

Oracle® Database Gateway for WebSphere MQ

Installation and User's Guide

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Oracle Database Gateway for WebSphere MQ Installation and User's Guide, 11g Release 1 (11.1)

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Preface

Oracle Database Gateway for WebSphere MQ provides access to WebSphere MQ services. This gateway requires a system that is capable of running 64-bit applications.

Intended Audience

This guide is intended for anyone responsible for installing, configuring, or administering the Oracle Database Gateway for WebSphere MQ. It is also for developers writing applications that access message queuing systems, particularly those developers who need to access queues owned by both WebSphere MQ and other non-Oracle message queuing systems as well as queues owned by Oracle Advanced Queuing (AQ).

Read this guide if you are responsible for tasks such as:

- Administering the gateway
- Setting up gateway security
- Using the gateway
- Diagnosing gateway errors

Before using this guide, you must understand the fundamentals of your operating system, the Oracle Database Gateways, PL/SQL, the Oracle database, and WebSphere MQ software before using this guide to install, configure, or administer the gateway.

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Product Name

The complete name for this product is Oracle Database Gateway for WebSphere MQ, also called OG4MQ.

Typographic Conventions

The following typographic conventions are used in this guide:

Convention	Description
<code>monospace</code>	Monospace type indicates commands, directory names, user names, path names, and file names.
<i>italics</i>	Italic type indicates variables, including variable portions of file names. It is also used for emphasis and for book titles.
UPPERCASE	Uppercase letters indicate Structured Query Language (SQL) reserved words, initialization parameters, and environment variables.
Bold	Bold type indicates screen names and fields.
SQL*Plus prompts	The SQL*Plus prompt, SQL>, appears in SQL statement and SQL*Plus command examples. Enter your response at the prompt. Do not enter the text of the prompt, "SQL>", in your response.

Command Syntax

Command syntax appears in `monospace` font. The dollar character (\$), number sign (#), or percent character (%) are UNIX command prompts. Do not enter them as part of the command. The following command syntax conventions are used in this guide:

Convention	Description
backslash \	A backslash is the UNIX command continuation character. It is used in command examples that are too long to fit on a single line. Enter the command as displayed (with a backslash) or enter it on a single line without a backslash: <pre>dd if=/dev/rdisk/c0t1d0s6 of=/dev/rst0 bs=10b \ count=10000</pre>
braces {}	Braces indicate required items: <pre>.DEFINE {macro1}</pre>

Convention	Description
brackets []	Brackets indicate optional items: <code>cvtrct termname [outfile]</code>
ellipses ...	Ellipses indicate an arbitrary number of similar items: <code>CHKVAL fieldname value1 value2 ... valueN</code>
<i>italics</i>	Italic type indicates a variable. Substitute a value for the variable: <code>library_name</code>
vertical line	A vertical line indicates a choice within braces or brackets: <code>FILE filesize [K M]</code>

Related Publications

See the *Oracle Database Heterogeneous Connectivity Administrator's Guide* for information common to all Oracle Database Gateways, including important information about functions, parameters, and error messages.

Related Documents

The guide includes references to the following documents:

Oracle Call Interface Programmer's Guide

Oracle Database Administrator's Guide

Oracle Database Error Messages

Oracle Database Reference

Oracle Database Utilities

Oracle Database Heterogeneous Connectivity Administrator's Guide

Oracle Database Net Services Administrator's Guide

Oracle Database Net Services Reference

Oracle Database Security Guide

Oracle Database SQL Language Quick Reference

Oracle Database PL/SQL Packages and Types Reference

Oracle Database PL/SQL Language Reference

Oracle Database Installation Guide

Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)

Introduction

This chapter provides an overview of message queuing, WebSphere MQ, and the role of the gateway when accessing WebSphere MQ queues. It contains the following sections:

- [Introduction to Message Queuing](#) on page 1-1
- [Introduction to WebSphere MQ](#) on page 1-2
- [Introduction to the Gateway](#) on page 1-2

Introduction to Message Queuing

Message queuing enables distributed applications to communicate asynchronously by sending messages between the applications. The messages from the sending application are stored in a queue and are retrieved by the receiving application. The applications send or receive messages through a queue by sending a request to the message queuing system. Sending and receiving applications can use the same or different message queuing systems, allowing the message queuing system to handle the forwarding of the messages from the sender queue to the recipient queue.

Queued messages can be stored at intermediate nodes until the system is ready to forward them to the next node. At the destination node, the messages are stored in a queue until the receiving application retrieves them from the queue. Message delivery is guaranteed even if the network or application fails. This provides for a reliable communication channel between applications.

The complexity and details of the underlying model (of storing and forwarding messages between different environments) are handled by the message queuing system. By maintaining this level of abstraction, distributed applications can be developed without the need to worry about the details of how the information is transported.

Because the sending and receiving applications operate independently of one another, the sending application is less dependent on the availability of the remote application, the network between them, and the system on which the receiving application runs. This leads to a higher level of availability for the participating applications.

Messages and message queue operations can be configured by the applications to operate in specific modes. For example, a sending application can specify that queued messages should survive system crashes. As another example, the receiving application can specify a maximum waiting period for a receiving operation from a queue (in case no messages are available yet on the receiving queue).

Introduction to WebSphere MQ

WebSphere MQ is a message queuing system based on the model of message queue clients and message queue servers. The applications run either on the server node where the queue manager and queues reside, or on a remote client node. Applications can send or retrieve messages only from queues owned by the queue manager to which they are connected.

WebSphere MQ Terms

The following table describes WebSphere MQ terms used in this guide.

Term	Description
Message queues	Storage areas for messages exchanged between applications.
Message queue interface (MQI)	An application programming interface (API) for applications that want to send or receive messages through WebSphere MQ queues.
WebSphere MQ client configuration	A WebSphere MQ configuration where the queue manager and message queues are located on a different (remote) system or node than the application software. Client applications connect to the remote queue manager using IBM software that provides the necessary networking software to connect to the remote queue manager.
WebSphere MQ server configuration	A WebSphere MQ configuration where the queue manager and message queues are located on the same (local) system or node as the application software. Client applications connect to the local queue manager using MQI.
Queue manager	A WebSphere MQ feature that provides the message queuing facilities that applications use. It manages the queue definitions, configuration tables, and message queues. The queue manager also forwards messages from the sender queue to the remote recipient queues.
Triggers	A WebSphere MQ feature that enables an application to be started automatically when a message event, such as the arrival of a message, occurs. Triggers can be used to invoke programs or transactions. For example, a trigger could cause an Oracle application to call the gateway to retrieve a WebSphere MQ message and process it.

Introduction to the Gateway

The Oracle Database Gateway for WebSphere MQ enables Oracle applications to integrate with other WebSphere MQ applications. Oracle applications can send messages to other WebSphere MQ applications or receive messages from them. With the gateway, Oracle applications access WebSphere MQ message queues through remote procedure call (RPC) processing.

The gateway extends the RPC facilities that are available with the Oracle database and enables any client application to use PL/SQL to access messages in WebSphere MQ queues. The gateway provides PL/SQL procedures that are translated by the gateway into MQI calls. These procedures resemble the calls and types of MQI, but they are adapted to take full advantage of the transaction integration with the Oracle database. For more information about these procedures, refer to [Appendix A](#).

Through WebSphere MQ, the gateway communicates with any other WebSphere MQ systems on various platforms, including mainframes, UNIX based systems, Microsoft Windows, and other desktop environments. The gateway does not require any Oracle

software on the remote system. The gateway integrates with existing WebSphere MQ applications without any changes to those applications and enables users to exploit their investment in these applications while providing them with the ability to maximize on the benefits of message-oriented systems.

The gateway also provides a way to integrate these existing WebSphere MQ applications with new technology areas, such as network computing. Any Oracle application can invoke PL/SQL procedures, including applications that use the Oracle Application Server 11g.

Developing Gateway Applications

If you are developing applications that access WebSphere MQ through the gateway, use the Oracle Visual Workbench for Oracle Database Gateway for WebSphere MQ. Oracle Visual Workbench enables you to define an interface for accessing WebSphere MQ and define how to convert message data that is sent or retrieved from WebSphere MQ queues.

Visual Workbench generates PL/SQL code for the interface and data conversion. This generated code is called the message interface package (MIP). The MIP provides the underlying code to interact with the gateway, performs message data conversion, and provides an easy-to-use interface for Oracle applications to exchange messages with remote WebSphere MQ applications.

See Also: Refer to the *Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)* for more information about Oracle Visual Workbench.

When necessary, the generated MIP code can be modified to use WebSphere MQ functions that are not supported by Visual Workbench or to enhance message data conversions. Refer to [Appendix A](#) and [Appendix B](#) for more information about modifying the generated MIP code.

Gateway Terms

The following table describes gateway terms used in this guide.

Term	Description
Gateway initialization file	A file containing parameters that determine the running of the gateway.
Gateway remote procedures	Remote procedures implemented by the gateway. These procedures are used to invoke WebSphere MQ operations.
MIP (message interface package)	An Oracle PL/SQL package generated by Oracle Visual Workbench that serves as an interface between an existing WebSphere MQ application and an Oracle application. The MIP performs any necessary data conversion and invokes the gateway RPCs to perform appropriate WebSphere MQ operations. Refer to the <i>Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)</i> for more information about the generated packages.
Oracle database	Any Oracle database that communicates with the gateway. Oracle applications do not communicate directly with the gateway. Instead, they run PL/SQL code at an Oracle database to invoke the gateway procedures. The Oracle database can be on the same system as the gateway or on a different system.

Term	Description
Production Oracle database	As used in this guide, the production database refers to any Oracle database that you use for production, for actual business and not for testing.
PL/SQL stored procedure	A compiled PL/SQL procedure that is stored in the Oracle database or is included with the gateway.
Remote procedure call	A programming call that invokes a program on a system in response to a request from another system.
Oracle Visual Workbench	An abbreviated term for the Oracle Visual Workbench for Oracle Database Gateway for WebSphere MQ.

Advantages of Using the Gateway

Using the gateway to access WebSphere MQ provides the following advantages:

- **Transactional support**

The gateway and the Oracle database enable WebSphere MQ operations and Oracle database updates to be performed in a coordinated fashion. Oracle two-phase commit protection is extended to the WebSphere MQ environment without any special programming.
- **Fast remote procedures**

The remote procedures implemented by the gateway are optimized for efficient processing of WebSphere MQ requests.

The remote procedures to the gateway and WebSphere MQ are an optimized PL/SQL package that is precompiled in the gateway. Because there are no additional software layers on the target system, overhead is minimized.
- **Location transparency**

Client applications need not be on a specific operating system. For example, your Oracle application can send WebSphere MQ messages to an application on IBM MVS. If the receiving application is moved to a different platform, then you do not need to change the platform of your Oracle application.
- **Flexible interface**

Using the MIPs generated by the Visual Workbench, you can use the gateway to interface with the existing procedural logic or to integrate new procedural logic into an Oracle database environment.
- **Oracle database integration**

The integration of the Oracle database with the gateway enables you to benefit from existing and future Oracle features.
- **Wide selection of tools**

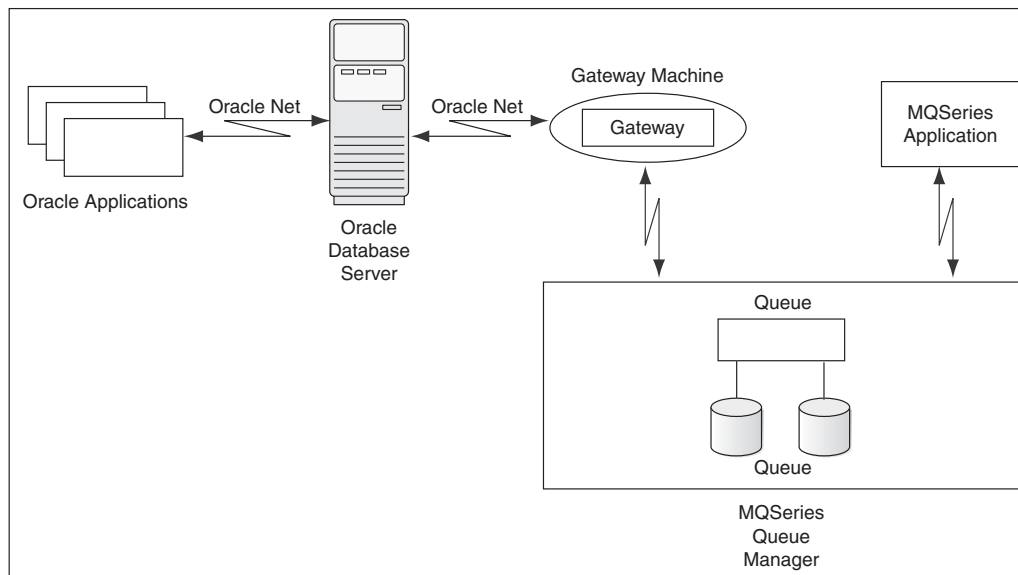
The gateway supports any tool or application that supports PL/SQL. This includes applications built with traditional Oracle tools, such as Oracle Developer, or applications built for intranet or Internet environments supported by Oracle Application Server 11g. The gateway also works with packaged Oracle applications, such as Oracle Financials, and with many third-party tools, such as Visual Basic, PowerBuilder, and Lotus Notes.
- **Security**

The gateway is compatible with the WebSphere MQ security authorization mechanism.

Gateway Architecture

Figure 1–1 shows the components of the gateway architecture.

Figure 1–1 Components of the Gateway Architecture



Component Descriptions

This section describes components of the gateway architecture.

Oracle Applications

Oracle applications connect to an Oracle database. They send data to and receive data from WebSphere MQ queues by invoking the gateway RPCs.

Oracle Database

Oracle applications do not connect directly to the gateway, but connect indirectly through an Oracle database. The Oracle database communicates with a gateway in the normal Oracle server-to-server manner using Oracle Net. The gateway is a single process and does not start background processes. On UNIX platforms, a gateway process is started for each user session.

Oracle Net

Oracle Net provides client to server and server-to-gateway communication. It enables an Oracle application to communicate with the Oracle database, and it enables the Oracle database to communicate with the gateway.

If the Oracle database is not on the same system as the gateway, then you must install the correct Oracle networking software on the platform where the Oracle database is installed.

Gateway

Oracle applications invoke the RPCs that are implemented by the gateway with PL/SQL. The gateway procedures map these RPCs to WebSphere MQ MQI calls to perform the corresponding WebSphere MQ operation.

The gateway is accessed through the Oracle database by using a database link name created by an Oracle `CREATE DATABASE LINK` statement. The database link is the construct used to identify Oracle databases.

WebSphere MQ Queue Manager

The WebSphere MQ server is where the WebSphere MQ queue manager and message queue are located. The WebSphere MQ server might, or might not, be on the same system as the gateway.

WebSphere MQ Application

WebSphere MQ applications connect directly to the WebSphere MQ queue manager by using WebSphere MQ MQI calls to perform the corresponding WebSphere MQ operation.

Gateway Structure

The gateway has some of the same components as an Oracle database. The following components are included:

- A directory where the gateway software is installed
- A system identifier (SID)
- An initialization file similar to the Oracle database initialization parameter file

The gateway does not have control, redo, or database files, nor does it have the full set of subdirectories and other files associated with an Oracle database.

Gateway Operation

The gateway is not started in the same way as the Oracle database. It has no background processes and does not require a management utility such as Oracle Enterprise Manager. Each Oracle database user session that accesses a gateway creates an independent process on the host system that runs the gateway.

Communication

All communication between the Oracle database, gateway, and WebSphere MQ queues is handled through RPC calls to the gateway. The PL/SQL code to do these calls is automatically generated by the Visual Workbench. For more information about communication between the gateway, the Oracle database, and WebSphere MQ, refer to [Appendix A](#) or the *Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)*.

Release Information

This chapter contains information that is specific to this release of the gateway. It contains the following sections:

- [Changes and Enhancements](#) on page 2-1
- [Known Problems for 11g](#) on page 2-3
- [Known Restrictions for 11g](#) on page 2-3

Changes and Enhancements

The following changes and enhancements apply to all releases of release 2 (10.2.0) gateway products.

Changes and Enhancements for Release 10.2.0

The following sections describe the changes and enhancements included in this release.

Oracle Database Dependencies

This release of Oracle Database Gateway for WebSphere MQ requires the latest released patch set for Oracle Database 10g release 2 (10.2.0), or for the Oracle database release that you are using.

Support for Large Data Buffers

The PL/SQL RAW data type limitation is 32 KB (32767) bytes. For large loads, you must use the TABLE OF RAWs data type. For more information about support for large data buffers, refer to [Appendix A](#).

OG4MQ Data Types

The following table provides information about Oracle Database Gateway for WebSphere MQ (OG4MQ) data types.

Data Type	V401	V804	V817 and V901	Oracle10g Release 2 and higher
MQOD	PGM.MQOD@dblink	PGM.MQOD	PGM.MQOD	PGM.MQOD
MQMD	PGM.MQMD@dblink	PGM.MQMD	PGM.MQMD	PGM.MQMD
MQPMO	PGM.MQPMO@dblink	PGM.MQPMO	PGM.MQPMO	PGM.MQPMO
MQGMO	PGM.MQGMO@dblink	PGM.MQGMO	PGM.MQGMO	PGM.MQGMO

Data Type	V401	V804	V817 and V901	Oracle10g Release 2 and higher
MQODRAW	NA	PGM.MQODRAW	PGM8.MQODRAW	NA
MQMDRAW	NA	PGM.MQMDRAW	PGM8.MQMDRAW	NA
MQPMORAW	NA	PGM.MQPMORAW	PGM8.MQPMORAW	NA
MQGMORAW	NA	PGM.MQGMORAW	PGM8.MQGMORAW	NA

PGM_UTL Procedures

The following table provides information about PGM_UTL procedures.

Procedure	V401	V804	V817 and V901	Oracle10g Release 2 and higher
TO_RAW	NA	PGM_UTL.TO_RAW	PGM_UTL8.TO_RAW	PGM.TO_RAW
RAW_TO_MQMD	NA	PGM_UTL.RAW_TO_MQMD	PGM_UTL8.RAW_TO_MQMD	PGM.RAW_TO_MQMD
RAW_TO_MQPMO	NA	PGM_UTL.RAW_TO_MQPMO	PGM_UTL8.RAW_TO_MQPMO	PGM.RAW_TO_MQPMO
RAW_TO_MQGMO	NA	PGM_UTL.RAW_TO_MQGMO	PGM_UTL8.RAW_TO_MQGMO	PGM.RAW_TO_MQGMO

Note: For Oracle10g release 10.2.0, the PGM.TO_RAW, PGM.RAW_TO_MQMD, PGM.RAW_TO_MQPMO and PGM.RAW_TO_MQGMO procedures are added for backward compatibility.

OG4MQ API Prototype Changes

The following table provides information about OG4MQ application programming interface changes.

API	V401 Arguments	V804 Arguments	V817 & V901 Arguments	10g Release 2 and higher Arguments
MQOPEN	(MQOD, INT, INT)	(RAW, INT, INT)	(RAW, INT, INT)	(PGM.MQOD, INT, INT)
MQPUT	(INT, MQMD, MQPMO, RAW)	(INT, RAW, RAW, RAW)	(INT, RAW, RAW, RAW)	(INT, PGM.MQMD, PGM_MQPMO, RAW) or (INT, PGM.MQMD, PGM_MQPMO, PGM.MQPUT_BUFFER)
MQGET	(INT, MQMD, MQGMO, RAW)	(INT, RAW, RAW, RAW)	(INT, RAW, RAW, RAW)	(INT, PGM.MQMD, PGM_MQGMO, RAW) or (INT, PGM.MQMD, PGM.MQGMO, PGM_MQGET_BUFFER)
MQCLOSE	(INT, INT)	(INT, INT)	(INT, INT)	(INT, INT)

Refer to [Appendix A](#) for the details of APIs.

OG4MQ Deployment Scripts

The following scripts are new in this release:

- `pgm.sql`
- `pgmobj.sql`
- `pgmdeploy.sql`
- `pgmundeploy.sql`

The gateway procedures in the PGM package are defined in `pgm.sql` and `PGM_MQ*` data type definitions used by the procedures are defined in `pgmobj.sql`. For complete information about PGM package, OG4MQ gateway procedures and data type definitions, refer to [Appendix A](#).

Large Payload Support

OG4MQ 11g supports large payloads or messages longer than 32767 bytes. For more information, refer to the `putlongsample.sql` and `getlongsample.sql` sample programs installed with the OG4MQ.

Database Link and Alias Library

A connection to the gateway is established through a database link. From OG4MQ 10g release 2 and later, this database link is no longer associated with each OG4MQ gateway procedural call (for example, `PGM.MQPUT@dblink`). From 10g release 2 and later, it needs to be defined only once in the `MQOD` data type used by `MQOPEN`, and this database link is registered in the object handle returned by the `MQOPEN` call. Refer to the sample programs installed with the gateway for details. By default, a public database link, `dg4mqdepdblink`, is created with your default SID when OG4MQ deployment scripts are executed.

Known Problems for 11g

The problems documented in this section are specific to the Oracle Database Gateway for WebSphere MQ and are known to exist in this release of the product. These problems will be fixed in a future gateway release. If you have any questions or concerns about these problems, contact Oracle Support Services.

A current list of problems is available online. Contact your local Oracle office for information about accessing this online information.

Known Restrictions for 11g

The following restriction is known to exist for this release.

Customizing LOG_DESTINATION

There is a known issue when customizing the gateway initialization file for gateway tracing for Microsoft Windows platform. When customizing the path name of `LOG_DESTINATION`, the delimiter must be double backslashes. For example:

```
LOG_DESTINATION=C:\\oracle\\product\\11.1.0\\dg4mqs\\dg4mq\\log\\dg4mqs.log
```

Note: If LOG_DESTINATION is not defined for MS windows platform, a default name is used and the log is created in ORACLE_HOME\dg4mq\trace directory

Customizing deployment script pgmobj.sql

There is a known issue when customizing the gateway deployment script `pgmobj.sql` for MS windows platform. When defining the path name of `libdg4mq`, the delimiter must be backslashes. For example create or replace library `libdg4mq` as:

```
CREATE OR REPLACE LIBRARY libdg4mq as
'C:\oracle\product\11.1.0\dg4mqs\bin\oradg4mqs.dll' transactional
```

or

```
CREATE OR REPLACE LIBRARY libdg4mq as '$ORACLE_HOME\bin\oradg4mqs.dll'
transactional
```

Requirements

This chapter provides information about the hardware and software required for the installation of Oracle Database Gateway for WebSphere MQ and the recommended online documentation. It contains the following sections:

- [Hardware Requirements](#) on page 3-1
- [Software Requirements](#) on page 3-1
- [Oracle Database](#) on page 3-3

Hardware Requirements

The following table contains the hardware requirements for Oracle Database Gateway for WebSphere MQ.

