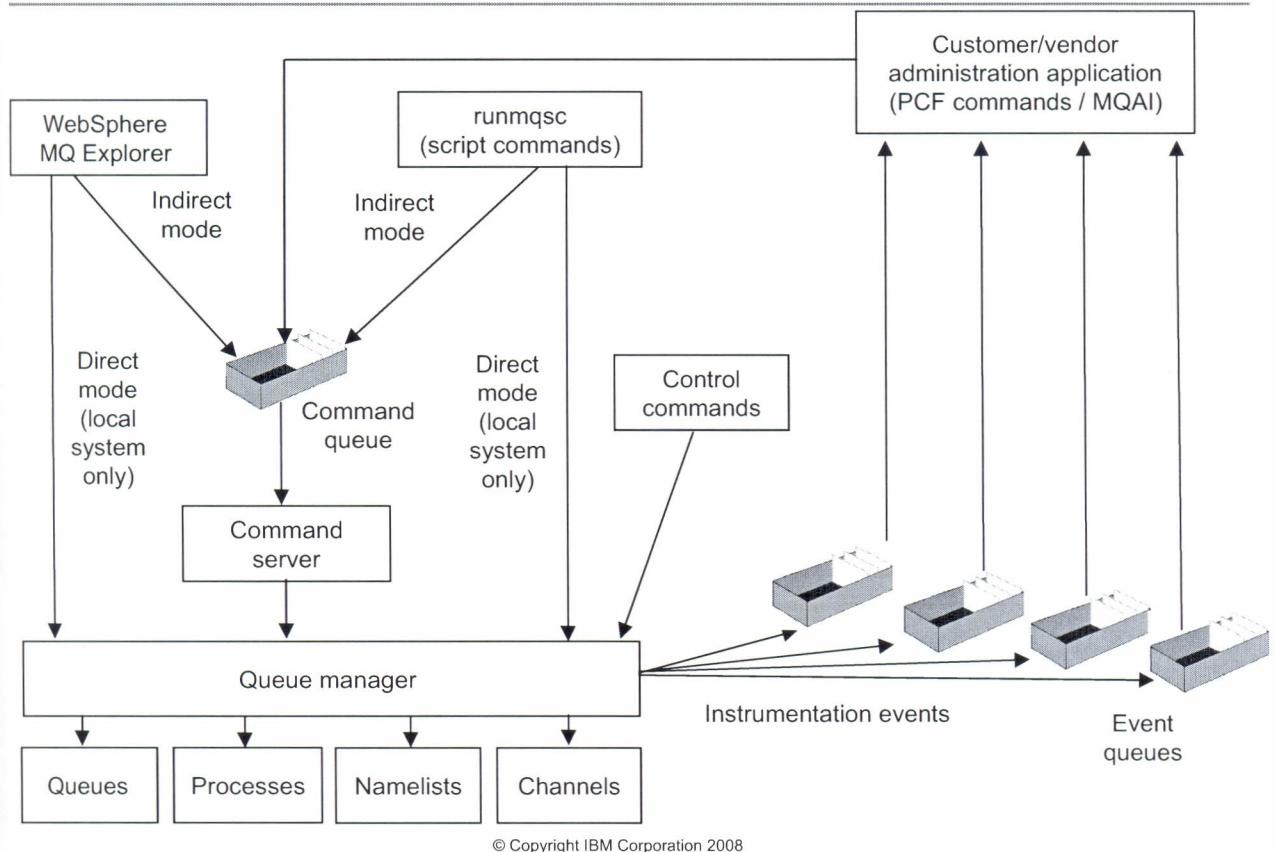


Figure 2-8. Administration interfaces

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Notes:

The administration interfaces include:

- WebSphere MQ Explorer
- WebSphere MQ commands (MQSC)
- Programmable command format (PCF) commands
- WebSphere MQ Administration Interface (MQAI)
- WebSphere control commands
- Administration application on WebSphere MQ for HP NonStop Server
- Event messages put on an event queue by the queue manager and retrieved by an application

Plan a WebSphere MQ implementation topic summary

Having completed this topic, you should be able to:

- Define the importance of naming conventions for a successful implementation
- Identify the different queue types and channels so that they can be considered for the implementation
- List the command modes for entering WebSphere MQ commands and know where to find them documented

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Figure 2-9. Plan a WebSphere MQ implementation topic summary

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Notes:

WebSphere MQ installation

Similar to installing other software on the same platform

- AIX
 - SMIT
 - Also an easy installation
- NCR UNIX
 - sysadm or pkgadd
- Compaq OpenVMS
 - VMSINSTAL
- HP-UX
 - swinstall
- Linux
 - Red Hat Package Manager
- SINIX and DC/OSx
 - pkgadd (DC/OSx)
 - sysadm (SINIX)
- SunOS
 - Run the supplied installation script from the CD-ROM
- Sun Solaris
 - pkgadd
- HP NonStop Server
 - RESTORE, then run the supplied installation utility, instmqm
- Windows
 - Automatic execution of setup from CD-ROM

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Figure 2-12. WebSphere MQ installation

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Notes:

The general rules for installation are as follows:

- Installing WebSphere MQ is like installing any other software on the same platform.
- Always follow the instructions in:
 - The appropriate *Quick Beginnings Guide* for the WebSphere MQ queue manager.
 - The appropriate System Management Guide for each of the remaining queue managers.
 - WebSphere MQ has a typical, compact, and a custom installation option. To ensure the installation complete, choose Custom so you can select all the features. Remember there are new features, for example, WebSphere MQ Client File Transfer Application and Server File Transfer Application that you could easily miss if you just chose a typical installation.

Pay particular attention to instructions about what to do **before** installation. For WebSphere MQ on UNIX systems for example, you must create a user ID with the name **mqm** whose primary group is **mqm**.

Pay particular attention to instructions about what to do **before** using WebSphere MQ. For example, on some UNIX systems, you are advised to change the values of certain kernel parameters if they are not sufficient to support WebSphere MQ.

You might install WebSphere MQ for AIX using SMIT, or you may choose the easy installation. The easy installation only places a minimal typical set of components on your system. It excludes, for example, the online documentation and the application development support. Further details can be found in *WebSphere MQ for AIX, V6.0 Quick Beginnings* GC34-6476.

During the installation of WebSphere MQ for HP Non Stop Server, you are prompted to enter the name of the volume to be used for the installation. If you do not enter a name, the default installation volume, \$SYSTEM, is used instead. The name \$SYSTEM is used in the examples throughout these course notes. If your installation volume is different, you need to replace the name \$SYSTEM with the name of your installation volume wherever appropriate.

From WebSphere MQ V6.0, 64 bit queue managers are now supported on AIX, HP-UX, Linux PPC, and Sun Solaris systems. All WebSphere MQ commands are 64 bit and have a built-in path to the WebSphere MQ 64 bit libraries. The path can be overridden by the use of LIBPATH and thus can cause WebSphere MQ commands to fail to run. Check the appropriate manual for the implications of 64 bit queue managers.

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Eclipse V3.3 prerequisite

- Required for WebSphere MQ Explorer V7
 - Must install Eclipse V3.3 before installing WebSphere MQ if using Explorer
 - WebSphere MQ Explorer V6 used Eclipse V3.2
- Install the executable file located in the CD or install image

<Prereqs>/IES/Setup.exe

- WebSphere MQ Explorer will be installed as plug-ins on top of Eclipse V3.3 during WebSphere MQ installation
- For Windows Vista and UAC enabled
 - Accept the Windows prompt to allow launchpad in elevated state

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Figure 2-13. Eclipse V3.3 prerequisite

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Notes:

WebSphere Eclipse V3.3 is same as the IBM Eclipse System (IES) V3.3. WebSphere MQ Explorer is a set of plug-ins that are installed on top of the WebSphere Eclipse installation.

The Vista user account control (UAC) delivers a more secure desktop. The main goal of User Account Control is to reduce the exposure and attack surface of the operating system by requiring that all users run in standard user mode. This limitation minimizes the ability for users to make changes that could destabilize their computers or inadvertently expose the network to viruses through undetected malware that has infected their computer.

With User Account Control, IT administrators can run most applications, components, and processes with a limited privilege, but have "elevation potential" for specific administrative tasks and application functions.