Hardware Items	Required for AIX-Based Systems	Required for HP 9000 Series HP_UX	Required for Solaris	Required for Linux/32	Required for MS Windows XP Systems	Required for MS Windows 2003 Systems
CPU	IBM RS/6000 AIX-Based System Processor	HP 9000 Series 700 or 800 processor for HP-UX 11.0	Sun Solaris Operating System (SPARC) Processor	Red Hat Linux AS 2.4 Intel Architecture 32 bit	Intel Pentium III or compatible	Intel Pentium or compatible
Disk space	1 GB	1 GB	1 GB	1 GB	300 MB	300 MB
Memory	256 MB	256 MB	256 MB	256 MB	256 MB	256 MB
Swap space	512 MB or twice the amount of RAM, whichever is greater	512 MB or twice the amount of RAM, whichever is greater	512 MB or twice the amount of RAM, whichever is greater	512 MB or twice the amount of RAM, whichever is greater	NA	NA

Software Requirements

The following table contains the software requirements for Oracle Database Gateway for WebSphere MQ.

Platform	Requirement	WebSphere MQ Server Software
AIX-Based Systems	64-bit only AIX 5L version 5.3, Maintenance Level 02 or later OS Patches: Check with your software vendor for current maintenance requirements.	When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for AIX version 5 release 5.1 or later is required. When the gateway resides on a different system than the WebSphere MQ server software, then WebSphere MQ Client for AIX version 5 release 5.1 or later is required on the gateway system.
HP 9000 Series 700 or 800 (HP-UX)	64-bit only HP-UX 11i v2 (11.23) or HP-UX 11i v3 (11.31) OS Patches: Check with your software vendor for current maintenance requirements.	When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for HP 9000 version 5 release 5.1 or later is required. When the gateway resides on a different system than the WebSphere MQ server software, then WebSphere MQ Client for HP 9000 version 5 release 5.1 or later is required on the gateway system.
Sun Solaris Operating System (SPARC)	32-bit OS only (32-bit or 64-bit hardware) Solaris 9 Update 6 or later Solaris 10 OS Patches: Check with your software vendor for current maintenance requirements.	When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for Sun Solaris version 5 release 5.1 or later is required. When the gateway resides on a different system than the WebSphere MQ server software, then WebSphere MQ Client for Sun Solaris version 5 release 5.1 or later is required on the gateway system.
Linux/32	32-bit OS only Oracle Enterprise Linux 4.0 Oracle Enterprise Linux 5.0 Red Hat Enterprise Linux 4.0 Red Hat Enterprise Linux 5.0 SUSE Linux Enterprise Server 10.0 OS Patches: Check with your software vendor for current maintenance requirements	When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for IA Linux/32 version 5 release 5.2 or later is required. When the gateway resides on a different system than the WebSphere MQ server software, then WebSphere MQ Client for IA Linux/32 version 5 release 5.2 or later is required on the gateway system.
MS Windows XP Professional	MS Windows XP Professional version 2002 The latest service pack for your operating system, MS Windows XP Professional (Service Pack 2)	When the gateway resides on the same system as the WebSphere MQ server software, or when the gateway resides on a different system than the WebSphere MQ server software, WebSphere MQ version 5.2 or later is required on the gateway system.
MS Windows 2003 Systems	MS Windows 2003, Version 2003 The latest service pack for your operating system, MS Windows 2000 (Service Pack 1)	When the gateway resides on the same system as the WebSphere MQ server software, or when the gateway resides on a different system than the WebSphere MQ server software, WebSphere MQ version 5.2 or later is required on the gateway system

Set the `ulimit` value for the maximum number of open files per process to 1024 or greater:

```
prompt> ulimit -n 1024
```

Note: All IBM software must be installed before the gateway software is installed. For example, if WebSphere MQ software is not installed before OG4MQ, then the product link fails.

Oracle Database

The Oracle database requires the latest patch set for Oracle Database 11g.

Preinstallation

This chapter guides you through the basic concepts and preinstallation steps for Oracle Database Gateway for WebSphere MQ. It contains the following topics:

- [Preinstallation Tasks](#) on page 4-1
- [About Oracle Universal Installer](#) on page 4-4

Preinstallation Tasks

The preinstallation tasks for the Oracle Database Gateway for WebSphere MQ are divided into the following parts:

- [WebSphere MQ Software](#)
- [Setting Environment Variables](#)

WebSphere MQ Software

Perform the following steps to check for WebSphere MQ software:

1. Determine where the WebSphere MQ queue manager runs.
 - Local system
If the WebSphere MQ queue manager runs on a local system, then the queue manager runs on the same system where you intend to install the gateway product set.
 - Remote system
If the WebSphere MQ queue manager runs on a remote system, then the queue manager runs on a different system, not the system where you intend to install the gateway product set.
2. Verify that the WebSphere MQ software is already installed. If the WebSphere MQ server software is installed on a different system than the gateway, then the WebSphere MQ client software must be installed on the gateway system.
3. Identify the name of the WebSphere MQ queue manager.
4. Identify the WebSphere MQ client channel definition.

If the queue manager is installed on a different system than the gateway, then the WebSphere MQ client software is used to access the remote queue manager. A channel definition is required for this configuration.

Setting Environment Variables

Before installing Oracle Database Gateway for WebSphere MQ on UNIX platforms, set the following environment variables:

- ORACLE_HOME
- ORACLE_SID
- DISPLAY
- TMP

Note: Verify that the values that you assign to the environment variables, which are listed in this section, are less than 42 characters long. Longer values might generate errors such as "Word too long" during installation.

ORACLE_HOME

ORACLE_HOME is the root directory in which Oracle software is installed.

Oracle Database Gateway for WebSphere MQ cannot share the same Oracle home directory with other Oracle products. If you have installed other Oracle products, then Oracle Database Gateway for WebSphere MQ must be installed in a different ORACLE_HOME directory. Refer to [Preventing Conflicts Between ORACLE_HOME Directories](#) on page 4-2.

Note: Do not install Oracle Database Gateway for WebSphere MQ in an ORACLE_HOME directory containing other Oracle products, including the database. Such an installation could overwrite shared components, causing the products to malfunction.

Preventing Conflicts Between ORACLE_HOME Directories

To prevent a conflict between the software in an existing *ORACLE_HOME* directory and Oracle Database Gateway for WebSphere MQ, you must remove all references to the existing ORACLE_HOME directory. The following steps describe removing these references.

1. Unset your existing ORACLE_HOME variable using one of the following commands.
 - C shell:


```
prompt> unsetenv ORACLE_HOME
```
 - Bourne/Korn shell:


```
prompt> export ORACLE_HOME=
```
2. Edit the following environment variables so that they do not use the existing ORACLE_HOME value:

Table 4-1 *Setting Environment Variables for a New ORACLE_HOME Directory*

Environment Variable	Platforms
PATH	AIX-based Systems, HP 9000 Series HP-UX, and Sun Solaris
CLASSPATH	AIX-based Systems, HP 9000 Series HP-UX, and Sun Solaris
LD_LIBRARY_PATH	Sun Solaris

Table 4–1 (Cont.) Setting Environment Variables for a New ORACLE_HOME Directory

Environment Variable	Platforms
LIBPATH	AIX-based Systems
SHLIB_PATH	HP 9000 Series HP-UX

Note: Verify that the C compiler is in your `PATH` before you start the installation.

Setting ORACLE_HOME

Set the `ORACLE_HOME` environment variable by using one of the following commands:

- C shell

```
prompt> setenv ORACLE_HOME fullpath
```

- Bourne/Korn shell

```
prompt> ORACLE_HOME=fullpath
prompt> export ORACLE_HOME
```

ORACLE_SID

`ORACLE_SID` is used for the SID of the gateway.

Setting ORACLE_SID

Set the `ORACLE_SID` environment variable by using one of the following commands:

- C shell

```
prompt> setenv ORACLE_SID dg4mqs
```

or

```
prompt> setenv ORACLE_SID dg4mqc
```

- Bourne/Korn shell

```
prompt> ORACLE_SID=dg4mqs
prompt> export ORACLE_SID
```

or

```
prompt> ORACLE_SID=dg4mqc
prompt> export ORACLE_SID
```

DISPLAY

Setting the `DISPLAY` environment variable enables you to run Oracle Universal Installer remotely from a local work station. On the system where you run Oracle Universal Installer, set the `DISPLAY` environment variable to specify the system name or IP address of your local workstation.

If you get an Xlib error when starting Oracle Universal Installer such as "Failed to connect to server", "Connection refused by server", or "Can't open display", then run the commands on your local workstations as follows:

On Server where the Installer is Running

- C shell

```
prompt> setenv DISPLAY hostname:0.0
```
- Bourne or Korn shell

```
prompt> export DISPLAY=hostname:0.0
prompt> export DISPLAY
```

In Session on Your Workstation

- C shell

```
prompt> xhost +server_name
```
- Bourne or Korn shell

```
prompt> xhost +server_name
```

TMP

During installation, Oracle Universal Installer uses a temporary directory for swap space. This directory must meet the "[Hardware Requirements](#)" on page 3-1. The installation might fail if you do not have sufficient space. Oracle Universal Installer checks for the `TMP` environment variable to locate the temporary directory. If this environment variable does not exist, then the installer uses the `/tmp` directory.

The following example demonstrates how to set the `TMP` environment variable.

- C shell

```
prompt> setenv TMP full_path
```
- Bourne/Korn shell

```
prompt> TMP=full_path
prompt> export TMP
```

About Oracle Universal Installer

Oracle Database Gateway for WebSphere MQ uses Oracle Universal Installer to configure environment variables and install components. Oracle Universal Installer guides you through each step of the installation process, so you can choose configuration options for a customized product.

The Oracle Universal Installer includes features that perform the following tasks:

- Explore and provide installation options for products
- Detect preset environment variables and configuration settings
- Set environment variables and configuration during installation
- Uninstall products

oraInventory Directory

The Oracle Universal Installer creates the `oraInventory` directory the first time it is run on your system. The `oraInventory` directory keeps an inventory of the products

that Oracle Universal Installer installs on your system as well as other installation information. If you have previously installed Oracle products, then you might already have an `oraInventory` directory.

- When a UNIX group name is specified, it grants that group the permission to write to the `oraInventory` directory. If another group attempts to run Oracle Universal Installer, then they must have permission to write to the `oraInventory` directory. If they do not have permission the installation fails.
- The user running the Oracle Universal Installer must have permission to write to the `oraInventory` directory and all its files. This is required to run the installer.
- The location of `oraInventory` is defined in `/etc/oratab/oraInst.loc` for HP 9000 Series HP-UX and AIX-Based Systems and `C:\Program Files\Oracle\Inventory\` for Microsoft Windows.
- The location of `oraInventory` is defined in `/var/opt/oraInst.loc` for Sun Solaris.
- The latest log file is `oraInventory_location/logs/installActions.log` On UNIX based systems and `C:\Program Files\Oracle\Inventory\logs\installActions.log` for Microsoft Windows. Log file names of previous installation sessions are in the following format: `installActionsdatetime.log`.
- Do not delete or manually alter the `oraInventory` directory or its contents. Doing this can prevent the Oracle Universal Installer from locating the products that you have installed on your system.

Starting Oracle Universal Installer

On UNIX based systems, perform the following steps to launch Oracle Universal Installer, which installs Oracle Database Gateway for WebSphere MQ:

1. Stop all Oracle processes and services (for example, the Oracle database).
2. Mount the installation CD-ROM.

The Oracle Product Installation CD-ROM is in RockRidge format. To begin installation, insert the CD.

To manually mount or unmount the CD-ROM, you must have `root` privileges. Unmount the CD-ROM before removing it from the drive.

To manually mount the CD-ROM, perform the following tasks:

- a. Insert the Oracle Database Gateway for WebSphere MQ CD-ROM into the CD-ROM drive.
- b. Log in as the `root` user.
- c. Create the CD-ROM mount point directory.

```
prompt> mkdir mount_point
```

- d. Mount the CD-ROM drive on the mount point directory and exit the `root` account:

```
prompt> mount options device_name mount_point
prompt> exit
```

The following examples show how to mount the CD-ROM manually on `/cdrom`:

Platform	Command Example
AIX-Based Systems	<pre>prompt> mkdir /cdrom prompt> mount -o ro -V cdrfs <i>device_name</i> /mnt/cdrom prompt> exit</pre>
HP 9000 Series HP-UX	<p>Note: Add the following line to the <code>/etc/pfs_fstab</code> file:</p> <pre>/dev/dsk/c5t2d0./cdrom pfs-rrip xlat=unix 0 0</pre> <p>where <code>/dev/dsk/c5t2d0</code> is the CD-ROM device file and <code>pfs-rripxlat=unix 0 0</code> indicates the CD-ROM is in Rockridge extension.</p> <pre>prompt> nohup /usr/sbin/pfs_mountd & prompt> nohup /usr/sbin/pfsd &</pre> <p>Note: Insert the CD-ROM into the CD-ROM drive.</p> <pre>prompt> /usr/sbin/pfs_mount /cdrom prompt> exit</pre>
Sun Solaris	<pre>prompt> mkdir /cdrom prompt> mount -r -F hsfs <i>device_name</i> /cdrom prompt> exit</pre>

Note: For AIX-Based System users only.

Before installing the gateways from the CD-ROM, become `root` and run `rootpre.sh`.

1. Log in as `root` and change directory to the CD-ROM mount point.

```
prompt> su root
prompt> cd mount_point
```

2. Run `rootpre.sh` and exit `root` account.

```
prompt> ./rootpre.sh
prompt> exit
```

-
3. Run Oracle Universal Installer from the CD-ROM.

Note: Be sure you are not logged in as the `root` user when you start Oracle Universal Installer. If you are, only the `root` user will have permissions to manage Oracle Database Gateway for WebSphere MQ.

- a. Log in as the Oracle Database Gateway for WebSphere MQ user.
- b. Start Oracle Universal Installer by entering:

```
prompt> mount_point/runInstaller
```

On Microsoft Windows, perform the following steps to launch Oracle Universal Installer, which installs Oracle Database Gateway for WebSphere MQ:

1. Start your system and select MS Windows from the operating system Loader option. Log in to your MS Windows system as a member of the Administrators group.

2. If you are installing the gateway for the first time, ensure there is sufficient space on the disk where you are installing the gateway as specified in "[Hardware Requirements](#)" on page 3-1.
3. Before installing the software, stop all Oracle NT Services that are running:
 - a. From the **Start** menu, go to **Setting**, then **Control Panel**, and then click **Services**. A list of all NT services is displayed.
 - b. Select an Oracle NT service (these services begin with Oracle).
 - c. Click **Stop**.
 - d. Continue to select and stop all Oracle NT services until all active Oracle NT Services are stopped.
4. Load the installation media and start the Oracle Universal Installer.

This launches Oracle Universal Installer using which you can install Oracle Database Gateway for WebSphere MQ.

Installation

This chapter guides you through the installation of the Enterprise Edition of Oracle Database Gateway for WebSphere MQ. It contains the following sections:

- [Installation](#) on page 5-1
- [Running root.sh on UNIX Based Systems](#) on page 5-2

Installation

[Table 5–1](#) guides you through the installation process. For each screen, perform the actions described in the Response column.

Table 5–1 *Installing the software*

Screen	Response
Welcome	Click Next .
File Locations	<p>The Source section of the screen is where you specify the source location that Oracle Universal Installer uses to install Oracle Database Gateway for WebSphere MQ. You need not edit the file specification in the Path field - the default setting for this field points to the Oracle Universal Installer file on your Oracle Database Gateway for WebSphere MQ CD-ROM.</p> <p>The Path field in the Destination section of the File Locations screen is where you specify the destination for your installation. You need not edit the path specification in the Path field. The default setting for this field points to ORACLE_HOME. After you set the fields in the File Locations screen, as necessary, click Next to continue. After loading the necessary information from the CD-ROM, the installer displays the Available Products screen.</p>
Available Products	Select Oracle Database 11g and click Next to continue. Oracle Universal Installer displays the Installation Types screen.
Installation Types	Select Custom and click Next to continue. Oracle Universal Installer displays the Available Product Component screen.
Available Product Components	Use the check boxes to indicate the product components that you want to install. By default, all the available components are selected for you. You need to de-select the components that you do not want by clicking on the check boxes. Click Next to continue, and Oracle Universal Installer displays the Where is the WebSphere MQ Queue Manager Installed? screen.
Where is the WebSphere MQ Queue Manager Installed?	Select Local if the MQM runs on the same system as the gateway, or select Remote if the MQM runs on a different system than the gateway. Click Next to continue.

Table 5–1 (Cont.) Installing the software

Screen	Response
Local WebSphere MQ Queue Manager Name	<p>If you choose Local for your MQM in the Where is the WebSphere MQ Queue Manager Installed? screen, then the Local WebSphere MQ Queue Manager Name screen is displayed. Type in the local WebSphere MQ queue manager name in the Queue Manager field. Click Next to continue, and Oracle Universal Installer displays the Summary screen.</p>
Remote WebSphere MQ Queue Manager Name	<p>If you choose Remote for your MQM in the Local WebSphere MQ Queue Manager Name screen, then the Remote WebSphere MQ Queue Manager Name screen is displayed. Enter the name for the remote WebSphere MQ queue manager in the Queue Manager field, and also enter the WebSphere MQ channel name in the Channel field.</p> <p>For information about server connection channels, refer to the IBM publication about WebSphere MQ Clients or ask your WebSphere MQ system administrator for the channel definition of the queue manager to which you want the gateway to connect.</p> <p>The definition syntax is:</p> <pre>CHANNEL_NAME/PROTOCOL/server_address[(port)]</pre> <p>where CHANNEL_NAME and PROTOCOL must be in uppercase, and server_address is the TCP/IP host name of the server. The port value is optional and is the TCP/IP port number on which the server is listening.</p> <p>If you do not provide a port number, then WebSphere MQ uses the port number that is specified in the QM.INI file. If no value is specified in the QM.INI file, then WebSphere MQ uses the port number that is identified in the TCP/IP services file for the WebSphere MQ services name. If this entry in the services file does not exist, then the default value of 1414 is used. It is important that the port number that is used by the client and the port number that is used by the server listener program be the same.</p> <p>For example: CHANNEL1/TCP/Sales</p> <p>Click Next to continue. The Oracle Universal Installer displays the Summary screen.</p>
Oracle Universal Installer Summary	<p>This screen enables you to review a tree list of options and components for this installation. Click Install to display the Installation Status screen.</p>
Installation Status	<p>The Installation Status screen displays the status of the installation as it proceeds, as well as the location of the Oracle Universal Installer log file for this installation session.</p> <p>Be patient as Oracle Universal Installer processes the software installation. Depending on the CPU, CD-ROM drive, and hard drive on your system, the installation process might take time to complete.</p>
End of Installation	<p>This is the final screen of Oracle Universal Installer in the installation process. Assuming that your installation was successful, click Exit to exit the installer.</p>

Running root.sh on UNIX Based Systems

After you complete the installation, perform the following steps to run the root.sh script:

1. Log on as the `root` user.
2. Go to the `$ORACLE_HOME/dg4mq/admin` directory for your WebSphere MQ gateway.

```
prompt> cd $ORACLE_HOME/dg4mq/admin
```

3. Run the `root.sh` script.

```
prompt> ./root.sh
```

This script enables the WebSphere MQ gateway to operate for the strict security model.

4. Exit the `root` account.

Removing the Gateway

This chapter guides you through the uninstallation and reinstallation options for Oracle Database Gateway for WebSphere MQ. It contains the following sections:

- [Removing the Gateway](#) on page 6-1
- [Reinstalling the gateway](#) on page 6-2

Removing the Gateway

To remove Oracle Database Gateway for WebSphere MQ perform the following steps:

1. Start the Oracle Universal Installer. For information about starting the installer, refer to [Starting Oracle Universal Installer](#) on page 4-5.

When Oracle Universal Installer starts, the Welcome screen is displayed. Click **Deinstall Products**.

The Welcome screen provides information about Oracle Universal Installer.

Oracle Universal Installer provides you with two ways to uninstall products:

- **Deinstall Products:** Uninstall individual components, or the entire product.
 - **Installed Products:** View currently installed products, and uninstall individual components or the entire product.
2. Review all installed components, and select the ones you want to uninstall. Click **Remove**.

The Inventory screen appears when you click **Deinstall Products** on the Welcome screen, or **Installed Products** on any screen.

The Inventory screen displays all the components that are installed in the Oracle home directory.

The following buttons appear on the Inventory screen:

- **Help:** Access detailed information about the functionality of the Inventory screen.
- **Remove:** Uninstall all checked components from the Oracle home directory.
- **Save As:** Save the inventory as text. A file browser dialog box pops up when you click **Save As**. Accept a file name and the complete inventory list as displayed by the inventory screen is logged into this file as text.
- **Close:** Quit the Inventory screen.
- **Location:** View the full location path of the selected component.

Note: The plus sign (+) sign before a product name indicates that there are more components and files installed within that particular product. Click it to view dependent components. If you choose to remove a product or component, then all of its dependent components and files are also deinstalled.

If you want to remove the Oracle Database Gateway for WebSphere MQ completely, select the box displayed before the product name. It is listed subsequent to the *ORACLE_HOME* name.

Note: If you deinstall a product or component, then all of its dependent components and files are also deinstalled.

3. Verify the components selected for uninstallation, and click **Yes**.

The Confirmation screen lists all the components selected for deinstallation in the previous step. Scroll down the screen to verify selected components.

The following buttons appear on the Confirmation screen:

- **Help:** Access detailed information about the functionality of the Confirmation screen.
- **Yes:** Start uninstallation of listed components.
- **No:** Return to the Inventory screen. Listed components are not removed from *ORACLE_HOME*.

4. Monitor the uninstallation process.

The Remove Progress Bar screen appears when you click **Remove**. Oracle Universal Installer detects all components chosen for deinstallation from the Inventory screen and removes them from the Oracle home.

- **Cancel:** To discontinue the deinstallation process.

Note: If you deinstall a product or component, then all of its dependent components and files are also deinstalled.

Reinstalling the gateway

To reinstall Oracle Database Gateway for WebSphere MQ over the same version, first remove, and then reinstall the product. Also refer to [Removing the Gateway](#) on page 6-1.

Configuration

After installing the gateway, follow the instructions in this chapter to configure the gateway. This chapter contains the following sections:

- [Configuration Overview](#) on page 7-1
- [Configuring the Gateway](#) on page 7-1
- [Configuring Oracle Net for the Gateway](#) on page 7-4
- [Configuring Oracle Net for Oracle Database](#) on page 7-8
- [Creating a Transaction Log Queue](#) on page 7-10
- [Administering the Database Links Alias Library](#) on page 7-10
- [Installing the Oracle Visual Workbench Repository](#) on page 7-12
- [Preparing the Production Oracle Database](#) on page 7-16

Configuration Overview

The gateway works with several components and products to communicate between the Oracle database and WebSphere MQ queues:

- Oracle Net
The gateway and the Oracle database communicate using Oracle Net in a server-to-server manner. You must configure both, the gateway and Oracle database to have Oracle Net communication enabled, by configuring the `tnsnames.ora` and `listener.ora` files.
- Gateway initialization files and parameters
The gateway has initialization files and parameters that you must customize for your installation. For example, you must choose your gateway system identifier (SID), and provide other information, such as the gateway log file destination.

Configuring the Gateway

The gateway is installed and preconfigured using default values for the gateway SID, directory names, file names, and gateway parameter settings. The default SID values are:

- `dg4mqs`
This is the default SID that is used when the gateway resides on the same system as the WebSphere MQ software.