Creating and deleting queue managers

```
crtmqm -q QManagerName
```

- You need authority to use a control command
- *QManagerName* is a required parameter
- -q specifies the default queue manager

```
dltmqm QManagerName
```

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Figure 2-27. Creating and deleting queue managers

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Notes:

The create queue manager command, `crtmqm`, and delete queue manager command, `dltmqm`, are examples of control commands. The name of the queue manager is a required parameter on both of these commands.

Some of the following optional parameters of the `crtmqm` command might be useful in the practical exercises.

- **-q** - Specifies that this queue manager is to be the default queue manager.
- **-lc** - Circular logging is to be used. Circular logging is the default logging method.
- **-ll** - Use linear logging. Linear logging is needed for recovery from media failures.
- **-lf LogFileSize** - The size of each of the log files expressed as a multiple of 4 KB.
- **-ld LogPath** - The directory to be used to hold the log files.

On WebSphere MQ for HP NonStop Server, the `crtmqm` command has two additional required parameters besides the name of the queue manager.

- **-n PATHMONProcessName.**

The name of the TS/MP PATHMON process for the queue manager.

- **-o HomeTerminalName**

The home terminal device name.

The control commands are described in *WebSphere MQ System Administration Guide*

Starting a queue manager

Guide

```
strmqm QManagerName
```

```
runmqsc QManagerName
```

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Figure 2-28. Starting a queue manager

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Notes:

The **strmqm** command starts the queue manager, and the **runmqsc** command runs WebSphere MQ commands, are further examples of control commands.

The system and default objects are created automatically when you create a queue manager.

WebSphere MQ MQSC command scripts

- Each command starts on new line
- Commands and keywords are not case-sensitive
- Blank line and line starting with asterisk (*) are ignored
- Restrict maximum line length to 72 characters for portability
- Last non-blank character determines continuation
 - Minus sign (-) continues command from start of next line
 - Plus sign (+) continues command from first non-blank character in the next line

```
DEFINE QLOCAL (MY_DEAD_LETTER_Q) +
    REPLACE
```

Example: ALTER QMGR DEADQ (MY_DEAD_LETTER_Q)

```
DEF QL(ANOTHER) REPLACE +
    DESCRL('This is a test queue')

    * This is a comment
```

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Figure 2-29. WebSphere MQ MQSC command scripts

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Notes:

Additional syntax rules for writing WebSphere MQ commands are as follows.

- On a Version 5 or later queue managers, you can optionally use a semicolon (;) to terminate a command.
- A WebSphere MQ command might contain a string of characters. The more important rules for using strings are as follows:
 - A string containing blanks, lowercase characters, or special characters other than those characters valid in the name of a WebSphere MQ object, must be enclosed in single quotation marks. Lowercase characters not enclosed in single quotation marks are folded to uppercase.
 - A string containing no characters is not valid.

The WebSphere MQ commands are described in the *WebSphere MQ Script (MQSC) Command Reference V7.0*.

Run WebSphere MQ commands

```
runmqsc QManagerName
```

- Standard input device -> runmqsc -> standard output device
- Optional parameters
 - e Do not copy source text to output report
 - v Perform syntax check only

```
runmqsc -e QManagerName
runmqsc QManagerName < mqsc.in > mqsc.out
```

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Figure 2-30. Run WebSphere MQ commands

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Notes:

On WebSphere MQ for Compaq OpenVMS, the **runmqsc** command reads from the system input device, SYS\$INPUT, and writes to the system output device, SYS\$OUTPUT.

On WebSphere MQ for HP NonStop Server, the **runmqsc** command reads from the standard IN file and writes to the standard OUT file. In order to redirect input and output when using the **runmqsc** command, you may either use the TACL redirection operators IN and OUT or the command parameters for this purpose, -i, and -o. For example:

`runmqsc /IN MQSCIN, OUT MQSCOUT/`

or

`runmqsc -i MQSCIN -o MQSCOUT`

To end interactive input of WebSphere MQ commands, enter the EOF character for the system you are using. Specifically, you need to enter the following command.

- **Digital OpenVMS**
CTRL+Z

- **Windows**

Ctrl+Z, and press **Enter** (END command on V5)

- **HP NonStop Server**

CTRL+Y

- **UNIX systems**

CTRL+D (END command on V5 or later)

Alternatively, on a Version 5 or later queue manager, you can enter the WebSphere MQ command END and, on WebSphere MQ for HP NonStop Server, you may type exit or quit and press **Enter**.

When issuing WebSphere MQ commands interactively, you can get help by entering command? where command is the name of the command you are interested in.

On UNIX systems, man pages are provided for all the WebSphere MQ commands.

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Creating a local queue

```

DEFINE QLOCAL(MY_QUEUE) REPLACE +
DESCR('This is a test queue') +
PUT(ENABLED) GET(ENABLED) +
DEFPSIST(YES) SHARE +
MAXDEPTH(1000) MAXMSGL(2000) +
NPMCLASS(HIGH)

DEF QL(XXX) LIKE(MY_QUEUE)

DEF QL(QName)

```

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Figure 2-31. Creating a local queue

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Notes:

The visual depicts three examples of the WebSphere MQ MQSC (Script) command DEFINE QLOCAL which is used to create a local queue. The second and third examples use the synonym DEF QL.

Keywords and their values specify the values of attributes of the local queue being created. The values of the attributes which are not explicitly defined are taken from the values of the corresponding attributes of the default local queue, SYSTEM.DEFAULT.LOCAL.QUEUE.

The attribute NPMCLASS allows the survival of nonpersistent messages. The allowed settings are HIGH and NORMAL. The NPMCLASS can be defined or altered on local and model queues.

The keywords REPLACE and LIKE have the following meanings.

- **REPLACE** - If the queue exists, replace its definition with the new one. Any messages on an existing queue are retained.
- **LIKE** - Use the named queue for the default values of attributes rather than the default local queue.

Displaying attributes

- Display all the attributes of a queue

```
DISPLAY QLOCAL (XXX)
```

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- Display selected attributes of a queue

```
DISPLAY QUEUE (XXX) DESC GET PUT
DISPLAY QUEUE (YYY) MAXDEPTH CURDEPTH
```

- Generic queue names are allowed

```
DIS Q(SYSTEM*)
```

- Display all attributes of the queue manager object

```
DISPLAY QMGR
```

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Figure 2-32. Displaying attributes

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Notes:

The WebSphere MQ command to display the attributes of a queue is DISPLAY QUEUE. The synonym is DIS Q.

DISPLAY QUEUE command applies to all types of queue: local, alias, remote, and model.

A generic queue name can be specified by the use of a trailing asterisk (*). An asterisk on its own specifies all queues.

The keyword ALL causes all the attributes be displayed. On a Version 5 or later queue manager, ALL is the default if you do not specify a generic queue name and do not request any specific attributes.

You can request the display of selected attributes by using the appropriate keywords.

The WebSphere MQ command to display the attributes of the queue manager object is DISPLAY QMGR. The name of the queue manager does not appear in the command.

On a Version 5 or later queue manager, if you do not request any specific attributes on the DISPLAY QMGR command, the default action is to display all the attributes.

* On AIX, HP OpenVMS, HP-UX, Linux, Solaris, Windows, you can use the following commands (or their synonyms) as an alternative way to display these attributes.

- DISPLAY QALIAS
- DISPLAY QLOCAL
- DISPLAY QMODEL
- DISPLAY QREMOTE

On the DISPLAY QMGR command, you can now choose to display different sets of queue manager parameters. The parameters are CHINIT, CLUSTER, EVENT, and SYSTEM.

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Defining other queue types

- Alias queue

```
DEFINE QALIAS (AAA) TARGQ (XXX)
```

- Local definition of a remote queue (remote queue definition)

```
DEFINE QREMOTE (BBB) +
    RNAME (YYY) RQMNAME (QM2)
```

- Model queue

- TEMPDYN, dynamic queue deleted when closed
- PERMDYN, dynamic queue can hold persistent messages

```
DEFINE QMODEL (ANSQ) DEFTYPE (TEMPDYN)
```

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Figure 2-33. Defining other queue types

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Notes:

An *alias queue* is a WebSphere MQ object that is used to refer indirectly to another queue. The WebSphere MQ command to create an alias queue is `DEFINE QALIAS`. The `TARGQ` keyword specifies the name of the queue to which the alias queue resolves. This queue might either be:

- A local queue
- A local definition of a remote queue

A *local definition of a remote queue*, or a *remote queue definition*, is a WebSphere MQ object owned by one queue manager that refers to a queue owned by another queue manager. The WebSphere MQ command to create a local definition of a remote queue is `DEFINE QREMOTE`. The keyword `RNAME` specifies the name of the queue as it is known on the remote queue manager, and the keyword `RQMNAME` specifies the name of the remote queue manager.