- `dg4mqc`
This is the default SID that is used when the gateway resides on a different system than the WebSphere MQ software. In this case, the gateway functions as a remote WebSphere MQ client.

A basic gateway initialization file is also installed, and values in this file are set based on the information you entered during the installation phase.

Using the Gateway with the Default Values

If you are configuring one gateway instance, and if you have no need to change any of the default values, then most of the gateway configuration process is completed by Oracle Universal Installer. In this case, perform the following actions:

- Skip all steps under ["Changing Default Values"](#) on page 7-2.
- Skip ["Step 1: Configure the Oracle Net Oracle Net Listener for the Gateway"](#) on page 7-4
- Begin with ["Step 2: Stop and Start the Oracle Net Listener for the Gateway"](#) on page 7-6, and continue to the end of the chapter.

Using the Gateway Without the Default Values

If multiple instances of the gateway are being configured, or to modify the default values set during the installation phases, then begin with the steps under ["Changing Default Values"](#) on page 7-2 and continue to the end of the chapter.

Changing Default Values

When changing default values, choose a gateway SID and customize the gateway initialization file.

Step 1: Choose a System ID for the Gateway

The gateway SID is a string of 1 to 64 alphanumeric characters that identifies a gateway instance. The SID is used in the gateway boot file and as part of the file name for the gateway parameter file. Choose a SID different from the default SID and different from `dg4mqs` and `dg4mqc`.

You need a distinct gateway instance, and SID, for each queue manager you want to access. If you want to access two different queue managers, then you need two gateway SIDs, one for each instance of the gateway. If you have one queue manager and want to access it sometimes with one set of gateway parameter settings and at other times with different gateway parameter settings, then you can do this by having multiple gateway SIDs for one queue manager.

Step 2: Customize the Gateway Initialization File

The gateway initialization file (`initsid.ora`) supports all database gateway initialization parameters described in [Appendix C, "Gateway Initialization Parameters"](#). The initialization file must be available when the gateway is started.

During installation, a default initialization file is created in `ORACLE_HOME\dg4mq\admin\initsid.ora` on Microsoft Windows and `$ORACLE_HOME/dg4mq/admin/initsid.ora`, on UNIX based systems where `sid` is the default SID of `dg4mqs` or `dg4mqc`. If you chose an SID other than the default, then rename this file using the SID you chose in [Step 1: Choose a System ID for the Gateway](#). Customize the default initialization file as necessary.

The following entries might appear in an initialization file:

```
LOG_DESTINATION=log_file
QUEUE_MANAGER=manager_name
AUTHORIZATION_MODEL=auth_model
TRANSACTION_MODEL=tx_model
TRANSACTION_LOG_QUEUE=tx_queue_name
TRANSACTION_RECOVERY_USER=rec_user
TRANSACTION_RECOVERY_PASSWORD=rec_password
TRACE_LEVEL=0
MQSERVER=channel
MQCCSID=character_set
```

See Also: Refer to *Oracle Database Net Services Administrator's Guide* and *Oracle Database Net Services Reference* for additional information

In this file:

- *log_file* specifies the full path name of the gateway log file.
- *manager_name* is the name of the WebSphere MQ queue manager to access.
- *auth_model* is the authorization model to use. The default value is RELAXED.
- *tx_model* is the transaction model to use. The default is SINGLE_SITE.
- *tx_queue_name* is the name of the queue for logging transaction IDs for distributed transactions. This is used only when *tx_model* is set to COMMIT_CONFIRM.
- *rec_user* specifies the user name that the gateway uses to start recovery of a distributed transaction. This is used only when *auth_model* is set to STRICT and *tx_model* is set to COMMIT_CONFIRM.
- *rec_password* specifies the password of the user name that the gateway uses to start recovery of a distributed transaction.
- *channel* specifies the location of the WebSphere MQ server and the communication method to use. The channel format is:
channel_name/connection_type/hostname [(port_number)].

For example:

```
MQSERVER=CHAN9/TCP/dolphin(1425)
```

- *character_set* specifies the coded character set number used by the gateway when communicating with the WebSphere MQ queue manager. This is an optional parameter.

This parameter is set only if the system that is running the WebSphere MQ queue manager uses a different encoding scheme than the system that runs the gateway. When set, the value of *character_set* is used by the WebSphere MQ client software on the gateway system to convert the data.

Refer to [Chapter 8, "Gateway Running Environment"](#) for more information on transaction and security models.

See Also: Refer to *Oracle Database Net Services Administrator's Guide* and *Oracle Database Net Services Reference* for additional information.

Configuring Oracle Net for the Gateway

The gateway requires Oracle Net to provide transparent data access to and from the Oracle database. Oracle Net uses the Oracle Net Listener to receive incoming connections from an Oracle Net client. In the case of the gateway, the Oracle Net Listener listens for incoming requests from the Oracle database. For the Oracle Net Listener to listen for the gateway, information about the gateway must be added to the Oracle Net Listener configuration file (`listener.ora`). This file is located in the `ORACLE_HOME/network/admin` directory on Microsoft Windows and `ORACLE_HOME/network/admin` directory on UNIX based systems by default, where `ORACLE_HOME` is the directory under which the gateway is installed. The default values in this file are set for you during the installation process by Oracle Universal Installer.

Using Oracle Net with Default Gateway Values

If you are configuring one gateway instance, and if you do not need to change any of the default values, then no further configuration is necessary for Oracle Net. Perform only "[Step 2: Stop and Start the Oracle Net Listener for the Gateway](#)" on page 7-6.

Using Oracle Net When Changing the Default Gateway Values

If you intend to use the Oracle Net listener for multiple gateway instances, or if you need to modify some of the default values set during the installation phase, then perform Step 1 and Step 2 in this section.

In Step 1, you add gateway information or change default information in the `listener.ora` file in the gateway directory `ORACLE_HOME/network/admin` on Microsoft Windows and `ORACLE_HOME/network/admin` on UNIX based systems.

Step 1: Configure the Oracle Net Oracle Net Listener for the Gateway

Two entries must be added to the `listener.ora` file:

- A list of Oracle Net addresses for the Oracle Net Listener to listen on
- The gateway process that the Oracle Net Listener should start in response to incoming connection requests

Note: The Oracle Net Listener and the gateway must reside on the same node. If you already have a Oracle Net Listener running on the node, then you must make the changes suggested in Step 1 and 2 to your existing `listener.ora` and `tnsnames.ora` files.

After making the changes, you can reload the changes by running the `reload` subcommand in the `lsnrctl` utility without shutting down the Oracle Net Listener.

Specifying Oracle Net Addresses for the Oracle Net Listener

If you are using Oracle Net and the TCP/IP protocol adapter, then the syntax of an entry in the `listener.ora` file is:

```
LISTENER=
  (ADDRESS_LIST=
    (ADDRESS=
      (PROTOCOL=TCP)
      (HOST=host_name)
      (PORT=port_number)
    )
  )
```

```
)
```

In this entry:

- *host_name* is the name of the system where the gateway is installed.
- *port_number* specifies the IP port number used by the Oracle Net Listener. If you have other listeners running on *host_name*, such as the listener of an Oracle database on the same system, then the value of *port_number* must be different from the other listener port numbers.

If you are using Oracle Net and the interprocess socket call (IPC) protocol adapter, the syntax of the entry in `listener.ora` file is:

```
LISTENER=
  (ADDRESS_LIST=
    (ADDRESS=
      (PROTOCOL=IPC)
      (KEY=key_name)
    )
  )
```

In this entry:

- `IPC` specifies that the protocol used for connections is IPC.
- *key_name* is the unique user-defined service name.

Entry for the Gateway

To configure the Oracle Net Listener to listen for a gateway instance in incoming connection requests, add an entry to the `listener.ora` file using the following syntax:

```
SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=
      (SID_NAME=gateway_sid)
      (ORACLE_HOME=gateway_directory)
      (PROGRAM=driver)
    )
  )
```

In this entry:

- *gateway_sid* specifies the SID of the gateway and matches the gateway SID specified in the connect descriptor entry in the `tnsnames.ora` file. Refer to [Configuring Oracle Net for Oracle Database](#) on page 7-8.
- *gateway_directory* specifies the gateway directory in which the gateway software resides.
- *driver* is the name of the gateway executable file. If the gateway uses a local WebSphere MQ server, then the file name is `dg4mqc`. The file name is `dg4mqc` if the gateway is run as a WebSphere MQ client to access a remote WebSphere MQ server.

When you add an entry for multiple gateway instances, add the entry to the existing `SID_LIST` syntax:

```
SID_LIST_LISTENER=
  (SID_LIST=
    (SID_DESC=.
```

```

)
(SID_DESC=
)
(SID_DESC=
(SID_NAME=gateway_sid)
(ORACLE_HOME=gateway_directory)
(PROGRAM=driver)
)
)

```

The following are examples of entry made to the `listener.ora` file:

For Microsoft Windows:

```

(SID_DESC =
(SID_NAME=dg4mq)
(ORACLE_HOME=gateway_directory)
(PROGRAM=dg4mq)
)

```

For UNIX based systems:

```

(SID_DESC =
(SID_NAME=dg4mq)
(ORACLE_HOME=/oracle/app/oracle/product/dg4mq)
(PROGRAM=dg4mq)
)

```

See Also: Refer to *Oracle Database Net Services Administrator's Guide* and *Oracle Database Net Services Reference* for additional information about changing `listener.ora`.

Step 2: Stop and Start the Oracle Net Listener for the Gateway

The Oracle Net Listener must be started or reloaded to initiate the new settings.

Note: If you already have a Oracle Net Listener running on the Oracle database where the gateway is installed, then you must change your existing `listener.ora` and `tnsnames.ora` files. After making the changes, you can reload the changes by running the reload subcommand in the `lsnrctl` utility without shutting down the Oracle Net Listener.

Refer to the Note in [Step 1: Configure the Oracle Net Oracle Net Listener for the Gateway](#).

- Set the gateway directory name:

For Microsoft Windows:

```
set TNS_ADMIN=c:\orant\network\admin
```

If you are using the Bourne or Korn shell, then enter:

```
$ ORACLE_HOME=gateway_directory;export ORACLE_HOME
```

If you have the C shell, then enter:

```
$ setenv ORACLE_HOME gateway_directory
```

In this entry:

gateway_directory specifies the directory where the gateway software is installed.

- If the listener is already running, then use the `lsnrctl` command to reload the listener with the new settings:

For Microsoft Windows:

```
c:\orant\bin> lsnrctl reload your_listener_name
```

For UNIX based systems:

```
$ cd $ORACLE_HOME/bin
$ ./lsnrctl reload your_listener_name
```

In this entry:

ORACLE_HOME specifies the directory where the gateway software is installed.

- Check the status of the listener with the new settings:

For Microsoft Windows:

```
c:\orant\bin> lsnrctl status your_listener_name
```

For UNIX based systems:

```
$ ./lsnrctl status listener_name
```

The following are examples of the output from a `lsnrctl` status check:

For Microsoft Windows:

```
Connecting to (ADDRESS=(PROTOCOL=IPC) (KEY=ORAIPC))
STATUS of the LISTENER
-----
Alias                LISTENER
Version              TNSLSNR for MS Windows: version 11.1.0.6.0 - Production
Start Date          21-AUG-04 18:16:10
Uptime              0 days 0 hr. 2 min. 19 sec
Trace Level         off
Security            OFF
SNMP                OFF
Listener Parameter File oracle\app\oracle\product\dg4mqs\network\admin\listener.ora
Listener Log File   \oracle\app\oracle\product\dg4mqs\network\log\listener.log
Services Summary...
   dg4mqs            has 1 service handler(s)
The command completed successfully
```

For UNIX based systems:

```
Connecting to (ADDRESS=(PROTOCOL=IPC) (KEY=ORAIPC))
STATUS of the LISTENER
-----
Alias                LISTENER
Version              TNSLSNR for Solaris: version 11.1.0 - Production
Start Date          21-AUG-04 18:16:10
Uptime              0 days 0 hr. 2 min. 19 sec
Trace Level         off
Security            OFF
SNMP                OFF
```

```
Listener Parameter File  /oracle/app/oracle/product/dg4mq5/network/admin/listener.ora
Listener Log File       /oracle/app/oracle/product/dg4mq5/network/log/listener.log
Services Summary...
  dg4mq5                has 1 service handler(s)
The command completed successfully
```

In the example, dg4mq5 is the default SID value that was assigned during installation. You can use any valid ID for the SID, or keep the default.

Note: You must use the same SID value in the `tnsnames.ora` file, the `listener.ora` file, and the `GATEWAY_SID` environment variable in the gateway initialization file for each gateway instance being configured.

Configuring Oracle Net for Oracle Database

Any Oracle application that has access to an Oracle database can also access WebSphere MQ through the gateway. Before you use the gateway to access WebSphere MQ, you must configure the Oracle database so that it can communicate with the gateway by using Oracle Net. To configure the server, add connect descriptors to the `tnsnames.ora` file.

Any Oracle database that accesses the gateway needs a service name entry or a connect descriptor name entry in the `tnsnames.ora` file on the server, to tell the Oracle database how to make connections. This file, by default, is located in the `ORACLE_HOME\network\admin` directory on Microsoft Windows and `ORACLE_HOME/network/admin` directory on UNIX based systems, where `ORACLE_HOME` is the directory in which the Oracle database is installed. The `tnsnames.ora` file is required by the Oracle database that is accessing the gateway, and not by the gateway itself. Refer to ["Configuration Overview"](#) and to ["Configuring the Gateway"](#) on page 7-1.

See Also: Refer to *Oracle Database Net Services Administrator's Guide* and *Oracle Database Net Services Reference* for more information about changing the `tnsnames.ora` file.

Using Default Gateway Values

Oracle Universal Installer creates and preconfigures a `tnsnames.ora` file in the `ORACLE_HOME\network\admin` directory on Microsoft Windows and `ORACLE_HOME/network/admin` directory on UNIX based systems, where `ORACLE_HOME` is the directory in which the gateway software is installed. If you use the default values, and if you do not need to configure additional gateway instances, then you can append the contents of this file to the `tnsnames.ora` file of each Oracle database that accesses the gateway.

Changing Default Gateway Values

If you need to change some of the default settings, use the examples in this section to guide you.

TCP/IP Example

An Oracle database accesses the gateway using Oracle Net and the TCP/IP protocol adapter. The syntax of the connect descriptor entry in `tnsnames.ora` is:

```
tns_name_entry=
```



```

(DESCRIPTION=
  (ADDRESS=
    (PROTOCOL=TCP)
    (HOST=host_name)
    (PORT=port_number)
  )
  (CONNECT_DATA=
    (SID=gateway_sid)
  )
  (HS=OK)
)

```

In this example:

- *tns_name_entry* is the *tns_name_entry* of the CREATE DATABASE LINK statement. Refer to ["Creating Database Links"](#) on page 7-11 for more information.
- TCP specifies that the protocol used for connections is TCP/IP.
- *port_number* is the port number used by the Oracle Net Oracle Net Listener that listens for the gateway. This port number can be found in the `listener.ora` file that is used by the Oracle Net Listener. Refer to ["Specifying Oracle Net Addresses for the Oracle Net Listener"](#) on page 7-4.
- *host_name* specifies the system on which the gateway is running. The Oracle Net Listener host name can be found in the `listener.ora` file used by the Oracle Net Listener that is listening for the gateway. Refer to ["Specifying Oracle Net Addresses for the Oracle Net Listener"](#) on page 7-4.
- *gateway_sid* specifies the SID of the gateway and matches the SID specified in the `listener.ora` file of the Oracle Net Listener that listens for the gateway.

IPC Example

An Oracle database accesses the gateway using Oracle Net and the IPC protocol adapter. The syntax of the connect descriptor entry in `tnsnames.ora` is:

```

tns_name_entry=
  (DESCRIPTION=
    (ADDRESS=
      (PROTOCOL=IPC)
      (KEY=key_name)
    )
    (CONNECT_DATA=
      (SID=gateway_sid)
    )
    (HS=OK)
  )

```

where:

- *tns_name_entry* is the *tns_name_entry* of the CREATE DATABASE LINK statement. Refer to ["Creating Database Links"](#) on page 7-11 for more information.
- IPC specifies that the protocol used for connections is IPC.
- *key_name* is the service name.
- *gateway_sid* specifies the SID of the gateway and matches the SID specified in the `listener.ora` file of the Oracle Net Listener that is listening for the gateway.

Creating a Transaction Log Queue

When the `TRANSACTION_MODEL` parameter in the gateway initialization file is set to `COMMIT_CONFIRM` to allow for distributed transactions, then an additional configuration step is required to:

- Create a WebSphere MQ queue
- Set the `TRANSACTION_LOG_QUEUE`, `TRANSACTION_RECOVERY_USER` and `TRANSACTION_RECOVERY_PASSWORD` parameters in the gateway initialization file

Refer to ["Commit-Confirm Transactions"](#) on page 8-5 for more information about the commit-confirm transaction model and [Appendix C, "Gateway Initialization Parameters"](#) for information about `TRANSACTION_LOG_QUEUE`, `TRANSACTION_RECOVERY_USER`, and `TRANSACTION_RECOVERY_PASSWORD`.

See Also: Refer to IBM publications for information about creating and configuring a queue.

For the gateway to recover distributed transactions, a recovery account and queue must be set up in the queue manager by the WebSphere MQ system administrator. This account must be a valid WebSphere MQ user, and it must have authorization to access the recovery queue. Refer to ["Authorization for WebSphere MQ Objects"](#) on page 8-2 for more information about access privileges.

The gateway uses the recovery queue to check the status of failed transactions that were started at the queue manager by the gateway and were logged in this queue. The information in this queue is vital to the recovery process and must not be used, accessed, or updated except by the gateway.

Administering the Database Links Alias Library

A connection to the gateway is established through a database link when it is first used in an Oracle session. In this context, *connection* refers to the connection between the Oracle database and the gateway. The connection persists until the Oracle session ends. Another session or user can access the same database link and get a distinct connection to the gateway and the queue manager.

Database links are active for the duration of a gateway session. To close a database link during a session, use the `ALTER SESSION` statement.

See Also: For more information about using database links, refer to the *Oracle Database Administrator's Guide*.

Using Database Links

An alias library is a schema object that represents a library in PL/SQL. Oracle Database Gateway for WebSphere MQ uses an alias library to access the shared library installed with Oracle Database Gateway for WebSphere MQ. To create the alias library, you must have the `CREATE LIBRARY PRIVILEGE`. The alias library used by Oracle Database Gateway for WebSphere MQ is `libdg4mq` and is defined in the `pgmobj.sql` script, which is created when the Oracle Database Gateway for WebSphere MQ deployment scripts are executed.

Creating Database Links

To create a database link, use the `CREATE DATABASE LINK` statement. The `USING` clause points to a connect descriptor in the `tnsnames.ora` file. The `CONNECT TO` clause specifies the WebSphere MQ user ID and password when the security model is defined as `STRICT` with the `AUTHORIZATION_MODEL` parameter. If you do not include the `CONNECT TO` clause, then the current user ID and password are used.

When the `AUTHORIZATION_MODEL` parameter is set to `RELAXED`, you need not specify an user ID and password because the Oracle database uses the user ID and password of the user account that started the Oracle Net Listener for the gateway. If you specify an user ID and password with the `CONNECT TO` clause, then the Oracle database and gateway ignore those values. Refer to "[Security Models](#)" on page 8-1 for more information.

The syntax of `CREATE DATABASE LINK` is as follows:

```
CREATE [PUBLIC] DATABASE LINK dblink [CONNECT TO userid IDENTIFIED
BY password] USING 'tns_name_entry' ;
```

where:

- *dblink* is the database link name.
- *userid* is the user ID used to establish a session at the queue manager. It is only used when `AUTHORIZATION_MODEL` is set to `STRICT` in the `initsid.ora` file. The user ID must be authorized to access all WebSphere MQ objects, and use any database object referenced in the PL/SQL commands.

The *userid* must be in the password file on the computer on which WebSphere MQ and the gateway are installed. Otherwise, the *userid* must be published in the UNIX Network Information Service (NIS) when WebSphere MQ and the gateway are installed on different systems. If *userid* contains lowercase letters or non-alphanumeric characters, then you must surround *userid* with quotation marks (""). Refer to your WebSphere MQ documentation for more information about *userid*.

- *password* is the password used to establish a session at the queue manager. It is used only when `AUTHORIZATION_MODEL` is set to `STRICT` in the `initsid.ora` file.

The *password* must be in the password file on the system on which WebSphere MQ and the gateway are installed. Otherwise, the *password* must be published in the Windows or UNIX Network Information Service (NIS), as the case may be when WebSphere MQ and the gateway are installed on different systems.

If *password* contains lowercase letters or non alphanumeric characters, then surround *password* with quotation marks ("").

- *tns_name_entry* is the Oracle Net TNS connect descriptor name specified in the `tnsnames.ora` file.

Dropping Database Links

You can drop a database link with the `DROP DATABASE LINK` statement. For example, to drop the database link named `dblink`, enter:

```
DROP [PUBLIC] DATABASE LINK dblink;
```

A database link should not be dropped if it is required to resolve a distributed transaction that is in doubt.

See Also: Refer to the *Oracle Database Administrator's Guide* for more information about dropping database links.

Examining Available Database Links

The data dictionary of each database stores the definitions of all the database links in that database. The `USER_DB_LINKS` view shows the database links that are defined for a user. The `ALL_DB_LINKS` data dictionary views show all the defined database links.

Limiting the Number of Active Database Links

You can limit the number of connections from a user process to remote databases with the `OPEN_LINKS` parameter. This parameter controls the number of remote connections that any single user process can use with a single user session.

See Also: Refer to the *Oracle Database Administrator's Guide* for more information about limiting the number of active database links.

Creating Alias Library

Create the Oracle Database Gateway for WebSphere MQ alias library, `libdg4mq`, using the Oracle Database Gateway for WebSphere MQ deployment scripts. During installation, the appropriate shared library name is defined in `ORACLE_HOME\dg4mq\admin\deploy\pgmobj.sql` on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/ deploy/pgmobj.sql` on UNIX based systems based on the OG4MQ model you choose.

For a remote model, the `libdg4mqc.so` shared library is used. For example:

```
CREATE OR REPLACE LIBRARY libdg4mq AS 'ORACLE_HOME/lib/libdg4mqc.so'  
TRANSACTIONAL;
```

For a local model, the `libdg4mqc.so` shared library is used. For example:

```
CREATE OR REPLACE LIBRARY libdg4mq AS 'ORACLE_HOME/lib/libdg4mqc.so'  
TRANSACTIONAL;
```

Note: The file extension of shared libraries on hp-ux is `.sl`. For example, `libdg4mqc.sl`

Dropping Alias Library

Use the undeploy scripts to drop the `libdg4mq` Oracle Database Gateway for WebSphere MQ alias library.

Installing the Oracle Visual Workbench Repository

Install the Oracle Visual Workbench repository following the steps in this section.

You can skip the installation of the Oracle Visual Workbench repository if you do not plan to use Oracle Visual Workbench, or if you are preparing your production Oracle database, where you do not need a Visual Workbench repository, but instead need a Oracle Database Gateway for WebSphere MQ deployment. Refer to the "[Preparing the Production Oracle Database](#)" on page 7-16 for details.

Preinstallation Tasks

The following steps describe the preinstallation tasks.

Step 1: Choose a Repository Server

A repository server is an Oracle database on which the Visual Workbench repository is installed.

Step 2: Locate the Installation Scripts

The Visual Workbench repository installation scripts are installed with the Visual Workbench. If the repository is to be installed on the same system as Oracle Visual Workbench, then your repository server already has all the required installation scripts. Proceed to Step 3.

1. Create a directory on the repository server to be the script directory. For example:

For Microsoft Windows:

```
> md %ORACLE_HOME%\dg4mqadmin\repo
```

For UNIX based systems:

```
$ mkdir $ORACLE_HOME/dg4mq/admin/repo
$ chmod 777 $ORACLE_HOME/dg4mq/admin/repo
```

2. Use a file transfer program to transfer the repository zip file (`reposXXX.zip`, where `XXX` is the release number), or move all script files with the `.sql` suffix from the script file directory (`ORACLE_HOME\dg4mqvwb\server\admin` on Windows) on the Visual Workbench system to the script file directory on the repository server system.

Step 3: Upgrade the Visual Workbench Repository

Upgrade your existing Visual Workbench repository installation scripts by copying the `pgmxxx.sql` files installed with the Oracle Database Gateway for WebSphere MQ in the `ORACLE_HOME\dg4mq\admin\deploy` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/deploy` directory on UNIX based systems to the script file directory on the repository server system.

Step 4: Ensure that the UTL_RAW Package is Installed

All data mapping packages generated by the Visual Workbench use the `UTL_RAW` package, which provides routines for manipulating raw data.

From SQL*Plus, as the `SYS` user, issue the following statement:

```
SQL> DESCRIBE UTL_RAW
```

If the `DESCRIBE` statement is successful, then your repository server already has `UTL_RAW` installed, and you can proceed to Step 4.

If the `DESCRIBE` statement fails, then install `UTL_RAW`:

From SQL*Plus, as the `SYS` user, run the `utlraw.sql` and `prvtrawb.plb` scripts that are in the `ORACLE_HOME\rdbms\admin` directory on Microsoft Windows and `ORACLE_HOME/rdbms/admin` directory on UNIX based systems. You must run the `utlraw.sql` script first.

```
SQL> @utlraw.sql
SQL> @prvtrawb.plb
```

Step 5: Ensure that the DBMS_OUTPUT Package is Enabled

The sample programs and installation verification programs on the distribution CD-ROM use the standard DBMS_OUTPUT package.

From SQL*Plus, as SYS user, issue the following statement:

```
SQL> DESCRIBE DBMS_OUTPUT
```

If the DESCRIBE statement is successful, then your repository server has DBMS_OUTPUT installed, and you can proceed to Step 6.

If the DESCRIBE statement fails, then install DBMS_OUTPUT.

See Also: Refer to *Oracle Database Administrator's Guide* for more information.

Step 6: Create a Database Link

Create a database link on your Oracle Production System Server to access the Oracle Database Gateway for WebSphere MQ.

If you do not already have a database link, then refer to "[Administering the Database Links Alias Library](#)" on page 7-10 for more information about creating database links.

Visual Workbench Repository Installation Tasks

Use `pgvwbrepos.sql` to install the Visual Workbench Repository on Oracle10g. To run `pgvwbrepos.sql`, ensure that you are currently in the `ORACLE_HOME\dg4mq\admin\repo` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/repo` directory on UNIX based systems, and then enter the following command:

```
sqlplus /nolog @pgvwbrepos.sql
```

Note: If you are installing the Visual Workbench repository on Oracle8i or older, then you must use `pgvwbrepos8.sql`. All of the examples in this section are provided with the assumption that you are installing on Oracle9i and later.

The script takes you through the following steps:

Step 1: Enter the Database Connection Information

Use the default value of LOCAL by pressing **Enter**. Next, you are prompted to enter the passwords for the SYSTEM and SYS accounts of the Oracle database. Press **Enter** after entering each password.

The script stops if any information is incorrect. Verify the information before rerunning the script.

Step 2: Check for Existing Workbench Repository

The script checks for an existing Visual Workbench repository and for the data dictionary. If neither is found, then the script proceeds to Step 3 below.

If the data dictionary exists, then the script stops. Choose another Oracle database and rerun the script, starting at "[Step 1: Choose a Repository Server](#)" on page 7-13.

If a Visual Workbench repository exists, then the script gives you the following options:

- Upgrade the existing private repository to public status and proceed to Step 3.
- Replace the existing repository with the new private repository and proceed to Step 3.
- Stop the script.

Step 3: Check for The Required PL/SQL Packages

The script checks for the existence of `UTL_RAW`, `DBMS_OUTPUT`, and `DBMS_PIPE` in the Oracle database. If this software exists, then the script proceeds to Step 4.

The script stops if this software does not exist. Refer to *Oracle Database Administrator's Guide* about the missing software. After the software is installed, rerun the script.

Step 4: Install the UTL_PG Package

The script checks for the existence of the `UTL_PG` package. If it does not exist, then the `UTL_PG` package is installed. The script then proceeds to Step 5.

If `UTL_PG` exists, then you are prompted to reinstall it. Press Return to reinstall `UTL_PG`.

Step 5: Create the Administrative User and All Repository Tables

This step creates the administrative user for the Visual Workbench repository as `PGMADMIN` with the initial password of `PGMADMIN`. This user owns all objects in the repository.

After this step, a private Visual Workbench repository that includes the `PGM_SUP`, `PGM_BQM`, and `PGM_UTL8` packages, is created in the Oracle database, which only the `PGMADMIN` user can access.

Step 6: Create Public Synonyms and Development Roles

This is an optional step to change the private access privileges of the Visual Workbench repository. The private status enables only the `PGMADMIN` user to have access to the repository. If you enter `N` and press **Enter**, then the repository retains its private status.

A public status enables the granting of access privileges to other users besides `PGMADMIN`. If you want to give the repository public status, then enter `Y` and press **Enter**.

After the Repository is Created

After creating the Visual Workbench repository, there is one optional step, granting development privileges for the Visual Workbench repository to users.

To allow users, other than the `PGMADMIN` user, to perform development operations on the Visual Workbench repository, `PGMADMIN` must grant them the necessary privileges. To do this, perform the following:

- Ensure that the repository has a public status. It has this status if you created it by using Steps 1 to 6 of the `pgvwbrepos.sql` script. If you did not use Step 6, then rerun the script. When you get to Step 2 of the script, enter `A` at the prompt to upgrade the private repository to public status.

- Use SQL*Plus to connect to the repository as the PGMADMIN user and grant the PGMDEV role to each user. For example:

```
SQL> GRANT PGMDEV TO SCOTT;
```

Deinstall the Visual Workbench Repository

To deinstall a Visual Workbench repository on Oracle10g, use the repository script `pgvwbremove.sql`. To run this script, ensure that you are currently under the Oracle database `ORACLE_HOME\dg4mq\admin\repo` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/repo` directory on UNIX based systems (where you copied the scripts), and then enter the following command:

```
sqlplus /nolog @pgvwbremove.sql
```

Note: If you are deinstalling the Visual Workbench Repository on Oracle8i or earlier, then you must use `pgvwbremove8.sql`. All the examples in this section are provided with the assumption that you are installing on Oracle9i and later.

The script takes you through the following steps:

Step 1: Enter the Database Connection Information

Use the default value of LOCAL by pressing **Enter**.

Next, you are prompted to enter the passwords for the SYSTEM, SYS, and PGMADMIN accounts of the Oracle database. Press **Enter** after entering each password.

The script stops if any of the information is incorrect. Verify the information before rerunning the script.

Step 2: Check for the Existing Workbench Repository

Enter **Y** and press **Enter** for the prompt to remove public synonyms and development roles. This returns the repository to private status. You can exit the script now by entering **N** and pressing **Enter**, or you can proceed to the next prompt.

If you are certain you want to remove the private repository, then enter **Y** and press **Enter**. The script removes all repository tables and related packages.

Preparing the Production Oracle Database

These preparations include preparing, installing, and removing PL/SQL packages on the production database.

Introduction

Before you can compile MIPs on a production Oracle database, the following PL/SQL packages must be present on the production Oracle database:

- DBMS_PIPE, DBMS_OUTPUT, and UTL_RAW

These packages are shipped with each Oracle database and are typically preinstalled.

- PGM, PGM_BQM, PGM_SUP, and UTL_PG

These packages are shipped with your Oracle Database Gateway for WebSphere MQ. They are installed during the creation process of the Visual Workbench repository. Do not execute deployment script on the Oracle database with an installed Visual Workbench repository. If the Oracle database used for the repository is different from the Oracle database used in the production environment, you must install these packages on the production Oracle database.

This section describes how to run the following scripts:

- `pgmdeploy.sql`,
A deployment script that is used to verify the existence of the required PL/SQL packages and install them if they do not exist on the production Oracle database.
- `pgmundeploy.sql`
A script to remove the PL/SQL packages from a production Oracle database.

Verifying and Installing PL/SQL Packages

1. Locate the following scripts:

- `pgm.sql`
- `pgmbqm.sql`
- `pgmdeploy.sql`
- `pgmsup.sql`
- `pgmundeploy.sql`
- `prvtpg.sql`
- `utlpg.sql`

These scripts are installed with the gateway, in the `ORACLE_HOME\dg4mq\admin\deploy` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/deploy` directory on UNIX based systems, where `ORACLE_HOME` is the gateway home directory.

2. If your production Oracle database is on a system that is different from the gateway, then use a file transfer method, such as FTP, to transfer files in the `ORACLE_HOME\dg4mq\admin\deploy` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/deploy` directory on UNIX based systems, where `ORACLE_HOME` is the gateway home directory on your gateway system. On your production Oracle database system, change directory to the directory containing the deployment scripts that you just transferred and skip to Step 4.
3. If your production Oracle database is on the same system as the gateway, then change the directory to `ORACLE_HOME\dg4mq\admin\deploy` directory on Microsoft Windows and `ORACLE_HOME/dg4mq/admin/deploy` on UNIX based systems, where `ORACLE_HOME` is the gateway home directory.
4. Run the `pgmdeploy.sql` script by as follows:

```
$ sqlplus /nolog @pgmdeploy.sql
```
5. At the script prompt: Enter the connect string for the Oracle database... [LOCAL], press **Enter** to use the default value of LOCAL.
6. At the script prompt Enter the following required Oracle database password, enter the password of the SYS account.

After the script verifies the *SYS* account password, it connects to the production Oracle database. The script verifies and reports the PL/SQL packages that are installed there:

- If any of the Oracle database packages, *DBMS_OUTPUT*, *DBMS_PIPE* or *UTL_RAW* are missing, then the script stops. Have your DBA install the missing packages and re-run the deployment script.
- If any of the Oracle packages, *PGM*, *PGM_BQM*, *PGM_SUP*, and *UTL_PG* are missing, then the script installs them on the production Oracle database.

Removing the PL/SQL Packages

You can remove the PL/SQL packages that were installed by the `pgmdeploy.sql` script if, for example, none of your applications in the production environment uses a MIP. To remove these packages, perform the following steps:

1. On your production Oracle database, change to the directory containing the deployment scripts by entering the following command:

For Microsoft Windows:

```
> cd ORACLE_HOME\dg4mq\admin\deploy
```

For UNIX based systems:

```
$ cd $ORACLE_HOME/dg4mq/admin/deploy
```

2. Run the `pgmundeploy.sql` as follows:

```
$ sqlplus /nolog @pgmundeploy.sql
```

3. At the script prompt: Enter the connect string for the Oracle database... [LOCAL], press [Return] to use the default of LOCAL.
4. At the script prompt, enter the required Oracle database passwords, enter the password of the *SYS* account.

After the script verifies the *SYS* account password, it connects to the production Oracle database and removes the packages installed by the `pgmdeploy.sql` script.

After the `pgmundeploy.sql` script completes successfully, applications on the production Oracle database fail if they attempt to reference any of the MIPs that are compiled there.

Gateway Running Environment

This chapter describes the gateway running environment. It contains the following sections:

- [Security Models](#) on page 8-1
- [Transaction Support](#) on page 8-3
- [Troubleshooting](#) on page 8-5

Security Models

WebSphere MQ has its own authorization mechanism. Applications are allowed to perform certain operations on queues or queue managers only when their effective user ID has authorization for each operation. The effective user ID, typically the operating system user, depends on the WebSphere MQ environment and the platform it runs on.

The effective user ID in an Oracle environment is not dependent on an operating system account or the platform. Because of this difference, the gateway provides two authorization models for Oracle applications to work with WebSphere MQ:

- Relaxed
- Strict

Although Oracle and operating system user IDs can be longer than 12 characters, the length of user IDs used for either model cannot exceed 12 characters. Oracle user accounts do not have a minimum number of characters required for their passwords, but some platforms and operating systems do. Take their requirements into consideration when deciding on a password or user ID.

The authorization model is configured with the `AUTHORIZATION_MODEL` parameter in the gateway initialization file. Refer to [Appendix C, "Gateway Initialization Parameters"](#) for more information about the `AUTHORIZATION_MODEL` parameter.

Relaxed Model

This model discards the Oracle user name and password. The authorizations granted to the effective user ID of the gateway by the queue manager are the only associations an Oracle application has. For example, if the gateway user ID is granted permission to open or read messages, or place messages on a queue, then all Oracle applications that access the gateway can request those operations.

The effective user ID is determined by how the gateway runs:

- If the gateway runs as an MQI client application, then the user ID is determined by the MQI channel definition.

See Also: Refer to IBM publications for more information about channel definitions

- If the gateway runs as an MQI server application, then the effective user ID of the gateway is the user account that started the Oracle Net listener and has authorization to all the WebSphere MQ objects that the Oracle application wants to access. Refer to "[Authorization for WebSphere MQ Objects](#)" on page 8-2 for more information.

Oracle recommends using the relaxed model only if your application has minimal security requirements.

Strict Model

This model uses the Oracle user ID and password provided in the `CREATE DATABASE LINK` statement when a database link is created, or the current Oracle user ID and password if none was provided with `CREATE DATABASE LINK`.

The Oracle user ID:

- Must match a user account for the system that runs the gateway and for the system that runs the WebSphere MQ queue manager
- Must have authorization for all the accessed WebSphere MQ objects. Refer to "[Authorization for WebSphere MQ Objects](#)" on page 8-2 for more information.

The authorization process to verify the Oracle user ID and password varies, depending on how the gateway runs.

Authorization Process for a WebSphere MQ Server Application

If the gateway runs as a WebSphere MQ server application, then the authorization process checks the user ID and password against the local or network password file. If they match, then the gateway performs a SET-UID for the user ID and continues to run under this user ID. Further WebSphere MQ authorization checks happen for this user ID.

Authorization Process for a WebSphere MQ Client Application

If the gateway runs as a WebSphere MQ client application, then the authorization process checks the user ID and password against the local or network password file. If they match, then the `MQ_USER_ID` and `MQ_PASSWORD` WebSphere MQ environment variables are set to the values of the user ID and password. If the channel definition specifies the `MCAUSER` WebSphere MQ environment variable as blank characters, then WebSphere MQ authorization checks are performed for the user ID.

If `MCAUSER` is set, not set, or security exits are defined for the MQI channel, then these override the gateway efforts.

See Also: Refer to IBM publications for more information about WebSphere MQ environment variables.

Authorization for WebSphere MQ Objects

The effective user ID for the relaxed model and the Oracle user ID for the strict model require the WebSphere MQ authorizations described in [Table 8-1](#).

Table 8–1 WebSphere MQ Access Authorization

Type of Access	WebSphere MQ Authorization Keywords	Alternate WebSphere MQ Authorization Keywords
Permission to access the WebSphere MQ queue manager	all or allmqi	connect setid
Permission to send messages to a WebSphere MQ queue	all or allmqi	passall passid put setid
Permission to receive messages from a WebSphere MQ queue	all or allmqi	browse get passall passid setid

See Also: Refer to IBM publications for more information about WebSphere MQ authorizations.

Transaction Support

Transactions from an Oracle application that use the gateway and invoke WebSphere MQ message queue operations are managed by the transaction coordinator at the Oracle database where the transaction originates.

Non-Oracle Data Sources and Distributed Transactions

When an Oracle distributed database contains a gateway, the gateway must be properly configured to take part in a distributed transaction. The outcome of a distributed transaction involving a gateway should be that all participating sites roll back or commit their parts of the distributed transaction. All participating sites, including gateway sites, that are updated during a distributed transaction must be protected against failure and must be able to take part in the two-phase commit mechanism.

A gateway that updates a target system as part of a distributed transaction must be able to take part in the automatic recovery mechanism, which might require that recovery information be recorded in transaction memory at the target system.

If a SQL-based gateway is involved in a distributed transaction, the distributed database must be in a consistent state after the distributed transaction is committed.

A database gateway or a SQL-based gateway with the procedural option translates remote procedure calls into target system calls. From the viewpoint of the Oracle transaction model, the gateway is like an Oracle database executing a PL/SQL block containing SQL statements that are used to access an Oracle database.

For a database gateway, it is unknown if a target system call alters data. To ensure the consistency of a distributed database, it must be assumed that a database gateway updates the target system. Accordingly, all remote procedure calls sent to a database gateway take part in a distributed transaction and must be protected by the two-phase commit protocol. For example, you could issue the following SQL*Plus statements:

```
EXECUTE REMOTE_PROC@FACTORY;
```

```
INSERT INTO DEBIT@FINANCE
ROLLBACK;
```

In this example, `REMOTE_PROC` is a remote procedure call to access a database gateway, `DEBIT` is an Oracle table residing in an Oracle database, and `FACTORY` and `FINANCE` are database links used to access the remote sites.

Transaction Capability Types

When gateways are involved in a distributed transaction, the transaction capabilities of the non-Oracle data source determine whether the data source can participate in two-phase commit operations or distributed transactions.

Depending on the capabilities of the non-Oracle data source, transactions can be classified as one of the following types:

Type	Description
Read-only	During a distributed transaction, the gateway provides read-only access to the data source, so the gateway can only be queried. A Read-only is used for target systems that use the presumed-commit model or do not support rollback mechanisms.
Single-site	During a distributed transaction, the target system is either read-only (other sites can be updated) or the only site updated (can participate in remote transactions). Single-site is used for target systems that support rollback, commit, and presumed-abort, but cannot prepare or commit-confirm as they have no distributed transaction memory, the ability to remember what happened during and after a distributed transaction.
Commit-confirm	The gateway is a partial partner in the Oracle transaction mode. During a distributed transaction in which it is updated, the gateway must be the commit point site. Commit-confirm is used for target systems that support rollback, commit, presumed-abort, and commit-confirm, but do not support prepare. The commit-confirm capability requires distributed transaction memory.
Two-phase commit	The gateway is a partial partner in the Oracle transaction model. During a distributed transaction, the gateway cannot be the commit point site. Two-phase commit is used for target systems that support rollback, commit, presumed-abort, and prepare, but do not support commit-confirm, because they have no distributed transaction memory.
Two-phase commit-confirm	The gateway is a full partner in the Oracle transaction model. During a distributed transaction, the gateway can be the commit point site, depending on the commit point strength defined in the gateway initialization file. This transaction type is used for target systems that support a full two-phased commit transaction model. That is, the target system supports rollback, commit, presumed-abort, prepare, and commit-confirm.

Transaction Capability Types of Oracle Database Gateway for WebSphere MQ

Transactions from an Oracle application (that invoke WebSphere MQ message queue operations and that are using the gateway) are managed by the Oracle transaction coordinator at the Oracle database where the transaction originates. The Oracle Database Gateway for WebSphere MQ provides the following transaction types:

- Single-site

- Commit-confirm

Single-Site Transactions

Single-site transactions are supported for all WebSphere MQ environments and platforms. Single-Site means that the gateway can participate in a transaction only when queues belonging to the same WebSphere MQ queue manager are updated. An Oracle application can select, but not update, data on any Oracle database within the same transaction that sends to, or receives a message from, a WebSphere MQ queue. To update objects in the Oracle database, the transaction involving the WebSphere MQ queue should first be committed or rolled back.

This default mode of the gateway is implemented using WebSphere MQ single-phase, where the queue manager acts as the synchronizing point coordinator.

Commit-Confirm Transactions

Commit-Confirm transactions are enhanced forms of single-site transactions and are supported for all WebSphere MQ environments and platforms. Commit-confirm means that the gateway can participate in transactions when queues belonging to the same WebSphere MQ queue manager are updated and, at the same time, any number of Oracle databases are updated. Only one gateway with the commit-confirm model can join the distributed transaction because the gateway operates as the focal point of the transaction. To apply changes to queues of more than one queue manager, updates applied to one queue manager need to be committed before a new transaction is started for the next queue manager.

As with single-site transactions, commit-confirm transactions are implemented using WebSphere MQ single-phase, but it requires a dedicated recovery queue at the queue manager to log the transaction ID. At commit time, the gateway places a message in this queue with the message ID set to the Oracle transaction ID. After the gateway calls the queue manager to commit the transaction, the extra message on the transaction log queue becomes part of the overall transaction. This makes it possible to determine the outcome of the transaction in case of system failure, allowing the gateway to recover a failed transaction. When a transaction completes successfully, the gateway removes the associated message from the queue.

The WebSphere MQ administrator must create a reserved queue at the queue manager. The name of this queue is specified in the gateway initialization file with the `TRANSACTION_LOG_QUEUE` parameter. All Oracle users that access WebSphere MQ through the gateway should have full authorization for this queue. The transaction log queue is reserved for transaction logging only and must not be used, accessed, or updated other than by the gateway. When a system failure occurs, the Oracle recovery process checks the transaction log queue to determine the recovery strategy.

Two gateway initialization parameters, `TRANSACTION_RECOVERY_USER` and `TRANSACTION_RECOVERY_PASSWORD`, are set in the gateway initialization file to specify the user ID and password for recovery purposes. When set, the gateway uses this user ID and password combination for recovery work. The recovery user ID should have full authorization for the transaction log queue.

Refer to [Appendix C, "Gateway Initialization Parameters"](#) for more information about configuring the gateway for commit-confirm transactions.

Troubleshooting

This section includes information about messages, error codes, gateway tracing, and gateway operations.

Message and Error Code Processing

The gateway architecture includes a number of components. Any of these components can detect and report an error condition while processing PL/SQL code. An error condition can be complex, involving error codes and supporting data from multiple components. In all cases, the Oracle application receives a single Oracle error code on which to act.

Error conditions are represented in the following ways:

- Errors from the Oracle database

Messages from the Oracle database are in the format `ORA-xxxxx` or `PLS-xxxxx`, where `xxxxx` is a code number. `ORA-xxxxx` is followed by text explaining the error code. Refer to the *Oracle Database Error Messages* for explanations of these errors.

For example:

```
PLS-00306: wrong number or types of arguments in call to 'MQOPEN'
ORA-06550: line 7, column 3:
PL/SQL: Statement ignored
```

- Gateway and WebSphere MQ errors

When possible, a WebSphere MQ error code is converted to an Oracle error code. If that is not possible, then the Oracle error `ORA-29400` with the corresponding WebSphere MQ error code is returned. Refer to "[Common Error Codes](#)" on page 8-6 for more information.

For Example:

```
ORA-29400: data cartridge error
MQI MQCONN failed. completion code=2, reason code=2058
```

Note: Because the Oracle database distinguishes only between a successful or failed outcome of all user operations, MQI calls that return a warning are reported as a successful operation.

Interpreting Gateway Messages

Error codes are generally accompanied by additional message text, beyond the text associated with the Oracle message number. The additional text includes details about the error.

Gateway messages have the following format:

```
ORA-nnnnn:error_message_text
gateway_message_line
```

where:

- `nnnn` is an Oracle error number.
- `error_message_text` is the text of the message associated with the error.
- `gateway_message_line` is additional message text generated by the gateway.

Common Error Codes

The error conditions that are described in this section are common error conditions that an application might receive while using the gateway. However, do not cover all error situations.

ORA-01017: invalid username/password; logon denied**Cause:** Invalid username or password**Action:** Logon denied**ORA-29400: The MQSeries MQI call "call_name" fails with reason code mqi_code****Cause:** An MQI call to a WebSphere MQ queue manager failed. The gateway could not complete the current operation.**Action:** If *call_name* is MQOPEN and *mqi_code* is 2035, then do the following:

- If the gateway is configured for the relaxed security model, then use the WebSphere MQ administrative command interface to grant sufficient message privileges to the user account that started the Oracle Net listener. These privileges allow the user to send and receive messages for the specified WebSphere MQ queue. Refer to IBM publications for more information.
- If the gateway is configured for the strict security model, use the WebSphere MQ administrative command interface to grant message privileges to the user name specified in the CREATE DATABASE LINK statement. If no user name was specified in the CREATE DATABASE LINK statement, the privileges are granted to the current Oracle user ID. These privileges enable the user to send and receive messages for the specified WebSphere MQ queue. Refer to IBM publications for more information.

If *call_name* is MQOPEN, and if *mqi_code* is 2085, then verify that the queue that is specified in the WebSphere MQ profile exists at the WebSphere MQ queue manager that you are trying to access and that the queue name is correctly spelled and in the correct letter case.

See Also: Refer to IBM publications for more information on *mqi_codes* other than 2035 and 2085..

Gateway Tracing

The gateway has a trace feature for testing and debugging purposes. The trace feature collects information about the gateway running environment, MQI calls, and parameter values of the MQI calls. The amount of trace data to collect is based on the tracing level selected with the TRACE_LEVEL parameter. Refer to [Appendix C, "Gateway Initialization Parameters"](#) for more information about enabling tracing.

Note: Do not enable tracing when your application is running in a production environment because it reduces gateway performance.

The trace data is written to the directory and file specified by the LOG_DESTINATION parameter.

LOG_DESTINATION Parameter

This is a gateway initialization parameter.

Gateway: SQL-based and procedural

Default Value: The default value is SID_agt_PID.trc.

Range of Values: None

Syntax: LOG_DESTINATION = *log_file*

Parameter Description

LOG_DESTINATION = *log_file*

LOG_DESTINATION specifies the file name or directory where the gateway writes logging information. When *log_file* already exists, logging information is written to the end of file.

If you do not specify LOG_DESTINATION, then the default log file is created each time that the gateway starts up.

Verifying Gateway Operation

If your application cannot connect to the gateway, then rerun the application with the gateway trace feature enabled. If no trace information is written to the log file specified by LOG_DESTINATION, or if the log file is not created at all, then verify that:

- The Oracle Net configuration for the gateway and the Oracle database is set up properly (refer to ["Configuring Oracle Net for the Gateway"](#) on page 7-4)
- A database link exists between the Oracle database and the gateway was created (["Administering the Database Links Alias Library"](#) on page 7-10)

If the Oracle Net configuration and database link are set up correctly, then check the operation of the gateway with the `test.sql` script:

1. Change directory to the gateway sample directory by entering:

For Microsoft Windows:

```
> cd %ORACLE_HOME%\dg4mq\sample
```

For UNIX based systems:

```
$ cd $ORACLE_HOME/dg4mq/sample
```

2. Using an editor, modify the `test.sql` script as follows:
 - a. Specify the database link name that you created for the gateway. To do this, replace the characters `@dg4mq` with `@dblink`, where `dblink` is the name you chose when the database link was created.
 - b. Replace the characters `YOUR_QUEUE_NAME` with a valid WebSphere MQ queue name.
3. Using SQL*Plus, connect to your Oracle database as a valid user.
4. Run `test.sql`, a script that sends and retrieves a message from a WebSphere MQ queue. A successful completion displays the following output:

```
SQL> @test.sql
message put on queue = 10203040506070809000
MQPUT: CorrelId length = 24
MQPUT: MsgId length = 24
MQPUT returned with reason code 0
MQGET returned with reason code 0
message read back = 10203040506070809000
```

An unsuccessful test displays the following output:

```
SQL> @test.sql
message put on queue = 10203040506070809000
```

Error: Oracle Database Gateway for WebSphere MQ verification script failed.
ORA-29400: data cartridge error
MQI MQOPEN failed. completion code=2, reason code=2085

The PGM, PGM_UTL8, and PGM_SUP Packages

Use the Visual Workbench when developing applications that access WebSphere MQ through the gateway. The Visual Workbench defines an interface for accessing WebSphere MQ and automatically generates the PL/SQL code (the MIP) for Oracle applications to interface with the gateway. Refer to the *Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)* for more information about Visual Workbench.

The MIP uses definitions from the PGM, PGM_UTL8, and PGM_SUP packages. When necessary, you can alter the MIP to include WebSphere MQ functions that are not supported by Visual Workbench. This is done with the definitions and procedures from the PGM, and PGM_UTL8, and PGM_SUP packages.

The PGM, PGM_UTL8, and PGM_SUP packages are installed when the Visual Workbench repository or the OG4MQ deployment environment is created. For more information, refer to ["Installing the Oracle Visual Workbench Repository"](#) on page 7-12 and ["Preparing the Production Oracle Database"](#) on page 7-16.

This appendix discusses the PGM, PGM_UTL8, and PGM_SUP packages in the following sections:

- [PGM Package, OG4MQ Gateway Procedures, and Data Type Definitions](#) on page A-1
- [MQCLOSE Procedure](#) on page A-6
- [MQGET Procedure](#) on page A-7
- [MQOPEN Procedure](#) on page A-13
- [MQPUT Procedure](#) on page A-15
- [PGM_SUP Package](#) on page A-18

PGM Package, OG4MQ Gateway Procedures, and Data Type Definitions

The gateway procedures and type definitions of the PGM package are modeled after the WebSphere MQ MQI calls. For all the relevant calls and structures found in MQI, a corresponding counterpart exists in PGM and the associated data type definitions exist in `pgmobj.sql`. The gateway procedures and PGM type definitions are named the same as their MQI counterparts. However, the data types of arguments or structure fields are changed into corresponding PL/SQL data types.

Using these procedures and type definitions in an Oracle application is very similar to writing a WebSphere MQ application. The fields of all PGM type definitions are initialized. These initialization values are based on default values defined by MQI.

The use of gateway procedures and PGM type definitions requires extensive knowledge of MQI and WebSphere MQ programming in general. These procedures and records follow the MQI flowchart, semantics, and syntax rules.

The PGM package is installed when the Visual Workbench repository or the OG4MQ deployment environment is created and is granted public access. It has no schema because the gateway omits all schema names when describing or running a procedure. No schema qualifiers need to be prefixed to the names of the procedures and type definitions.

See Also: Refer to *IBM MQSeries Application Programming Reference* for complete information about writing WebSphere MQ applications and using MQI calls.

Summary of Procedures and Type Definitions

The gateway procedures and PGM provide the following procedures and type definitions:

Table A-1 *Procedures and Type Definitions*

Procedure	Procedure Purpose	Type Definitions Used by the Procedure
MQOPEN	Opens a queue.	PGM.MQOD and PGM.MQOH
MQPUT	Sends a message to the queue that was opened by MQOPEN	PGM.MQMD PGM.MQOH PGM.MQPMO
	Sends a message longer than 32767 bytes to the queue	PGM.MQMD PGM.MQOH PGM.MQPMO PGM.MQPUT_BFFER
MQGET	Retrieves or scans a message from the queue that was opened by MQOPEN	PGM.MQMD PGM.MQOH PGM.MQGMO
	Sends a message longer than 32767 bytes to the queue	PGM.MQMD PGM.MQOH PGM.MQGMO PGM.MQGET_BFFER
MQCLOSE	Closes the queue that was opened by MQOPEN	Does not use a type definition.

Procedure Conventions

The gateway procedures are described in alphabetic order in this appendix. The type definitions are described with the procedures that use them. Only type definition fields that can be changed are described. Other fields equivalent to MQI fields are left out because they are reserved for WebSphere MQ, are not supported by the gateway, or contain values that should not be changed.

A procedure's definition is shown using the IBM argument names associated with the equivalent MQI call. For example:

```
MQGET(hobj, mqmd, msgmo, msg)
```

The syntax of the MQGET call is as follows:

```
MQGET(handle, descript, get_options, message);
```

where:

- *handle* is your name for the first argument specified in the definition as *hobj*.
- *descript* is your name for the second argument specified in the definition as *mqmd*.
- *get_options* is your name for the third argument specified in the definition as *msgmo*.
- *message* is your name for the fourth argument specified in the definition as *msg*.

You can use your own names for these arguments if you code the arguments in the order shown in the definition.

For more information about PL/SQL, refer to the *Oracle Database PL/SQL Language Reference*.

MQI Calls Performed by the Gateway

The following MQI calls have no equivalent procedures in the gateway because the Oracle database and the gateway automatically perform the functions of these MQI calls:

- MQBACK

Transaction control is handled by the Oracle transaction coordinator. The Oracle application does not need to invoke a separate MQBACK call to undo the changes sent to WebSphere MQ.
- MQCONN

A connection to a queue manager is established by the Oracle database and the gateway whenever an Oracle application refers to a gateway procedure. The database link name that is used when calling the gateway procedure determines which queue manager the gateway connects to.
- MQCMIT

Transaction control is handled by the Oracle transaction coordinator. An Oracle application does not need to invoke a separate MQCMIT call to commit the changes sent to WebSphere MQ.
- MQDISC

Connections to a queue manager are closed by the Oracle database and gateway. An Oracle application does not need to close the connection with the queue manager. Ending the current Oracle session or dropping the database link causes the queue manager connection to end.

Unsupported MQI Calls

The following MQI calls are not supported by the gateway:

- MQINQ
- MQPUT1

- MQSET

Migration Tips

This section provides information about how to upgrade Oracle9i OG4MQ and existing customized PL/SQL application programs to use Oracle Database Gateway for WebSphere MQ features. OG4MQ data types and RPC API prototypes are changed to meet the requirements of the gateway infrastructure.

When upgrading OG4MQ to Oracle 10g release 2 or higher, Oracle recommends that you install the newer version of OG4MQ on a separate development Oracle system. After you have finished with system configuration and testing, transfer all of the COBOL copy books and regenerate and recompile MIPs using the Oracle Visual Workbench. For customized codes, make necessary changes and recompile.

Migrating OG4MQ Releases 8 and 9 PL/SQL Applications

To migrate OG4MQ releases 8 and 9 PL/SQL applications:

1. In the PL/SQL declarative section, remove `dblink` references from the following OG4MQ data types:
 - `PGM8.MQOD`
 - `PGM8.MQMD`
 - `PGM8.MQPMO`
 - `PGM8.MQGMO`

Then remove the following `PGM8.MQ*RAW` data types:

- `PGM8.MQODRAW`
 - `PGM8.MQMDRAW`
 - `PGM8.MQPMORAW`
 - `PGM8.MQGMORAW`
2. In the PL/SQL declarative section, change the data type of the handle of the queue, the third argument of `PGM.MQOPEN`, from `BINARY_INTEGER` to `PGM.MQOH` and replace the package name `PGM8` with `PGM`.

Change the data type of the handles of the queue, the third argument of `PGM.MQOPEN`, from `BINARY_INTEGER` to `PGM.MQOH`.

For example, for version 8 and 9 change the following data types to those listed for Oracle 10g:

```
objdesc      PGM8.MQOD;
msgdesc      PGM8.MQMD;
putmsgopts   PGM8.MQPMO;
getmsgopts   PGM8.MQGMO;
hobj         BINARY_INTEGER;
mqodRaw      PGM8.MQODRAW;
mqmdRaw      PGM8.MQMDRAW;
mqpmoRaw     PGM8.MQPMORAW;
mqgmoRaw     PGM8.MQGMORAW;
```

The data types for Oracle 10g release 2 and higher:

```
objdesc      PGM.MQOD;
msgdesc      PGM.MQMD;
putmsgopts   PGM.MQPMO;
```



```
getmsgopts PGM.MQGM0;
hobj       PGM.MQOH;
```

3. In the PL/SQL executable section, remove `dblink` references from the following OG4MQ procedures:

```
PGM8.MQOPEN@dblink()
PGM8.MQPUT@dblink()
PGM8.MQGET@dblink()
PGM8.MQCLOSE@dblink()
```

Then define the `dblink` in the new `PGM.MQOD` type where the object queue name is defined.

For example, for version 8 and 9:

```
objdesc.objectname := 'QUEUE1';
```

For Oracle 10g release 2 and higher:

```
objdesc.objectname := 'QUEUE1';
objdesc.dblinkname := 'dblink';
```

4. If necessary, change the package name `PGM8` of all OG4MQ procedures to `PGM`.

For example, for version 8 and 9:

```
PGM8.MQOPEN@dblink();
PGM8.MQPUT@dblink();
PGM8.MQGET@dblink();
PGM8.MQCLOSE@dblink();
```

For Oracle 10g release 2 and higher:

```
PGM.MQOPEN;
PGM.MQPUT;
PGM.MQGET;
PGM.MQCLOSE;
```

5. In the PL/SQL executable section, remove all statements starting with `PGM_UTL8.RAW_TO_*`, remove all `PGM_UTL8.TO_RAW` statements, and replace all references to the `MQ*RAW` data types with their matching `MQ*` data types in the following OG4MQ procedures:

- `PGM.MQOPEN`;
- `PGM.MQPU`;
- `PGM.MQGET`;
- `PGM.MQCLOSE`;

For example, for versions 8 and 9:

```
mqodRaw := PGM_UTL8.TO_RAW(objdesc);
PGM8.MQOPEN@dblink(mqodRaw, options, hobj);
objdesc := PGM_UTL8.RAW_TO_MQMD(mqodRaw);
mqmdRaw := PGM_UTL8.TO_RAW(msgdesc);
mqpmoRaw := PGM_UTL8.TO_RAW(putmsgopts);
PGM8.MQPUT@dblink(hobj, mqmdRaw, mqpmoRaw, putbuffer);
putmsgopts := PGM_UTL8.RAW_TO_MQPMO(mqpmoRaw);
msgdesc := PGM_UTL8.RAW_TO_MQMD(mqmdRaw);
```

```
mqmdRaw := PGM_UTL8.TO_RAW(msgdesc);
mqpmoRaw := PGM_UTL8.TO_RAW(getmsgopts);
```

```

PGM.MQGET@dblink(hobj, mqmdRaw, mcgmoRaw, putbuffer);
getmsgopts := PGM_UTL8.RAW_TO_MQGMO(mcgmoRaw);
msgdesc := PGM_UTL8.RAW_TO_MQMD(mqmdRaw);

```

For Oracle 10g release 2 and higher:

```

PGM.MQOPEN(objdesc, options, hobj);
PGM.MQPUT(hobj, msgdesc, putmsgopts, putbuffer);
PGM.MQGET(hobj, msgdesc, getmsgopts, getbuffer);

```

6. In PL/SQL executable section, remove all statements that reference the old MQ*RAW data types.

Migrating OG4MQ Release 4.0.1.* PL/SQL Applications

To migrate applications:

1. In the PL/SQL declarative section, remove `dblink` references from the following OG4MQ data types:
 - PGM.MQOD
 - PGM.MQMD
 - PGM.MQPMO
 - PGM.MQGMO
2. In the PL/SQL executable section, remove `dblink` references from the following OG4MQ procedures and define the `dblink` in the new PGM.MQOD object where the object queue name is defined:
 - PGM.MQOPEN@dblink()
 - PGM.MQPUT@dblink()
 - PGM.MQGET@dblink()
 - PGM.MQCLOSE@dblink()

For example, for version 4:

```

PGM.MQOPEN@dblink(objdesc, options, hobj);
objdesc.objectname := 'QUEUE1';
PGM.MQPUT@dblink(hobj, msgdesc, putmsgopts, putbuffer);
PGM.MQGET@dblink(hobj, msgdesc, getmsgopts, putbuffer);
PGM.MQCLOSE@dblink(hobj, options);

```

MQCLOSE Procedure

MQCLOSE closes a queue. On return, the queue handle is invalid and your application must reopen the queue with another call to MQOPEN before issuing another MQPUT, MQGET, or MQCLOSE call to the queue.

MQCLOSE differs from MQI calls in the following ways:

- The connection handle argument is omitted from MQCLOSE because the gateway automatically takes care of managing queue manager connections.
- The MQI completion code is not included in the procedure argument list. When a gateway procedure fails because the corresponding MQI call failed, then an Oracle error message is returned to the caller.

- The MQI reason code is not included in the procedure argument list. When the corresponding MQI call for a gateway procedure returns a reason code, then the reason code is included in the Oracle error message returned to the caller.

Definition

`MQCLOSE(hobj, options)`

where:

- *hobj* contains the handle for the queue to close. The handle is returned by a previous call to `MQOPEN`. This input argument is a new `PGM.MQOH` object in Oracle 10g release 2.
- *options* specifies the close action. Use `PGM_SUP.MQCO_NONE` or the other `PGM_SUP` constants for a close option. Refer to [MQCLOSE Values](#) on page A-23. This input argument is of the `BINARY_INTEGER` PL/SQL data type.

You can use your own variable names when arguments are in the required order as follows:

```
MQCLOSE(handle, close_options);
```

MQGET Procedure

`MQGET` retrieves a message from a queue. The queue must already be open from a previous call to `MQOPEN` with the `PGM_SUP.MQOO_INPUT_AS_Q_DEF` (or an equivalent option) option set. Retrieved messages for this form of `MQGET` must be shorter than 32767 bytes.

`MQGET` differs from MQI calls in the following ways:

- The connection handle argument is omitted from `MQGET` because the gateway automatically takes care of managing queue manager connections.
- The MQI completion code is not included in the procedure's argument list. When a gateway procedure fails because the corresponding MQI call failed, then an Oracle error message is returned to the caller.
- The MQI reason code is not included in the procedure's argument list. When the corresponding MQI call for a gateway procedure returns a reason code, then the reason code is included in the Oracle error message that was returned to the caller.
- The `msg` length argument is not included in the procedure's argument list because the Oracle database and the gateway automatically keep track of the message data length.

Definition

`MQGET(hobj, mqmd, mqgmo, msg)`

where:

- *hobj* contains the handle for the queue to open. The handle is returned by a previous call to `MQOPEN`. This input argument is a new `PGM.MQOH` object in Oracle 10g release 2.
- *mqmd* is used on input to describe the attributes of the message being retrieved. Use the fields of the `PGM.MQMD` object type definition to describe these attributes.

On output, *mqmd* contains information about how the request was processed. The queue manager sets some of the `PGM.MQMD` object fields on return.

This input and output argument is PL/SQL PGM.MQMD data type. For the details of PGM.MQMD, refer to [PGM.MQMD Type Definition](#) on page A-10.

- *mqgmois* used on input to describe the option values that control the retrieve request. Use the fields of the PGM.MQGMO object type definition to describe these options.

On output, the queue manager sets some of the PGM.MQGMO object fields on return.

This input and output argument is PL/SQL PGM.MQGMO data type. For the details of the PGM.MQGMO object, refer to [PGM.MQGMO Type Definition](#) on page A-12.

- *msg* contains the retrieved message. This output argument is PL/SQL data type RAW or PGM.MQGET_BUFFER.

Examples

1. Using your own variable names when arguments are in the required order:

```
MQGET(handle, descript, opts, message);
```

2. The following example, which is provided as a sample with the gateway (ORACLE_HOME\dg4mq\getsample.sql on Microsoft Windows and ORACLE_HOME/dg4mq/sample/getsample.sql on UNIX based systems), reads all messages from a WebSphere MQ queue. For more information, refer to the IBM publication on WebSphere MQ Application Programming.

Example A-1 getsample.sql

```
--
-- Copyright Oracle, 2007 All Rights Reserved.
--
-- NAME
--   getsample.sql
--
-- DESCRIPTION
--
--   Specify the database link name you created for the gateway. To do this,
--   replace the database link name 'YOUR_DBLINK_NAME' with the dblink name
--   you chose when the database link was created.
--
--   This script performs a test run for the MQSeries gateway. In this
--   script the queue name is 'YOUR_QUEUE_NAME', replace it with a valid
--   queue name at the queue manager the gateway is configured for.
--
-- NOTES
--   Run the script from the SQL*Plus command line.
--
--   Make the sure the user is granted 'EXECUTE' on package dbms_output
--
SET SERVEROUTPUT ON
DECLARE

    objdesc      PGM.MQOD;
    msgDesc      PGM.MQMD;
    getOptions   PGM.MQGMO;
    objectHandle PGM.MQOH;
    message      raw(32767);

BEGIN
```

```

objdesc.OBJECTNAME := 'QUEUE1';
objdesc.DBLINKNAME := 'dg4mqdepdblink';

-- Open the queue 'YOUR_QUEUE_NAME' for reading.

PGM.MQOPEN(objdesc, PGM_SUP.MQOO_INPUT_AS_Q_DEF, objectHandle);

-- Get all messages from the queue.

WHILE TRUE LOOP

    -- Reset msgid and correlid to get the next message.

    msgDesc.MSGID := PGM_SUP.MQMI_NONE;
    msgDesc.CORRELID := PGM_SUP.MQCI_NONE;

    PGM.MQGET(objectHandle, msgDesc, getOptions, message);

    -- Process the message...
    DBMS_OUTPUT.PUT_LINE('message read back = ' || rawtohex(message));

END LOOP;

EXCEPTION

    WHEN PGM_SUP.NO_MORE_MESSAGES THEN

        DBMS_OUTPUT.PUT_LINE('Warning: No more message found on the queue');

        -- Close the queue again.

        PGM.MQCLOSE(objectHandle, PGM_SUP.MQCO_NONE);

    WHEN OTHERS THEN

        -- Re-raise the error;

        DBMS_OUTPUT.PUT_LINE('Error: Oracle Database Gateway for WebSphere MQ
verification script failed. ');
        DBMS_OUTPUT.PUT_LINE(SQLERRM);
        raise;

END;
/

```

Notes:

Note: The PL/SQL block fails if the exception clause is left out. In that case, the PGM_SUP.NO_MORE_MESSAGES error code is raised. The MSGID and CORRELID fields that are used for MQGET are set after each call to MQGET. If they are not reset at each cycle, then MQGET checks for the next message that has the same identifiers as the last read operation, which usually do not exist. The PL/SQL block would only read one message.

PGM.MQMD Type Definition

PGM.MQMD specifies the control information that accompanies a message when it travels between the sending and receiving applications. It also contains information about how the message is handled by the queue manager or by the receiving application. PGM.MQMD describes the attributes of the message being retrieved.

You can use the default values for PGM.MQMD fields or change the fields for your application requirements. For example, to change a field value, do the following:

```
mqmd.field_name := field_value;
```

where:

- *mqmd* is the PGM.MQMD object data type and it describes the attributes of the message being retrieved
- *field_name* is a field name of the PGM.MQMD object type definition. You can set as many fields as necessary. Refer to [Table A-2](#) for field names and descriptions.
- *field_value* is the value to assign to *field_name*. You can specify a value or use a PGM_SUP constant to assign a value.

Table A-2 PGM.MQMD Object Fields

Field Name	Description	PL/SQL Data Type	Initial Value
REPORT	Allows the application that sends a message to specify which report message (or messages) should be created by the queue manager when an expected or unexpected event occurs. Use a PGM_SUP constant to assign a value. Refer to REPORT Field on page A-21.	RAW(4)	PGM_SUP.MQRO_ NONE
MSGTYPE	Specifies the message type: reply message, report message, or normal message (datagram). Use a PGM_SUP constant to assign a value. Refer to MSGTYPE Field on page A-20.	BINARY_INTEGER	PGM_SUP.MQMT_ DATAGRAM
EXPIRY	Specifies the amount of time that a message stays in a queue. The expiration period is in tenths of a second, and is set by the sending application. Use a PGM_SUP constant to assign a value. Refer to EXPIRY Field on page A-20.	BINARY_INTEGER	PGM_SUP.QMEI_ UNLIMITED
FEEDBACK	Used with the REPORT field to indicate the kind of report. Use a PGM_SUP constant to assign a value. Refer to FEEDBACK Field on page A-20.	BINARY_INTEGER	PGM_SUP.MQFB_ NONE
ENCODING	Used for numeric values in the message data. Use a PGM_SUP constant to assign a value. Refer to ENCODING Field on page A-19.	RAW(4)	PGM_SUP.MQENC_ NATIVE
CODEDCHARSETID	Specifies the coded character set identifier of the characters in the message. Use a PGM_SUP constant to assign a value. Refer to CODEDCHARSETID Field on page A-19.	BINARY_INTEGER	PGM_SUP.MQCCSI_ DEFAULT

Table A-2 (Cont.) PGM.MQMD Object Fields

Field Name	Description	PL/SQL Data Type	Initial Value
FORMAT	A free format name used to inform the receiver about the contents of the message. Specify a format or use a PGM_SUP constant. Refer to FORMAT Field on page A-20.	CHAR(8)	PGM_SUP.MQFMT_ NONE
PRIORITY	Specifies message priority. Specify a value greater than or equal to 0 (zero is the lowest priority), or use a PGM_SUP constant. Refer to PRIORITY Field on page A-21.	BINARY_INTEGER	PGM_SUP.MQPRI_ PRIORITY_AS_Q_ DEF
PERSISTENCE	An input field for the sending application. Persistent messages survive when a queue manager is restarted. Non persistent messages and messages in temporary queues are lost when a queue manager is restarted. Specify the desired persistence with a PGM_SUP constant. Refer to PERSISTENCE Field on page A-21.	BINARY_INTEGER	PGM_SUP.MQPER_ PERSISTENCE_AS_ Q_DEF
MSGID	Specifies the message identifier of the message to be retrieved (when receiving a message). If no value is specified when a sending a message (PGM_SUP.MQMI_NONE), then the queue manager assigns a unique value.	RAW(24)	PGM_SUP.MQMI_NONE
CORRELID	Specifies the correlation identifier for the message to retrieve when receiving a message (refer to the MSGID field). When sending a message, specify any value, or use PGM_SUP.MQCI_NONE if the message does not require a correlation ID.	RAW(24)	PGM_SUP.MQCI_NONE
BACKOUTCOUNT	An output field for the MQGET procedure. It indicates the number of times a message was placed back on a queue because of a rollback operation.	BINARY_INTEGER	Zero
REPLYTOQ	Specifies the name of the reply-to queue. This is an input field for MQPUT and allows the sending application to indicate where reply messages should be sent. It is also an output field for MQGET and tells the receiving application where to send a reply.	CHAR(48)	NULL
REPLYTOQMGR	Specifies the queue manager to which the reply message or report should be sent. This is an input field for MQPUT and an output field for MQGET.	CHAR(48)	NULL

Table A-2 (Cont.) PGM.MQMD Object Fields

Field Name	Description	PL/SQL Data Type	Initial Value
USERIDENTIFIER	An output field for receiving applications. It identifies the user that sent the message. Sending applications can specify a user on input if the CONTEXT field for the mqpmo argument of MQPUT was set to PGM_SUP.MQPMO_SET_IDENTITY_CONTEXT or to PGM_SUP.MQPMO_SET_ALL_CONTEXT.	CHAR(12)	NULL
ACCOUNTINGTOKEN	Used to transfer accounting information between applications. Sending applications provide accounting information or use PGM_SUP.MQACT_NONE to specify that no accounting information is included.	CHAR(32)	PGM_SUP.MQACT_NONE
APPLIDENTITYDATA	Specifies more information to send along with the message to help the receiving application provide more information about the message or its sender.	CHAR(32)	NULL
PUTAPPLTYPE	Describes the kind of application that placed the message on the queue. Use a PGM_SUP constant to assign a value. Refer to PUTAPPLTYPE Field on page A-21.	BINARY_INTEGER	PGM.MQAT_NO_CONTEXT
PUTAPPLNAME	Specifies the name of the application that placed the message on the queue. Sending applications specify a name or let the queue manager fill in this field. This is an output field for receiving applications.	CHAR(28)	NULL
PUTDATE	Specifies the date on which a message was placed on the queue. Sending applications can set a date or let the queue manager take care of it. The date format used by the queue manager is YYYYMMDD. This is an output field for receiving applications.	CHAR(8)	NULL
PUTTIME	Specifies the time that a message was placed on the queue. Sending applications can set a time or let the queue manager take care of it. The time format that is used by the queue manager is HHMMSS.STH. This is an output field for receiving applications.	CHAR(8)	NULL
APPLORIGINDATA	Used by the sending application to add information to the message about the message origin. This is an output field for receiving applications.	CHAR(4)	NULL

PGM.MQGMO Type Definition

Use PGM.MQGMO to specify option and control information about how the message is retrieved from a queue. You can use the default values for PGM.MQGMO fields or

change the fields for your application requirements. For example, to change a field value:

```
mqgmo.field_name := field_value
```

where:

- `mqgmo` is the `PGM.MQGMO` object data type, and it specifies option and control information about how the message is retrieved from a queue.
- `field_name` is a field name of the `PGM.MQGMO` type definition. You can set as many fields as necessary. Refer to [Table A-3](#) for names and field descriptions.
- `field_value` is the value to assign to `field_name`. You can specify a value or use a `PGM_SUP` constant to assign a value.

Table A-3 PGM.MQGMO Fields

Field Name	Description	PL/SQL Data Type	Initial Value
OPTIONS	Specifies options to control the <code>MQGET</code> procedure. Add one or more <code>PGM_SUP</code> constants to set it. Refer to OPTIONS Field on page A-18.	BINARY_INTEGER	PGM.MQGMO_SYNCPOINT (Messages that are retrieved from the queue are coordinated by the Oracle transaction coordinator.)
WAITINTERVAL	Specifies the maximum time in milliseconds that <code>MQGET</code> waits for a message to arrive in the queue. <code>WAITINTERVAL</code> should be equal to or greater than 0, or set to the value of <code>PGM_SUP.MQWI_UNLIMITED</code> (unlimited wait interval).	BINARY_INTEGER	Zero
RESOLVEDQNAME	Contains the resolved name of the destination queue from which the message was retrieved. This is an output field set by the queue manager upon return from the call.	CHAR(48)	NULL

MQOPEN Procedure

`MQOPEN` establishes access to a queue. Depending on the mode selected to open the queue, an application can issue subsequent `MQPUT`, `MQGET`, or `MQCLOSE` calls.

`MQOPEN` differs from `MQI` calls in the following ways:

- The connection handle argument is omitted from `MQOPEN` because the gateway automatically takes care of managing queue manager connections.
- The `MQI` completion code is not included in the procedure argument list. When a gateway procedure fails because the corresponding `MQI` call failed, then an Oracle error message is returned to the caller.
- The `MQI` reason code is not included in the procedure argument list. If the corresponding `MQI` call for a gateway procedure returns a reason code, then the reason code is included in the Oracle error message that is returned to the caller.

Definition

```
MQOPEN(mqod, options, hobj)
```

where:

- `mqod` specifies the queue to open. Use the fields of the `PGM.MQOD` type definition to describe these attributes. On output, the queue manager sets some of the `PGM.MQOD` object fields on return.

This input and output argument is PL/SQL `PGM.MQOD` data type. For details of `PGM.MQOD`, refer to [PGM.MQOD Type Definition](#) on page A-14.

- `options` specifies the kind of open. Refer to [MQOPEN Values](#) on page A-23. This input argument is of the PL/SQL `BINARY_INTEGER` data type.
- `hobj` contains the handle of the queue after the queue is opened and becomes an input argument for subsequent PGM calls. The queue handle remains valid until one of the following conditions occur:
 - The queue is closed by a call to `MQCLOSE`
 - The current transaction is made permanent by a `COMMIT` or `ROLLBACK` command
 - The Oracle user session is ended by a `DISCONNECT` command. This output argument is of the `PGM.MQOH` data type.

You can use your own variable names when arguments are in the required order as follows:

```
MQOPEN and(descript, open_options, handle);
```

PGM.MQOD Type Definition

`PGM.MQOD` is used to define the object to open. You can use the default values for `PGM.MQOD` fields or change the fields for your application requirements. For example, you can change a field value as follows:

```
mqod.field_name := field_value
```

where:

- `mqod` is the `PGM.MQOD` data type and specifies the object to open.
- `field_name` is a field name of the `PGM.MQOD` type definition. You can set as many fields as necessary. Refer to [Table A-4](#) for field names and descriptions.
- `field_value` is the value to assign to `field_name`. You can specify a value or use a `PGM_SUP` constant to assign a value.

Table A-4 PGM.MQOD Object Fields

Field Name	Description	PL/SQL Data Type	Initial Value
OBJECTTYPE	Specifies the object to open. Use a <code>PGM_SUP</code> constant to assign a value. Refer to OBJECTTYPE Field on page A-22.	<code>BINARY_INTEGER</code>	<code>PGM_SUP.MQOT_Q (queue)</code>
DBLINKNAME	Specifies the database link name.	<code>CHAR(64)</code>	<code>NULL</code>
OBJECTNAME	Specifies the local name of the object as defined by the queue manager.	<code>CHAR(48)</code>	<code>NULL</code>

Table A-4 (Cont.) PGM.MQOD Object Fields

Field Name	Description	PL/SQL Data Type	Initial Value
OBJECTQMGRNAME	Specifies the name of the queue manager for the object defined by OBJECTNAME. Leave OBJECTQMGRNAME set to null values because the gateway supports only the opening of objects at the connected queue.	CHAR(48)	NULL
DYNAMICQNAME	Is ignored unless the OBJECTNAME field specifies the name of a model queue. When a model queue is involved, then this field specifies the name of the dynamic queue to be created at the queue manager to which the gateway is connected.	CHAR(48)	AMQ . *
ALTERNATEUSERID	If the options argument of MQOPEN is set to the value of PGM_SUP.MQOO_ALTERNATE_USER_AUTHORITY, then this field specifies the alternate user ID which the queue manager uses to check the authorization for the queue being opened.	CHAR(12)	NULL

MQPUT Procedure

MQPUT sends a message to a queue. The queue must already be open by a previous call to MQOPEN with its options argument set to the value of PGM_SUP.MQOO_OUTPUT.

MQPUT differs from MQI calls as follows:

- The connection handle argument is omitted from MQPUT because the gateway automatically takes care of managing queue manager connections.
- The MQI completion code is not included in the procedure argument list. When a gateway procedure fails because the corresponding MQI call failed, then an Oracle error message is returned to the caller.
- The MQI reason code is not included in the procedure argument list. When the corresponding MQI call for a gateway procedure returns a reason code, then the reason code is included in the Oracle error message returned to the caller.
- The msg length argument is not included in the procedure argument list because the Oracle database and the gateway automatically keep track of the message data length.

Definition

MQPUT(*hobj*, *mqmd*, *mqpmo*, *msg*)

where:

- *hobj* contains the handle for the queue to send the message to. The handle is returned by a previous call to MQOPEN. This input argument is a new PGM.MQOH in Oracle10g release 2.
- *mqmd* is used on input to describe the attributes of the message being retrieved. Use the fields of the PGM.MQMD type definition to describe these attributes. On output, *mqmd* contains information about how the request was processed. The queue manager sets some of the PGM.MQMD fields on return.

This input and output argument is a PGM.MQMD. For details of PGM.MQMD, refer to [PGM.MQMD Type Definition](#) on page A-10.

- `mqpmo` is used on input to describe the option values that control the put request. Use the fields of the PGM.MQPMO type definition to describe these options. On output, the queue manager sets some of the PGM.MQPMO fields on return.

This input and output argument is PGM.MQPMO. For details of PGM.MQPMO, refer to [PGM.MQPMO Type Definition](#) on page A-17.

- `msg` contains the message to send. This input argument is PL/SQL data type RAW or PGM.MQPUT_BUFFER.

Example

1. You can use your own variable names when arguments are in the required order:

```
MQPUT(handle, descript, options, message);
```

2. The following sample, which is provided as a sample with the gateway (`ORACLE_HOME\dg4mq\sample\putsample.sql` on Microsoft Windows and `ORACLE_HOME/dg4mq/sample/putsample.sql` on UNIX based systems), sends a message shorter than 32767 bytes:

Example A-2 putsample.sql

```
--
-- Copyright Oracle, 2005 All Rights Reserved.
--
-- NAME
--   putsample.sql
--
-- DESCRIPTION
--
--   Specify the database link name you created for the gateway. To do this,
--   replace the database link name 'YOUR_DBLINK_NAME' with the dblink name
--   you chose when the database link was created.
--
--   This script performs a test run for the MQSeries gateway. In this
--   script the queue name is 'YOUR_QUEUE_NAME', replace it with a valid
--   queue name at the queue manager the gateway is configured for.
--
-- NOTES
--   Run the script from the SQL*Plus command line.
--
--   Make the sure the user is granted 'EXECUTE' on package dbms_output
--
SET SERVEROUTPUT ON

DECLARE
    objdesc      PGM.MQOD;
    msgDesc      PGM.MQMD;
    putOptions    PGM.MQPMO;
    objectHandle PGM.MQOH;
    message       raw(255);

BEGIN

    objdesc.OBJECTNAME := 'QUEUE1';
    objdesc.DBLINKNAME := 'dg4mqdepdblink';
```

```

-- Open the queue 'YOUR_QUEUE_NAME' for sending.
PGM.MQOPEN(objdesc, PGM_SUP.MQOO_OUTPUT, objectHandle);

-- Put the message buffer on the queue.
message := '01020304050607080900';

PGM.MQPUT(objectHandle, msgDesc, putOptions, message);

-- Print the message we are putting on the queue
dbms_output.put_line('message put on queue = ' || rawtohex(message));

-- Close the queue again.

PGM.MQCLOSE(objectHandle, PGM_SUP.MQCO_NONE);

EXCEPTION

-- something else went wrong.. tell the user.

WHEN OTHERS THEN
    DBMS_OUTPUT.PUT_LINE('Error: Procedural Gateway for IBM MQSeries
verification script failed. ');
    DBMS_OUTPUT.PUT_LINE(SQLERRM);
    PGM.MQCLOSE(objectHandle, PGM_SUP.MQCO_NONE);

END;
/

```

PGM.MQPMO Type Definition

PGM.MQPMO is used to define the `mqpmo` argument of MQPUT. It specifies option and control information for processing a message.

You can use the default values for PGM.MQPMO fields or change the fields for the application requirements. For example, to change a field value:

```
mqpmo.field_name := field_value
```

where:

- `mqpmo` is the PGM.MQPMO data type and specifies option and control information about how the message is processed and put into a queue.
- `field_name` is a field name of the PGM.MQPMO type definition. You can set as many fields as necessary. Refer to [Table A-5](#) for field names and descriptions.
- `field_value` is the value to assign to `field_name`. You can specify a value or use a PGM_SUP constant to assign a value.

Table A-5 PGM.MQPMO Fields

Field Name	Description	PL/SQL Data Type	Initial Value
OPTIONS	Specifies options to control the MQPUT procedure. The field is set by adding one or more of the PGM_SUP definitions. Refer to "OPTIONS Field" on page A-22.	BINARY_INTEGER	PGM.MQPMO_SYNCPOINT (Messages placed on the queue are coordinated by the Oracle transaction coordinator.)
CONTEXT	Specifies the object handle of the input queue. It is only used when the OPTIONS field has the bit PGM_SUP.MQPMO_PASS_IDENTITY_CONTEXT or the bit PGM_SUP.MQPMO_PASS_ALL_CONTEXT set.	BINARY_INTEGER	Zero
RESOLVEDQNAME	Contains the resolved name of the destination queue. This is an output field set by the queue manager on return.	CHAR(48)	NULL
RESOLVEDQMGRNAME	Contains the resolved name of the queue manager for the queue name returned in the RESOLVEDQNAME field. This is an output field set by the queue manager on return.	CHAR(48)	NULL

PGM_SUP Package

PGM_SUP contains constant and exception definitions to use with the gateway procedures and PGM type definitions. Using these values requires extensive knowledge of MQI and WebSphere MQ programming in general. These definitions follow the MQI definition rules. For complete information about writing WebSphere MQ applications, refer to the *IBM MQSeries Application Programming Reference*.

PGM.MQGMO Values

The following sections provide information about PGM.MQGMO values.

OPTIONS Field

MQGMO_NO_WAIT	constant binary_integer := 0;
MQGMO_NONE	constant binary_integer := 0;
MQGMO_WAIT	constant binary_integer := 1;
MQGMO_SYNCPOINT	constant binary_integer := 2;
MQGMO_NO_SYNCPOINT	constant binary_integer := 4;
MQGMO_SET_SIGNAL	constant binary_integer := 8;
MQGMO_BROWSE_FIRST	constant binary_integer := 16;
MQGMO_BROWSE_NEXT	constant binary_integer := 32;
MQGMO_ACCEPT_TRUNCATED_MSG	constant binary_integer := 64;
MQGMO_MARK_SKIP_BACKOUT	constant binary_integer := 128;
MQGMO_MSG_UNDER_CURSOR	constant binary_integer := 256;
MQGMO_LOCK	constant binary_integer := 512;
MQGMO_UNLOCK	constant binary_integer := 1024;
MQGMO_BROWSE_MSG_UNDER_CURSOR	constant binary_integer := 2048;
MQGMO_SYNCPOINT_IF_PERSISTENT	constant binary_integer := 4096;
MQGMO_FAIL_IF QUIESCING	constant binary_integer := 8192;
MQGMO_CONVERT	constant binary_integer := 16384;
MQGMO_LOGICAL_ORDER	constant binary_integer := 32768;

```

MQGMO_COMPLETE_MSG          constant binary_integer := 65536;
MQGMO_ALL_MSGS_AVAILABLE   constant binary_integer := 131072;
MQGMO_ALL_SEGMENTS_AVAILABLE constant binary_integer := 262144;

```

VERSION Field

```

MQGMO_VERSION_1            constant binary_integer := 1;
MQGMO_CURRENT_VERSION      constant binary_integer := 1;
MQGMO_VERSION_2            constant binary_integer := 2;
MQGMO_VERSION_3            constant binary_integer := 3;

```

MATCHOPTIONS Field

```

MQMO_DEFAULT               constant binary_integer := 3;
MQMO_NONE                  constant binary_integer := 0;
MQMO_MATCH_MSG_ID         constant binary_integer := 1;
MQMO_MATCH_CORREL_ID      constant binary_integer := 2;
MQMO_MATCH_GROUP_ID       constant binary_integer := 4;
MQMO_MATCH_MSG_SEQ_NUMBER constant binary_integer := 8;
MQMO_MATCH_OFFSET         constant binary_integer := 16;
MQMO_MATCH_MSG_TOKEN      constant binary_integer := 32;

```

WAITINTERVAL

```

PGM_SUP.MQWI_UNLIMITED    CONSTANT BINARY_INTEGER := -1;
PGM_SUP.MQWI_UNITS        CONSTANT BINARY_INTEGER := 1000;

```

PGM.MQMD Values

The following sections provide information about PGM.MQOD values.

CODEDCHARSETID Field

```

PGM_SUP.MQCCSI_DEFAULT    CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQCCSI_Q_MGR      CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQCCSI_EMBEDDED   CONSTANT BINARY_INTEGER := -1;

```

ENCODING Field

```

PGM_SUP.
MQENC_NATIVE
  CONSTANT RAW(4) := '00000111';

```

ENCODING Field, Values for Binary Integers

```

PGM_SUP.MQENC_INTEGER_UNDEFINED CONSTANT RAW(4) := '00000000';
PGM_SUP.MQENC_INTEGER_NORMAL   CONSTANT RAW(4) := '00000001';
PGM_SUP.MQENC_INTEGER_REVERSED  CONSTANT RAW(4) := '00000002';

```

ENCODING Field, Values for Floating Point Numbers

```

PGM_SUP.MQENC_FLOAT_UNDEFINED   CONSTANT RAW(4) := '00000000';
PGM_SUP.MQENC_FLOAT_IEEE_NORMAL CONSTANT RAW(4) := '00000100';
PGM_SUP.MQENC_FLOAT_IEEE_REVERSED CONSTANT RAW(4) := '00000200';
PGM_SUP.MQENC_FLOAT_S390        CONSTANT RAW(4) := '00000300';

```

ENCODING Field, Mask Values

```

PGM_SUP.MQENC_INTEGER_MASK    CONSTANT RAW(4) := '0000000f';
PGM_SUP.MQENC_DECIMAL_MASK    CONSTANT RAW(4) := '000000f0';
PGM_SUP.MQENC_FLOAT_MASK      CONSTANT RAW(4) := '00000f00';
PGM_SUP.MQENC_RESERVED_MASK   CONSTANT RAW(4) := 'ffffff00';

```

ENCODING Field, Values for Packed Decimal Integers

```
PGM_SUP.MQENC_DECIMAL_UNDEFINED CONSTANT RAW(4) := '00000000';
PGM_SUP.MQENC_DECIMAL_NORMAL    CONSTANT RAW(4) := '00000010';
PGM_SUP.MQENC_DECIMAL_REVERSED  CONSTANT RAW(4) := '00000020';
```

EXPIRY Field

```
PGM_SUP.MQEI_UNLIMITED  CONSTANT BINARY_INTEGER := -1;
PGM_SUP.MQEI_MIN_EXPIRY CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQEI_UNITS      CONSTANT BINARY_INTEGER := 10;
```

FEEDBACK Field

```
PGM_SUP.MQFB_NONE                CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQFB_SYSTEM_FIRST        CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQFB_EXPIRATION          CONSTANT BINARY_INTEGER := 258;
PGM_SUP.MQFB_COA                 CONSTANT BINARY_INTEGER := 259;
PGM_SUP.MQFB_COD                 CONSTANT BINARY_INTEGER := 260;
PGM_SUP.MQFB_QUIT                CONSTANT BINARY_INTEGER := 256;
PGM_SUP.MQFB_CHANNEL_COMPLETED   CONSTANT BINARY_INTEGER := 262;
PGM_SUP.MQFB_CHANNEL_FAIL_RETRY  CONSTANT BINARY_INTEGER := 263;
PGM_SUP.MQFB_CHANNEL_FAIL        CONSTANT BINARY_INTEGER := 264;
PGM_SUP.MQFB_APPL_CANNOT_BE_STARTED CONSTANT BINARY_INTEGER := 265;
PGM_SUP.MQFB_TM_ERROR            CONSTANT BINARY_INTEGER := 266;
PGM_SUP.MQFB_APPL_TYPE_ERROR     CONSTANT BINARY_INTEGER := 267;
PGM_SUP.MQFB_STOPPED_BY_MSG_EXIT CONSTANT BINARY_INTEGER := 268;
PGM_SUP.MQFB_XMIT_Q_MSG_ERROR    CONSTANT BINARY_INTEGER := 271;
PGM_SUP.MQFB_SYSTEM_LAST         CONSTANT BINARY_INTEGER := 65535;
PGM_SUP.MQFB_APPL_FIRST          CONSTANT BINARY_INTEGER := 65536;
PGM_SUP.MQFB_APPL_LAST           CONSTANT BINARY_INTEGER := 999999999;
```

FORMAT Field

```
MQFMT_NONE          constant char(8) := '          ';
MQFMT_ADMIN         constant char(8) := 'MQADMIN  ';
MQFMT_CHANNEL_COMPLETED constant char(8) := 'MQCHCOM  ';
MQFMT_CICS          constant char(8) := 'MQCICS   ';
MQFMT_COMMAND_1    constant char(8) := 'MQCMD1   ';
MQFMT_COMMAND_2    constant char(8) := 'MQCMD2   ';
MQFMT_DEAD_LETTER_HEADER constant char(8) := 'MQDEAD   ';
MQFMT_DIST_HEADER  constant char(8) := 'MQHDIST  ';
MQFMT_EVENT        constant char(8) := 'MQEVENT  ';
MQFMT_IMS          constant char(8) := 'MQIMS    ';
MQFMT_IMS_VAR_STRING constant char(8) := 'MQIMSVS  ';
MQFMT_MD_EXTENSION constant char(8) := 'MQHMDE   ';
MQFMT_PCF          constant char(8) := 'MQPCF    ';
MQFMT_REF_MSG_HEADER constant char(8) := 'MQHREF   ';
MQFMT_STRING       constant char(8) := 'MQSTR    ';
MQFMT_TRIGGER      constant char(8) := 'MQTRIG   ';
MQFMT_WORK_INFO_HEADER constant char(8) := 'MQHWIH   ';
MQFMT_XMIT_Q_HEADER constant char(8) := 'MQXMIT   ';
```

MSGTYPE Field

```
PGM_SUP.MQMT_SYSTEM_FIRST CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQMT_REQUEST      CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQMT_REPLY        CONSTANT BINARY_INTEGER := 2;
PGM_SUP.MQMT_DATAGRAM     CONSTANT BINARY_INTEGER := 8;
PGM_SUP.MQMT_REPORT       CONSTANT BINARY_INTEGER := 4;
PGM_SUP.MQMT_SYSTEM_LAST  CONSTANT BINARY_INTEGER := 65535;
PGM_SUP.MQMT_APPL_FIRST   CONSTANT BINARY_INTEGER := 65536;
```



```
PGM_SUP.MQMT_APPL_LAST      CONSTANT BINARY_INTEGER := 999999999;
```

PERSISTENCE Field

```
PGM_SUP.MQPER_PERSISTENT      CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQPER_NOT_PERSISTENT  CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQPER_PERSISTENCE_AS_Q_DEF CONSTANT BINARY_INTEGER := 2;
```

PRIORITY Field

```
PGM_SUP.MQPRI_PRIORITY_AS_Q_DEF CONSTANT BINARY_INTEGER := -1;
PGM_SUP.MQPRI_MIN_PRIORITY      CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQPRI_MAX_PRIORITY      CONSTANT BINARY_INTEGER := 9;
```

PUTAPPLTYPE Field

```
MQAT_UNKNOWN      constant binary_integer := -1;
MQAT_NO_CONTEXT   constant binary_integer := 0;
MQAT_CICS         constant binary_integer := 1;
MQAT_MVS         constant binary_integer := 2;
MQAT_OS390       constant binary_integer := 2;
MQAT_IMS         constant binary_integer := 3;
MQAT_OS2         constant binary_integer := 4;
MQAT_DOS         constant binary_integer := 5;
MQAT_AIX         constant binary_integer := 6;
MQAT_UNIX        constant binary_integer := 6;
MQAT_QMGR        constant binary_integer := 7;
MQAT_OS400       constant binary_integer := 8;
MQAT_WINDOWS     constant binary_integer := 9;
MQAT_CICS_VSE    constant binary_integer := 10;
MQAT_WINDOWS_NT  constant binary_integer := 11;
MQAT_VMS         constant binary_integer := 12;
MQAT_GUARDIAN    constant binary_integer := 13;
MQAT_NSK         constant binary_integer := 13;
MQAT_VOS         constant binary_integer := 14;
MQAT_IMS_BRIDGE  constant binary_integer := 19;
MQAT_XCF         constant binary_integer := 20;
MQAT_CICS_BRIDGE constant binary_integer := 21;
MQAT_NOTES_AGENT constant binary_integer := 22;
MQAT_USER_FIRST  constant binary_integer := 65536;
MQAT_USER_LAST   constant binary_integer := 999999999;
MQAT_DEFAULT     constant binary_integer := 6;
```

REPORT Field

```
MQRO_NEW_MSG_ID      constant raw(4) := '00000000';
MQRO_COPY_MSG_ID_TO_CORREL_ID constant raw(4) := '00000000';
MQRO_DEAD_LETTER_Q   constant raw(4) := '00000000';
MQRO_NONE            constant raw(4) := '00000000';
MQRO_PAN             constant raw(4) := '00000001';
MQRO_NAN             constant raw(4) := '00000002';
MQRO_PASS_CORREL_ID  constant raw(4) := '00000040';
MQRO_PASS_MSG_ID     constant raw(4) := '00000080';
MQRO_COA             constant raw(4) := '00000100';
MQRO_COA_WITH_DATA   constant raw(4) := '00000300';
MQRO_COA_WITH_FULL_DATA constant raw(4) := '00000700';
MQRO_COD             constant raw(4) := '00000800';
MQRO_COD_WITH_DATA   constant raw(4) := '00001800';
MQRO_COD_WITH_FULL_DATA constant raw(4) := '00003800';
MQRO_EXPIRATION      constant raw(4) := '00200000';
```

```

MQRO_EXPIRATION_WITH_DATA      constant raw(4) := '00600000';
MQRO_EXPIRATION_WITH_FULL_DATA constant raw(4) := '00E00000';
MQRO_EXCEPTION                  constant raw(4) := '01000000';
MQRO_EXCEPTION_WITH_DATA        constant raw(4) := '03000000';
MQRO_EXCEPTION_WITH_FULL_DATA   constant raw(4) := '07000000';
MQRO_DISCARD_MSG                constant raw(4) := '08000000';

```

VERSION Field

```

MQMD_VERSION_1                  constant binary_integer := 1;
MQMD_VERSION_2                  constant binary_integer := 2;
MQMD_CURRENT_VERSION            constant binary_integer := 2;

```

Report Field, Mask Values

```

PGM_SUP.MQRO_REJECT_UNSUP_MASK  CONSTANT RAW(4) := '101c0000';
PGM_SUP.MQRO_ACCEPT_UNSUP_MASK  CONSTANT RAW(4) := 'efe000ff';
PGM_SUP.MQRO_ACCEPT_UNSUP_IF_XMIT_MASK CONSTANT RAW(4) := '0003ff00';

```

PGM.MQOD Values

The following sections provide information about PGM.MQOD values.

OBJECTTYPE Field

```

PGM_SUP.MQOT_Q                  CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQOT_PROCESS            CONSTANT BINARY_INTEGER := 3;
PGM_SUP.MQOT_Q_MGR              CONSTANT BINARY_INTEGER := 5;
PGM_SUP.MQOT_CHANNEL            CONSTANT BINARY_INTEGER := 6;

```

OBJECTTYPE Field, Extended Values

```

MQOT_ALL                        constant binary_integer := 1001;
MQOT_ALIAS_Q                    constant binary_integer := 1002;
MQOT_MODEL_Q                    constant binary_integer := 1003;
MQOT_LOCAL_Q                    constant binary_integer := 1004;
MQOT_REMOTE_Q                   constant binary_integer := 1005;
MQOT_SENDER_CHANNEL             constant binary_integer := 1007;
MQOT_SERVER_CHANNEL             constant binary_integer := 1008;
MQOT_REQUESTER_CHANNEL          constant binary_integer := 1009;
MQOT_RECEIVER_CHANNEL           constant binary_integer := 1010;
MQOT_CURRENT_CHANNEL            constant binary_integer := 1011;
MQOT_SAVED_CHANNEL              constant binary_integer := 1012;
MQOT_SVRCONN_CHANNEL            constant binary_integer := 1013;
MQOT_CLNTCONN_CHANNEL           constant binary_integer := 1014;

```

VERSION Field

```

MQOD_VERSION_1                  constant binary_integer := 1;
MQOD_VERSION_2                  constant binary_integer := 2;
MQOD_CURRENT_VERSION            constant binary_integer := 2;

```

PGM.MQPMO Values

The following sections provide information about PGM.MQPMO values.

OPTIONS Field

```

MQPMO_NONE                      constant binary_integer := 0;
MQPMO_SYNCPOINT                 constant binary_integer := 2;
MQPMO_NO_SYNCPOINT              constant binary_integer := 4;

```

MQPMO_DEFAULT_CONTEXT	constant binary_integer := 32;
MQPMO_NEW_MSG_ID	constant binary_integer := 64;
MQPMO_NEW_CORREL_ID	constant binary_integer := 128;
MQPMO_PASS_IDENTITY_CONTEXT	constant binary_integer := 256;
MQPMO_PASS_ALL_CONTEXT	constant binary_integer := 512;
MQPMO_SET_IDENTITY_CONTEXT	constant binary_integer := 1024;
MQPMO_SET_ALL_CONTEXT	constant binary_integer := 2048;
MQPMO_ALTERNATE_USER_AUTHORITY	constant binary_integer := 4096;
MQPMO_FAIL_IF QUIESCING	constant binary_integer := 8192;
MQPMO_NO_CONTEXT	constant binary_integer := 16384;
MQPMO_LOGICAL_ORDER	constant binary_integer := 32768;

VERSION Field

MQPMO_VERSION_1	constant binary_integer := 1;
MQPMO_VERSION_2	constant binary_integer := 2;
MQPMO_CURRENT_VERSION	constant binary_integer := 2;

MQCLOSE Values

The following sections provide information about MQCLOSE values.

***hobj* Argument**

PGM_SUP.MQHO_UNUSABLE_HOBJ CONSTANT BINARY_INTEGER := -1;

***options* Argument**

PGM_SUP.MQCO_NONE	CONSTANT BINARY_INTEGER := 0;
PGM_SUP.MQCO_DELETE	CONSTANT BINARY_INTEGER := 1;
PGM_SUP.MQCO_DELETE_PURGE	CONSTANT BINARY_INTEGER := 2;

MQOPEN Values

The following sections provide information about MQOPEN values.

***options* Argument**

MQOO_BIND_AS_Q_DEF	constant binary_integer := 0;
MQOO_INPUT_AS_Q_DEF	constant binary_integer := 1;
MQOO_INPUT_SHARED	constant binary_integer := 2;
MQOO_INPUT_EXCLUSIVE	constant binary_integer := 4;
MQOO_BROWSE	constant binary_integer := 8;
MQOO_OUTPUT	constant binary_integer := 16;
MQOO_INQUIRE	constant binary_integer := 32;
MQOO_SET	constant binary_integer := 64;
MQOO_SAVE_ALL_CONTEXT	constant binary_integer := 128;
MQOO_PASS_IDENTITY_CONTEXT	constant binary_integer := 256;
MQOO_PASS_ALL_CONTEXT	constant binary_integer := 512;
MQOO_SET_IDENTITY_CONTEXT	constant binary_integer := 1024;
MQOO_SET_ALL_CONTEXT	constant binary_integer := 2048;
MQOO_ALTERNATE_USER_AUTHORITY	constant binary_integer := 4096;
MQOO_FAIL_IF QUIESCING	constant binary_integer := 8192;
MQOO_BIND_ON_OPEN	constant binary_integer := 16384;
MQOO_BIND_NOT_FIXED	constant binary_integer := 32768;
MQOO_RESOLVE_NAMES	constant binary_integer := 65536;

Maximum Lengths for Fields of PGM Type Definitions

These constants contain the maximum lengths allowed for fields used by the PGM Type Definitions. For example, the constant PGM_SUP.MQ_ACCOUNTING_TOKEN_LENGTH specifies that the maximum length for PGM.MQMD.ACCOUNTINGTOKEN is 32 characters.

```

MQ_ABEND_CODE_LENGTH          constant binary_integer := 4;
MQ_ACCOUNTING_TOKEN_LENGTH    constant binary_integer := 32;
MQ_APPL_IDENTITY_DATA_LENGTH  constant binary_integer := 32;
MQ_APPL_ORIGIN_DATA_LENGTH    constant binary_integer := 4;
MQ_ATTENTION_ID_LENGTH        constant binary_integer := 4;
MQ_AUTHENTICATOR_LENGTH       constant binary_integer := 8;
MQ_CANCEL_CODE_LENGTH         constant binary_integer := 4;
MQ_CLUSTER_NAME_LENGTH        constant binary_integer := 48;
MQ_CORREL_ID_LENGTH           constant binary_integer := 24;
MQ_CREATION_DATE_LENGTH       constant binary_integer := 12;
MQ_CREATION_TIME_LENGTH       constant binary_integer := 8;
MQ_DATE_LENGTH                constant binary_integer := 12;
MQ_EXIT_NAME_LENGTH           constant binary_integer := 128;
MQ_FACILITY_LENGTH            constant binary_integer := 8;
MQ_FACILITY_LIKE_LENGTH       constant binary_integer := 4;
MQ_FORMAT_LENGTH              constant binary_integer := 8;
MQ_FUNCTION_LENGTH            constant binary_integer := 4;
MQ_GROUP_ID_LENGTH            constant binary_integer := 24;
MQ_LTERM_OVERRIDE_LENGTH      constant binary_integer := 8;
MQ_MFS_MAP_NAME_LENGTH        constant binary_integer := 8;
MQ_MSG_HEADER_LENGTH          constant binary_integer := 4000;
MQ_MSG_ID_LENGTH              constant binary_integer := 24;
MQ_MSG_TOKEN_LENGTH           constant binary_integer := 16;
MQ_NAMELIST_DESC_LENGTH       constant binary_integer := 64;
MQ_NAMELIST_NAME_LENGTH       constant binary_integer := 48;
MQ_OBJECT_INSTANCE_ID_LENGTH  constant binary_integer := 24;
MQ_NAME_LENGTH                constant binary_integer := 48;
MQ_PROCESS_APPL_ID_LENGTH     constant binary_integer := 256;
MQ_PROCESS_DESC_LENGTH        constant binary_integer := 64;
MQ_PROCESS_ENV_DATA_LENGTH    constant binary_integer := 128;
MQ_PROCESS_NAME_LENGTH        constant binary_integer := 48;
MQ_PROCESS_USER_DATA_LENGTH   constant binary_integer := 128;
MQ_PUT_APPL_NAME_LENGTH       constant binary_integer := 28;
MQ_PUT_DATE_LENGTH            constant binary_integer := 8;
MQ_PUT_TIME_LENGTH            constant binary_integer := 8;
MQ_Q_DESC_LENGTH              constant binary_integer := 64;
MQ_Q_MGR_DESC_LENGTH          constant binary_integer := 64;
MQ_Q_MGR_IDENTIFIER_LENGTH    constant binary_integer := 48;
MQ_Q_MGR_NAME_LENGTH          constant binary_integer := 48;
MQ_Q_NAME_LENGTH              constant binary_integer := 48;
MQ_REMOTE_SYS_ID_LENGTH       constant binary_integer := 4;
MQ_SERVICE_NAME_LENGTH        constant binary_integer := 32;
MQ_SERVICE_STEP_LENGTH        constant binary_integer := 8;
MQ_START_CODE_LENGTH          constant binary_integer := 4;
MQ_STORAGE_CLASS_LENGTH       constant binary_integer := 8;
MQ_TIME_LENGTH                constant binary_integer := 8;
MQ_TRAN_INSTANCE_ID_LENGTH    constant binary_integer := 16;
MQ_TRANSACTION_ID_LENGTH      constant binary_integer := 4;
MQ_TP_NAME_LENGTH             constant binary_integer := 64;
MQ_TRIGGER_DATA_LENGTH        constant binary_integer := 64;
MQ_USER_ID_LENGTH             constant binary_integer := 12;

```

Error Code Definitions

Error Code -29400: Data Cartridge Error

This error code indicates that the MQI opcode implemented in OG4MQ fails. Refer to IBM WebSphere reference manual for information about the cause by looking up the opcode and its completion code and reason code.

MQI opcode failed. completion code=xxxx. reason code=xxxx.

Example A-3 test.sql

```
--
-- Copyright Oracle, 2005 All Rights Reserved.
--
-- NAME
--   test.sql
--
-- DESCRIPTION
--
--   Specify the database link name you created for the gateway. To do this,
--   replace the database link name 'YOUR_DBLINK_NAME' with the dblink name
--   you chose when the database link was created.
--
--   This script performs a test run for the MQSeries gateway. In this
--   script the queue name is 'YOUR_QUEUE_NAME', replace queue name with
--   a valid queue name at the queue manager the gateway is configured
--   for.
--
--   First the script puts a raw message of 10 bytes on the specified
--   queue.
--
--   When successfully completed the put operation, the script does a
--   get on the same queue to read the message back.
--
--   The contents of both messages put and retrieved from the queue are
--   printed to standard out for verification by the user.
--
-- NOTES
--   Run the script from the SQL*Plus command line.
--
--   Make the sure the user is granted 'EXECUTE' on package dbms_output
--
set serveroutput on

declare

  objdesc   PGM.MQOD;
  hobj      PGM.MQOH;
  msgdesc   PGM.MQMD;
  putmsgopts PGM.MQPMO;
  getmsgopts PGM.MQGMO;
  options   binary_integer;
  putbuffer raw(10) := '10203040506070809000';
  getbuffer raw(10);

begin

  --
  -- Print the message we are putting on the queue
```

```
--  
  
dbms_output.put_line('message put on queue = ' || rawtohex(putbuffer));  
  
--  
-- Specify queue name and dblink name (replace with proper names).  
--  
objdesc.objectname := 'YOUR_QUEUE_NAME';  
objdesc.dblinkname := 'YOUR_DBLINK_NAME';  
  
--  
-- Specify a put operation.  
--  
  
options := pgm_sup.MQOO_OUTPUT;  
  
--  
-- Open the queue.  
--  
  
PGM.MQOPEN(objdesc, options, hobj);  
  
--  
-- Put the message buffer on the queue.  
--  
  
PGM.MQPUT(hobj, msgdesc, putmsgopts, putbuffer);  
  
--  
-- Define close options.  
--  
  
options := pgm_sup.MQCO_NONE;  
  
--  
-- Close queue.  
--  
  
PGM.MQCLOSE(hobj, options);  
  
--  
-- Specify a get operation.  
--  
  
options := pgm_sup.MQOO_INPUT_AS_Q_DEF;  
  
--  
-- Open queue.  
--  
  
PGM.MQOPEN(objdesc, options, hobj);  
  
--  
-- Get message from the queue.  
--  
  
getmsgopts.msglength := 10;  
PGM.MQGET(hobj, msgdesc, getmsgopts, getbuffer);  
  
--
```

```
-- Define close options.
--

options := pgm_sup.MQCO_NONE;

--
-- Close the queue again.
--

PGM.MQCLOSE(hobj, options);

--
-- Print the result
--

dbms_output.put_line('message read back = ' || rawtohex(getbuffer));

exception

--
-- When no more messages... tell the user and close the queue.
--

when pgm_sup.NO_MORE_MESSAGES then
    dbms_output.put_line('Warning: No message found on the queue');
    options := pgm_sup.MQCO_NONE;
    PGM.MQCLOSE(hobj, options);

--
-- something else went wrong.. tell the user.
--

when others then
    dbms_output.put_line('Error: Procedural Gateway for IBM MQSeries verification
script failed. ');
    dbms_output.put_line(SQLERRM);

end;
/
```

UTL_RAW Package

Use the Oracle Visual Workbench for developing applications that access WebSphere MQ through the gateway. The Oracle Visual Workbench defines an interface for accessing WebSphere MQ and automatically generates the PL/SQL code (the MIP) for Oracle applications to interface with the gateway. Refer to the *Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide for Microsoft Windows (32-Bit)* for more information about Oracle Visual Workbench. This appendix includes the following sections:

- [Message Data Types](#) on page B-1
- [UTL_RAW Functions](#) on page B-1

Message Data Types

Messages sent to a WebSphere MQ queue or retrieved from a WebSphere MQ queue are transferred as untyped data by the MIP procedures. When data profiles are defined in the MIP, the MIP converts message data from Oracle data types to target data types that the receiving application understands. The message data is packed into a buffer of the RAW data type before being sent to the WebSphere MQ queue. The same conversion process applies when receiving a message. The MIP unpacks the message from the buffer and converts it to specified Oracle data types.

The MIP uses the functions of the UTL_RAW package to perform the message data conversions. The UTL_RAW package is a PL/SQL package that contains procedures for converting and packing message data which is sent back and forth through the WebSphere MQ queues using the RAW data type and PL/SQL data types.

When necessary, you can enhance the message data conversions in the generated MIP with the UTL_RAW functions. When no data profiles are defined in the MIP, you can create your own data conversion procedures with UTL_RAW functions, calling these functions before sending a message and immediately after receiving a message.

The UTL_RAW package is not included with the gateway. It is shipped with each Oracle database. Refer to your Oracle DBA for information about installing the UTL_RAW package.

UTL_RAW Functions

The UTL_RAW functions are called with the following syntax:

```
UTL_RAW.function(arg1, arg2, ...)
```

The function name, arguments, their Oracle data types, and the return value data type are provided with each function description in this appendix. For ease of description,

the functions are described with PL/SQL syntax that shows the resulting function value placed in a variable as follows:

```
result := UTL_RAW.function(arg1, arg2, ...);
```

However, the function can also be used as a component in a PL/SQL expression. For example, the function takes two characters strings, *Hello* and *world!*, converts them to raw message data with `UTL_RAW.CAST_TO_RAW`, concatenates them with `UTL_RAW.CONCAT`, and uses the gateway to send them to a WebSphere MQ queue. The same message is retrieved from the queue, converted to a character data type with `UTL_RAW.CAST_TO_VARCHAR2`, and then printed.

UTL_RAW.TO_RAW

`PGM_UTL.TO_RAW` converts values of the `PGM.MQOD`, `PGM.MQMD`, `PGM.MQPMO` and `PGM.MQGMO` object to into raw values.

Syntax

```
result := PGM_UTL.TO_RAW(input);
```

where:

- *result* is a variable that holds the output value of the function. It is of the RAW data type.
- *input* is the input value of the `PGM.MQOD`, `PGM.MQMD`, `PGM.MQPMO` or `PGM.MQGMO` data type objects that is converted to raw data.

UTL_RAW.BIT_AND

`UTL_RAW.BIT_AND` performs a bitwise logical AND operation on two raw values. If the values have different lengths, then the AND operation is terminated after the last byte of the shorter of the two values. The unprocessed portion of the longer value is appended to the partial result to produce the final result. The length of the resulting value equals the longer of the two input values.

Syntax

```
result := UTL_RAW.BIT_AND(input1, input2);
```

where:

- *result* is the variable that holds the output value of the function. It is data type RAW. The value is null if *input1* or *input2* is null.
- *input1* is an input value of data type RAW to `BIT_AND` with *input2*.
- *input2* is an input value of data type RAW to `BIT_AND` with *input1*.

UTL_RAW.BIT_COMPLEMENT

`UTL_RAW.BIT_COMPLEMENT` performs a bitwise logical COMPLEMENT operation of a raw value. The length of the resulting value equals the length of the input value.

Syntax

```
result := UTL_RAW.BIT_COMPLEMENT(input);
```

where:

- `result` is the variable that holds the output value of the function. It is of RAW data type. The value is null if `input` is null.
- `input` is an input value of the RAW data type on which to perform the COMPLEMENT operation.

UTL_RAW.BIT_OR

UTL_RAW.BIT_OR performs a bitwise logical OR operation of two raw values. If the values have different lengths, then the OR operation is terminated after the last byte of the shorter of the two values. The unprocessed portion of the longer value is appended to the partial result to produce the final result. The length of the resulting value equals the length of the longer of the two input values.

Syntax

```
result := UTL_RAW.BIT_OR(input1, input2);
```

where:

- `result` is the variable that holds the output value of the function. It is of the data type RAW. The value is null if `input1` or `input2` is null.
- `input1` is an input value of the RAW data type to BIT_OR with `input2`.
- `input2` is an input value of the RAW data type to BIT_OR with `input1`.

UTL_RAW.BIT_XOR

UTL_RAW.BIT_XOR performs a bitwise logical EXCLUSIVE OR operation of two raw values. If the values have different lengths, then the EXCLUSIVE OR operation is terminated after the last byte of the shorter of the two values. The unprocessed portion of the longer value is appended to the partial result to produce the final result. The length of the resulting value equals the longer of the two input values.

Syntax

```
result := UTL_RAW.BIT_XOR(input1, input2);
```

where:

- `result` is the variable that holds the output value of the function. It is data type RAW. The value is null if `input1` or `input2` is null.
- `input1` is an input value of the RAW data type to EXCLUSIVE OR with `input2`.
- `input2` is an input value of the RAW data type to EXCLUSIVE OR with `input1`.

UTL_RAW.CAST_TO_RAW

UTL_RAW.CAST_TO_RAW converts a value of data type VARCHAR2 into a raw value with the same number of bytes. The input value is treated as if it were composed of single 8-bit bytes, not characters. Multibyte character boundaries are ignored. The data is not modified in any way, it is only changed to data type RAW.

Syntax

```
result := UTL_RAW.CAST_TO_RAW(input);
```

where:

- `result` is the variable that holds the output value of the function. It is data type RAW. The value is null if `input` is null.
- `input` is the input value of the VARCHAR2 data type to convert to raw data.

UTL_RAW.CAST_TO_VARCHAR2

UTL_RAW.CAST_TO_VARCHAR2 converts a raw value into a value of data type VARCHAR2 with the same number of data bytes. The result is treated as if it were composed of single 8-bit bytes, not characters. Multibyte character boundaries are ignored. The data is not modified in any way, it is only changed to data type VARCHAR2.

Syntax

```
result := UTL_RAW.CAST_TO_VARCHAR2(input);
```

where:

- `result` is the variable that holds the output value of the function. It is data type VARCHAR2. The value is null if `input` is null.
- `input` is the input value of the RAW data type to convert to data type VARCHAR2.

UTL_RAW.COMPARE

UTL_RAW.COMPARE compares one raw value to another raw value. If they are identical, then UTL_RAW.COMPARE returns 0. If they are not identical, then COMPARE returns the position of the first byte that does not match. If the input values have different lengths, then the shorter input value is padded on the right by a value that you specify.

Syntax

```
result := UTL_RAW.COMPARE(input1, input2[, pad]);
```

where:

- `result` is the variable that holds the output value of the function. It is of data type NUMBER. A value of 0 is returned if the values of `input1` and `input2` are null or identical or the position, numbered from 1, of the first mismatched byte.
- `input1` is the first input value of the RAW data type to compare.
- `input2` is the second input value of the RAW data type to compare.
- `pad` is a single byte value used to pad the shorter input value. The default is X'00'.

UTL_RAW.CONCAT

UTL_RAW.CONCAT concatenates a set of up to 12 raw values into a single raw value. The values are appended together, left to right, in the order that they appear in the parameter list. Null input values are skipped, and the concatenation continues with the next non-null value.

If the sum of the lengths of the input values exceeds 32 767 bytes, then a VALUE_ERROR exception is raised.

Syntax

```
result := UTL_RAW.CONCAT(input1, ... input12);
```

where:

- `result` is the variable that holds the output value of the function. It is data type RAW.
- `input1 . . . input12` are the input values of RAW data type to concatenate.

UTL_RAW.CONVERT

UTL_RAW.CONVERT converts a raw value to a different character set A VALUE_ERROR exception is raised for any of the following conditions:

- The input value is null or 0 in length
- One or both of the specified character sets is missing, null, or 0 in length
- The character set names are invalid or unsupported by the Oracle database

Syntax

```
result := UTL_RAW.CONVERT(input, new_charset, old_charset);
```

where:

- `result` is the variable that holds the output value of the function. It is of the RAW data type.
- `input` is the input value of the RAW data type to convert.
- `new_charset` is the Globalization Support character set to convert `input` to.
- `old_charset` is the Globalization Support character set that input is currently using.

UTL_RAW.COPIES

UTL_RAW.COPIES returns one or more copies of a value. The values are concatenated together. A VALUE_ERROR exception is raised for any of the following conditions:

- The input value is null or has a length of 0
- A negative number of copies is specified
- The length of the result exceeds 32 767 bytes

Syntax

```
result := UTL_RAW.COPIES(input, number);
```

where:

- `result` is the variable that holds the output value of the function. It is of the RAW data type.
- `input` is a value of the RAW data type to copy.
- `number` is the number of times to copy input. It must be a positive value.

UTL_RAW.LENGTH

UTL_RAW.LENGTH returns the length, in bytes, of a raw value.

Syntax

```
result := UTL_RAW.LENGTH(input);
```

where:

- `result` is the output value of the function. It is of the `NUMBER` data type.
- `input` is the input value of the `RAW` data type to evaluate.

UTL_RAW.OVERLAY

`UTL_RAW.OVERLAY` replaces a portion of a raw value with a new string of raw data. If the new data is shorter than the length of the overlay area, then the new data is padded to make it long enough. If the new data is longer than the overlay area, then the extra bytes are ignored. If you specify an overlay area that exceeds the length of the input value, then the input value is extended according to the length specified. If you specify a starting position for the overlay area that exceeds the length of the input value, then the input value is padded to the position specified, and then the input value is further extended with the new data.

A `VALUE_ERROR` exception is raised for any of the following conditions:

- The new data used to overlay the input value is null or has a length of 0
- The portion of the input value to overlay is not defined
- The length of the portion to overlay exceeds 32 767 bytes
- The number of bytes to overlay is defined as less than 0
- The position within the input value to begin the overlay operation is defined as less than 1

Syntax

```
result := UTL_RAW.OVERLAY(new_bytes, input, position, length, pad);
```

where:

- `result` is the variable that holds the output value of the function. It is of the `RAW` data type.
- `new_bytes` is the new value, a byte string of the `RAW` data type, to overlay input with. Bytes are selected from `new_bytes` beginning with the leftmost byte.
- `input` is the input value of data type `RAW` to overlay.
- `position` is the position within input, numbered from 1, at which to begin overlaying. This value must be greater than 0. The default is 1.
- `length` is the number of bytes to overlay. This must be greater than, or equal to, 0. The default is the length of `new_bytes`.
- `pad` is a single byte value used to pad when length exceeds the overlay length or when position exceeds the length of `input`. The default is `X'00'`.

UTL_RAW.REVERSE

`UTL_RAW.REVERSE` reverses the byte sequence of a raw value from end-to-end. For example, this function reverses `X'0102F3'` to `X'F30201'` or `xyz` to `zyx`. The length of the resulting value is the same length as the input value. A `VALUE_ERROR` exception is raised if the input value is null or has a length of 0.

Syntax

```
result := UTL_RAW.REVERSE(input);
```

where:

- `result` is the output value of the function. It is of the RAW data type.
- `input` is the input value of the RAW data type to be reversed.

UTL_RAW.SUBSTR

UTL_RAW.SUBSTR removes bytes from a raw value. If you specify a positive number as the starting point for the bytes to remove, then SUBSTR counts from the beginning of the input value to find the first byte. If you specify a negative number, then UTL_RAW.SUBSTR counts backwards from the end of the input value to find the first byte.

A VALUE_ERROR exception is raised for any of the following conditions:

- The position to begin the removal is specified as 0
- The number of bytes to remove is specified as less than 0

Syntax

```
result := UTL_RAW.SUBSTR(input, position[, length]);
```

where:

- `result` is the variable that holds the output value of the function. It is of the RAW data type. The value is the specified byte or bytes from `input`, or the value is a null value if `input` is null.
- `input` is the input value of the RAW data type from which to extract a portion of its bytes.
- `position` is the byte position from which to start extraction. This value cannot be 0. If the value of `position` is negative, then SUBSTR counts backwards from the end of input.
- `length` is the number of bytes to extract from `input` after `position`. This value must be greater than 0. When not specified, all bytes to the end of input are returned.

UTL_RAW.TRANSLATE

UTL_RAW.TRANSLATE changes the value of some of the bytes in a raw value according to a scheme that you specify. Bytes in the input value are compared to a matching string, and when found to match, the byte at the same position in the replacement string is copied to the result. It is omitted from the result if the offset exceeds the length of the replacement string. Bytes in the input value that do not appear in the matching string are copied to the resulting value. Only the leftmost occurrence of a byte in the matching string is used, and subsequent duplicate occurrences are ignored.

If the matching string contains more bytes than the replacement string, then the extra bytes at the end of the matching string have no corresponding bytes in the replacement string. Any bytes in the input value that match such bytes are omitted from the resulting value.

A VALUE_ERROR exception is raised for any of the following conditions:

- The input value is null or has a length of 0
- The matching string is null or has a length of 0
- The replacement string is null or has a length of 0

Syntax

```
result := UTL_RAW.TRANSLATE(input, match, replace_bytes);
```

where:

- `result` is the variable that holds the output value of the function. It is of data type RAW.
- `input` is the input value of data type RAW to change.
- `match` specifies the byte 0codes to search for in `input` and to change to `replace_bytes`. It is of data type RAW.
- `replace_bytes` specifies the byte codes that replace the codes specified by `match`. It is of data type RAW.

UTL_RAW.TRANSLITERATE

UTL_RAW.TRANSLITERATE replaces all occurrences of any bytes in a matching string with the corresponding bytes of a replacement string. Bytes in the input value are compared to the matching string, and if they are not found, then they are copied unaltered to the resulting value. If they are found, then they are replaced in the resulting value by the byte at the same offset in the replacement string, or with the pad byte that you specify when the offset exceeds the length of the replacement string. Only the leftmost occurrence of a byte in the matching string is used. Subsequent duplicate occurrences are ignored. The result value of UTL_RAW.TRANSLITERATE is always the same length as the input value.

If the replacement string is shorter than the matching string, then the pad byte is placed in the resulting value when a selected matching string byte has no corresponding byte in the replacement string. A VALUE_ERROR exception is raised when the input value is null or has a length of 0.

UTL_RAW.TRANSLITERATE differs from UTL_RAW.TRANSLATE in the following ways:

- Bytes in the input value that are undefined in the replacement string are padded with a value that you specify
- The resulting value is always the same length as the input value

Syntax

```
result := UTL_RAW.TRANSLITERATE (input, replace_bytes, match, pad);
```

where:

- `Result` is the output value of the function. It is data type RAW.
- `Input` is the input value of data type RAW to change.
- `Replace_bytes` specifies the byte codes to which corresponding bytes of match are changed. This value can be any length that is valid for the RAW data type. The default is a null value and effectively extends with pad to the length of match as necessary.
- `Match` specifies the byte codes to match in `input`. The value can be any length that is valid for the RAW data type. The default is X'00' through X'FF'.
- `Pad` is a single byte value that is used to extend the length of `replace_bytes` when `replace_bytes` is shorter than `match`. The default is X'00'.

UTL_RAW.TRANSLATE differs from the UTL_RAW.TRANSLITERATE function in the following ways:

- The raw values used for the matching and replacement strings have no default values
- Bytes in the input value that are undefined in the replacement string are omitted in the resulting value
- The resulting value can be shorter than the input value

UTL_RAW.XRANGE

UTL_RAW.XRANGE returns a raw value containing all valid one-byte codes within a range that you specify. If the starting byte value is greater than the ending byte value, then the succession of resulting bytes begin with the starting byte, wrapping from X'FF' to X'00', and end at the ending byte.

When specified, the values for the starting and ending bytes must be single-byte raw values.

Syntax

```
result := UTL_RAW.XRANGE(start, end);
```

where:

- *result* is the output value of the function. It is of data type RAW.
- *start* is a single byte code to start with. The default is X'00'.
- *end* is a single byte code to end with. The default is X'FF'.

Gateway Initialization Parameters

The gateway has its own initialization parameters, which are described in this appendix, and supports the initialization parameters for Oracle Database Gateways.

This appendix contains the following sections:

- [Gateway Initialization File](#) on page C-1
- [Gateway Parameters](#) on page C-1

Gateway Initialization File

The gateway initialization file is called `initsid.ora`. A default initialization file is created in the directory `ORACLE_HOME\dg4mq\admin` on Microsoft Windows and `ORACLE_HOME/dg4mq/admin` on UNIX based systems during the installation of the Oracle Database Gateway for WebSphere MQ.

Gateway Parameters

This section describes gateway parameters, listing the default value, range of values, and the syntax for usage. This section describes the following parameters:

- `LOG_DESTINATION`
- `AUTHORIZATION_MODEL`
- `QUEUE_MANAGER`
- `TRACE_LEVEL`
- `TRANSACTION_LOG_QUEUE`
- `TRANSACTION_MODEL`
- `TRANSACTION_RECOVERY_PASSWORD`
- `TRANSACTION_RECOVERY_USER`

LOG_DESTINATION

The following table describes the `LOG_DESTINATION` parameter:

LOG_DESTINATION	Use
Syntax	<code>LOG_DESTINATION = log_file</code>
Default value	<code>SID_agt_PID.trc</code> (PID is the process ID of the gateway)
Range of values	None

LOG_DESTINATION specifies the full path name of the gateway log file.

AUTHORIZATION_MODEL

The following table describes how to use the AUTHORIZATION_MODEL parameter:

AUTHORIZATION_MODEL	Use
Syntax	AUTHORIZATION_MODEL = {RELAXED STRICT}
Default value	RELAXED
Range of values	RELAXED or STRICT

AUTHORIZATION_MODEL defines the authorization model for the gateway user. The relaxed model specifies that authorizations that are granted to the effective user ID of the gateway by the queue manager are the only associations that an Oracle application has.

The strict model specifies that the Oracle user ID and password (that are provided when a database link is created), or the current user ID and password (when the Oracle user ID and password are not provided), should be checked against the local or network password file.

Refer to "[Security Models](#)" on page 8-1 for more information about effective user IDs.

QUEUE_MANAGER

The following table describes the QUEUE_MANAGER parameter:

QUEUE_MANAGER	Use
Syntax	QUEUE_MANAGER = <i>manager_name</i>
Default value	None
Range of values	None

QUEUE_MANAGER, a required parameter, specifies the name of the queue manager that the gateway connects to at logon time. The effective user ID of the gateway should have the correct user privileges or should be authorized to connect to this queue manager. Specify *manager_name* using the following rules:

- 1 to 48 alphanumeric characters in length
- No leading or embedded blank characters
- Trailing blank characters are permitted

Refer to "[Security Models](#)" on page 8-1 for more information about effective user IDs.

TRACE_LEVEL

The following table describes the TRACE_LEVEL parameter:

TRACE_LEVEL	Use
Syntax	TRACE_LEVEL = <i>level</i>
Default value	0
Range of values	0 to 7

`TRACE_LEVEL` controls whether tracing information is collected as the gateway runs. When set to collect information, the trace data is written to the log file that is specified by the `LOG_DESTINATION` parameter. Specify *level* as an integer from 0 to 3, which is the sum of the desired trace values. The following table describes the significance of these values:

Trace Level	Description
0	Specifies that no tracing is to be done.
1	Specifies that general tracing is to be done. This includes the user ID that is used to log on to the WebSphere MQ queue manager, the name of the queue manager, the gateway transaction mode, security mode, and so on.
2	Specifies that tracing is to be done for all MQI calls that are issued by the gateway.
3	Specifies that tracing is to be done for all parameter values that are passed to, or received from, the MQI calls that were issued by the gateway.

For more information about MQI calls.

See Also: Refer to IBM publications, for more information about MQI calls.

TRANSACTION_LOG_QUEUE

The following table describes how to use `TRANSACTION_LOG_QUEUE`.

TRANSACTION_LOG_QUEUE	Description
Syntax	<code>TRANSACTION_LOG_QUEUE = tx_queue_name</code>
Default value	None
Range of values	None

`TRANSACTION_LOG_QUEUE` specifies the name of the queue for logging transaction IDs. Specify *tx_queue_name* using the following rules:

- 1 to 48 alphanumeric characters in length
- No leading or embedded blank characters
- Trailing blank characters are permitted

Refer to "[Creating a Transaction Log Queue](#)" on page 7-10 for more information.

TRANSACTION_MODEL

The following table describes how to use `TRANSACTION_MODEL`.

TRANSACTION_MODEL	Description
Syntax	<code>TRANSACTION_MODEL = {COMMIT_CONFIRM SINGLE_SITE}</code>
Default value	<code>SINGLE_SITE</code>
Range of values	<code>COMMIT_CONFIRM</code> or <code>SINGLE_SITE</code>

TRANSACTION_MODEL defines the transaction mode of the gateway. Specify a value for TRANSACTION_MODEL as described in the following table:

Item	Description
COMMIT_CONFIRM	Specifies that the gateway can participate in transactions when queues belonging to the same WebSphere queue manager are updated. At the same time, any number of Oracle databases are updated. Only one gateway with the commit-confirm model can join the distributed transaction, because the gateway operates as the focal point of the transaction. When this value is specified, you must also set the RECOVERY_USER, RECOVERY_PASSWORD, and TRANSACTION_LOG_QUEUE parameters.
SINGLE_SITE	Specifies that the gateway can participate in a transaction only when queues belonging to the same WebSphere queue manager are updated. An Oracle application can select, but not update, data at any Oracle database within the same transaction that accesses WebSphere MQ.

TRANSACTION_RECOVERY_PASSWORD

The following table describes TRANSACTION_RECOVERY_PASSWORD.

TRANSACTION_RECOVERY_PASSWORD	Description
Default value	*
Range of values	An asterisk (*), which indicates that the parameter must be encrypted, or any valid password
Syntax	TRANSACTION_RECOVERY_PASSWORD = rec_ password or TRANSACTION_RECOVERY_PASSWORD = *

TRANSACTION_RECOVERY_PASSWORD specifies the password of the user that the gateway uses to start recovery of a transaction. The default value is set to an asterisk (*), and this asterisk indicates that the value of this parameter is stored in an encrypted form in a separate password file. To specify or change a valid password for encrypted gateway parameters, you need to use the dg4pwd gateway utility to do the work. For more information, refer to ["Using the dg4pwd Utility"](#).

The TRANSACTION_RECOVERY_PASSWORD parameter is required only when TRANSACTION_MODEL is set to COMMIT_CONFIRM. Refer to ["Creating a Transaction Log Queue"](#) on page 7-10 for more information.

Passwords in the Gateway Initialization File

The gateway uses user IDs and passwords to access information in the remote database on the WebSphere MQ server. Some user IDs and passwords must be defined in the gateway initialization file to handle functions such as resource recovery. In a security-conscious environment, plain-text passwords are regarded as insecure when they are accessible in the initialization file. A new encryption feature has been added to the gateway to make such passwords more secure. The dg4pwd utility can be used to encrypt passwords that would normally be stored in the gateway initialization file. Using this feature is optional, but highly recommended by Oracle. With this feature,

passwords are no longer stored in the initialization file but are stored in a password file in an encrypted form. This makes the password information more secure. The following section describes how to use this feature.

Using the dg4pwd Utility

The dg4pwd utility is used to encrypt passwords that would normally be stored in the gateway initialization file. The utility works by reading the initialization file and looks for parameters with a special value. The value is the asterisk (*). The asterisk indicates that the value of this parameter is stored in an encrypted form in another file. The following sample is a section of the initialization file with this value.

TRANSACTION_RECOVERY_PASSWORD=*

The initialization file is first edited to set the value of the parameter to the asterisk (*). Then the dg4pwd utility is run, specifying the gateway SID on the command line. The utility reads the initialization file and prompts the user to enter the values to be encrypted.

The syntax of this command is:

```
dg4pwd gateway_sid
```

In this command, *gateway_sid* is the SID of the gateway.

The following is an example, assuming that the gateway SID is dg4mqs:

```
% dg4pwd dg4mqs
ORACLE Gateway Password Utility (dg4mqseries) Constructing password file for
Gateway SID dg4mqs
Enter the value for TRANSACTION_RECOVERY_PASSWORD
welcome
%
```

In this example, the TRANSACTION_RECOVERY_PASSWORD parameter is identified as requiring encryption. The user enters the value (for example, welcome) and presses the Enter key. If more parameters require encryption, then you are prompted for their values. The encrypted data is stored in the dg4mq\admin directory on Microsoft Windows and dg4mq/admin directory on UNIX based systems.

Note: It is important that the ORACLE_HOME environment variable specifies the correct gateway home to ensure that the correct gateway initialization file is read.

TRANSACTION_RECOVERY_USER

The following table describes how to use the TRANSACTION_RECOVERY_USER parameter:

Item	Description
Syntax	TRANSACTION_RECOVERY_USER = <i>rec_user</i>
Default value	None.
Range of values	Any valid operating system user ID that is authorized by WebSphere MQ Manager (MQM)

TRANSACTION_RECOVERY_USER specifies the user name that the gateway uses to start the recovery of a transaction. This parameter is required only when

AUTHORIZATION_MODEL is set to STRICT, and TRANSACTION_MODEL is set to COMMIT_CONFIRM. Refer to ["Creating a Transaction Log Queue"](#) on page 7-10 for more information.

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