A *model queue* is a WebSphere MQ object whose attributes are used as a template for creating a dynamic queue. When an application opens a model queue, the queue manager

creates a dynamic queue. The WebSphere MQ command to create a model queue is DEFINE QMODEL. The DEFTYPE keyword is used to specify whether a dynamic queue created from the model queue is:

- A *temporary* dynamic queue, which is deleted when it is closed and does not survive a queue manager restart, or
- A *permanent* dynamic queue, whose deletion on the MQCLOSE call is optional and which does survive a queue manager restart.

Local and model queues have a new attribute NPMCLASS that allows non-persistent messages to survive on a restart of a queue manager after that queue manager has performed a graceful shutdown.

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More WebSphere MQ commands

- Alter selected attributes

```
ALTER QLOCAL (XXX) PUT (DISABLED)
ALTER QALIAS (AAA) TARGQ (YYY)
ALTER QMGR DESCRIPT ('New description')
```

- The following are only valid if the queue is not in use
 - Delete a queue

```
DELETE QLOCAL (XXX)
DELETE QREMOTE (BBB)
```

- Delete all messages on a local queue

```
CLEAR QLOCAL (XXX)
```

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Figure 2-34. More WebSphere MQ commands

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Notes:

End queue manager

- Controlled (or quiesced)
 - Allows connected applications to end, but no new ones

`endmqm -c QManagerName`

- Controlled (wait)
 - Same as –c option, except that endmqm reports queue manager shutdown status periodically

`endmqm -w QManagerName`

- Immediate
 - Completes all current MQI calls, but no new ones

`endmqm -i QManagerName`

- Preemptive
 - Stops without waiting for applications to disconnect or for MQI calls to complete

`endmqm -p QManagerName`

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Figure 2-35. End queue manager

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Notes:

The control command to stop the queue manager is **endmqm**.

• Controlled (or quiesced) shutdown

The queue manager stops after all applications have disconnected. All new requests to connect to the queue manager fail. Controlled shutdown is the default mode.

• Immediate shutdown

The queue manager stops after it has completed all the MQI calls currently being processed. Any MQI calls issued after this command has been entered fail. Any incomplete units of work are rolled back when the queue manager is next started.

• Controlled shutdown with wait

End programs in the same manner as the controlled option. However, the command prompt does not return until the queue manager has ended.

• Preemptive shutdown

The queue manager stops without waiting for applications to disconnect or for MQI calls to complete. Use of this mode can lead to unpredictable results.

Checkpoint questions (1 of 2)

1. True or false: Queue manager names can be made up of any printable ASCII characters.
2. Alias queues can point to which of the following other queue types?
 - a. Another alias queue
 - b. Local queues
 - c. Model queues
3. Any local queue can be a dead letter queue if it:
 - a. Is identified as the dead letter queue to the queue manager.
 - b. Has put enabled.
 - c. Is not being used by any other application.
4. True or false: Altering queue attributes can be done while the queue manager is running and the changes take effect immediately.

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Figure 2-39. Checkpoint questions (1 of 2)

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Figure 2

Notes:

Checkpoint questions (2 of 2)

5. For which of these queue types is the NPMCLASS attribute valid?
 - a. Local
 - b. Remote
 - c. Model
 - d. Alias
 - e. Cluster queue
6. What does the command CRTMQM -q -u DLQ CHIWINSVR create?
 - a. A queue manager named DLQ
 - b. A default queue manager named CHIWINSVR with queue DLQ assigned to the queue manager as the dead letter queue.
 - c. A queue manager named CHIWINSVR
 - d. A queue manager named CHIWINSVR with a default transmission queue DLQ assigned to the queue manager
7. The command endmqm -c DALHOST was issued. What type of shutdown is performed?
 - a. Normal
 - b. Preemptive
 - c. Controlled
 - d. Immediate

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Figure 2-40. Checkpoint questions (2 of 2)

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Notes: