

# Oracle® Database Gateway for WebSphere MQ

## Installation and User's Guide



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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 DG4MQ.

## 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.
<b>Bold</b>	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/rdskc0t1d0s6 of=/dev/rst0 bs=10b \ count=10000</pre>
braces { }	Braces indicate required items:  <pre>.DEFINE {macro1}</pre>
brackets [ ]	Brackets indicate optional items:  <pre>cvtcrt termname [outfile]</pre>
ellipses ...	Ellipses indicate an arbitrary number of similar items:  <pre>CHKVAL fieldname value1 value2 ... valueN</pre>
<i>italics</i>	Italic type indicates a variable. Substitute a value for the variable:  <pre>library_name</pre>
vertical line	A vertical line indicates a choice within braces or brackets:  <pre>FILE filesize [K M]</pre>

## Related Publications

See the *Oracle Database Heterogeneous Connectivity User'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 User'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*

# 1

## Introduction to Oracle Database Gateway for WebSphere MQ

The following topics provide an overview of message queuing, WebSphere MQ, and the role of the gateway when accessing WebSphere MQ queues.

### 1.1 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).

### 1.2 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.

## 1.2.1 WebSphere MQ Terms

This table describes WebSphere MQ terms used in this guide.

**Table 1-1 WebSphere MQ Terms**

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.

## 1.3 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.

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.

#### Related Topics

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)

## 1.3.1 Developing Gateway Applications

Using the Oracle Visual Workbench for Oracle Database Gateway for WebSphere MQ.

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.

#### Related Topics

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)
- [UTL\\_RAW Package](#)

## 1.3.2 Gateway Terms

This table describes gateway terms used in this guide.

**Table 1-2 Oracle Database Gateway Terms**

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.

**Table 1-2 (Cont.) Oracle Database Gateway Terms**

Term	Description
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.
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.

### 1.3.3 Advantages of Using the Gateway

This is a description of the advantages of using the gateway to access WebSphere MQ.

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.

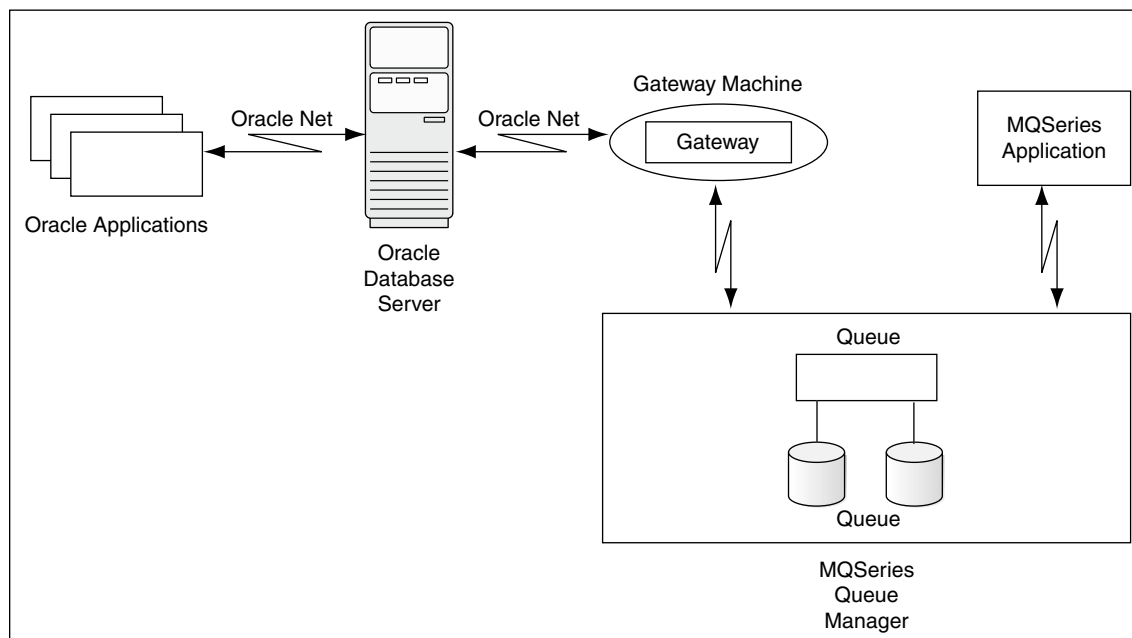
- Flexible interface  
Using the MIPs generated by the Visual Workbench, you can use the gateway to interface with the existing procedural logic or to integrate new procedural logic into an Oracle database environment.
- Oracle database integration  
The integration of the Oracle database with the gateway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

### 1.3.4 Gateway Architecture

This is a description of the gateway architecture components in graphic format.

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

**Figure 1-1 Components of the Gateway Architecture**



### 1.3.5 Component Descriptions

This topic describes components of the gateway architecture.

### 1.3.5.1 Oracle Applications

The Oracle applications component.

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

### 1.3.5.2 Oracle Database

The Oracle database component.

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.

### 1.3.5.3 Oracle Net

The Oracle Net component.

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.

### 1.3.5.4 Gateway

The gateway component.

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.

### 1.3.5.5 WebSphere MQ Queue Manager

The WebSphere MQ queue manager component.

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.

### 1.3.5.6 WebSphere MQ Application

The WebSphere MQ applications component.

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

## 1.3.6 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.

## 1.3.7 Gateway Operation

Each Oracle database user session that accesses a gateway creates an independent process on the host system that runs the gateway.

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.

## 1.3.8 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:

### **Related Topics**

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)

# 2

## Release Information for Oracle Database Gateway for WebSphere MQ

The following topics contain information that is specific to this release of Oracle Database Gateway for WebSphere MQ:

### 2.1 Changes and Enhancements

These topics describe the changes and enhancements included in this release.

#### 2.1.1 Oracle Database Dependencies

This topic explains Oracle database dependencies.

This release of Oracle Database Gateway for WebSphere MQ requires the latest released patch set for Oracle Database 12c Release 2 (12.2), or for the Oracle database release that you are using.

#### 2.1.2 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:

##### Related Topics

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)

#### 2.1.3 DG4MQ Data Types

This table provides information about Oracle Database Gateway for WebSphere MQ (DG4MQ) 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
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

## 2.1.4 PGM\_UTL Procedures

This 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.

## 2.1.5 DG4MQ API Prototype Changes

This table provides information about DG4MQ 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)

### Related Topics

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)

## 2.1.6 DG4MQ Deployment Scripts

These DG4MQ deployment 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, DG4MQ gateway procedures and data type definitions, refer to:

### Related Topics

- [The PGM, PGM\\_UTL8, and PGM\\_SUP Packages](#)

## 2.1.7 Large Payload Support

DG4MQ 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 DG4MQ.

## 2.1.8 Database Link and Alias Library

A connection to the gateway is established through a database link.

From DG4MQ 10g release 2 and later, this database link is no longer associated with each DG4MQ 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 DG4MQ deployment scripts are executed.

## 2.2 Known Problems

This topic describes the known problems in this release.

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.

## 2.3 Known Restrictions

This topic describes the known restrictions in this release.



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\\12.2\\dg4mqs\\dg4mq\\log\\dg4mqs.log
```

#### Note:

If LOG\_DESTINATION is not defined for Microsoft 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 Microsoft 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\12.2\dg4mqs\bin\oradg4mqs.dll' transactional
```

or

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

### CALLBACK links

Oracle Database Gateway for WebSphere MQ does not support CALLBACK links. Trying a CALLBACK link with the gateway will return the following error message:

```
ORA-02025: All tables in the SQL statement must be at the remote database
```

# 3

## System Requirements for Oracle Database Gateway for WebSphere MQ

These topics provide information about the hardware and software required for the installation of Oracle Database Gateway for WebSphere MQ and the recommended online documentation.

 **See Also:**

- *Oracle Database Installation Guide*
- *Oracle Database Installation Guide for Microsoft Windows*

### 3.1 Hardware Requirements for Oracle Database Gateway for WebSphere MQ

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

**Table 3-1 Hardware Requirements for Oracle Database Gateway for WebSphere MQ**

Hardware Items	Required for IBM AIX on POWER Systems (64-Bit)	Required for Linux x86 64 bit	Required for Oracle Solaris on SPARC (64-Bit)	Required for Oracle Solaris on x86-64 (64-Bit)	Required for HP-UX Itanium	Required for Microsoft Windows 64 bit
Temporary Disk space	1 GB	1 GB	1 GB	1 GB	1 GB	2 GB
Disk space	1.5 GB	750 MB	750 MB	750 MB	1.5 GB	300 MB
Physical Memory	512 MB	512 MB	512 MB	512 MB	512 MB	512 MB
Swap space	1 GB	1 GB	1 GB	1 GB	1 GB	NA
Processor	IBM RS/6000 AIX-Based System Processor	x86_64	Sun Solaris Operating System (SPARC) Processor	x86_64	HP Itanium processor for hp-ux 11	Intel Pentium or compatible

## 3.2 Software Requirements for Oracle Database Gateway for WebSphere MQ

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

**Table 3-2 Software Requirements for Oracle Database Gateway for WebSphere MQ**

Platform	Requirement	WebSphere MQ Server Software
IBM AIX on POWER Systems (64-Bit)	<p>IBM AIX on Power Systems (64 bit) v7.2, v7.1</p> <p>OS Patches: Check with your software vendor for current maintenance requirements.</p>	<p>When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for AIX version 6.0 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 6.0 or later is required on the gateway system.</p>
Linux x86-64 (64 bit)	<p>One of the following operating system versions:</p> <ul style="list-style-type: none"> <li>Linux x86-64 SLES v12</li> <li>Linux x86-64 SLES v15</li> <li>Linux x86-64 Red Hat Enterprise Linux 7</li> <li>Linux x86-64 Oracle Linux v7</li> </ul> <p>OS Patches: Check with your software vendor for current maintenance requirements</p>	<p>When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for IA Linux x 86 64 bit version 6.0 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 x86 64 bit version 6.0 or later is required on the gateway system.</p>
Oracle Solaris on SPARC (64-Bit)	<p>One of the following operating system versions:</p> <ul style="list-style-type: none"> <li>Oracle Solaris on SPARC (64 bit) v11</li> <li>Oracle Solaris on SPARC (64 bit) v10</li> </ul> <p>OS Patches: Check with your software vendor for current maintenance requirements.</p>	<p>When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for Sun Solaris version 6.0 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 6.0 or later is required on the gateway system.</p>
Oracle Solaris on x86-64 (64 Bit)	<p>Oracle Solaris on x86-64 (64 bit) v11</p> <p>OS Patches: Check with your software vendor for current maintenance requirements.</p>	<p>When the gateway resides on the same system as the WebSphere MQ server software, then WebSphere MQ for Sun Solaris version 6.0 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 6.0 or later is required on the gateway system.</p>
HP-UX Itanium	HP-UX Itanium v11.31	-

**Table 3-2 (Cont.) Software Requirements for Oracle Database Gateway for WebSphere MQ**

Platform	Requirement	WebSphere MQ Server Software
Microsoft Windows x86-64 (64 bit)	One of the following operating system versions: <ul style="list-style-type: none"><li>• Microsoft Windows 10 (64 bit)</li><li>• Microsoft Windows x64 8.1 (64 bit)</li><li>• Microsoft Windows x64 7 (64 bit)</li><li>• Microsoft Windows x64 2012 R2 (64 bit)</li><li>• Microsoft Windows x64 2016 (64 bit)</li><li>• Microsoft Windows x64 2019 (64 bit)</li></ul>	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 7.0 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 DG4MQ, then the product link fails.

## 3.3 Oracle Database

The Oracle database requires the latest patch set for Oracle Database 12c.

# 4

## Preinstallation Information for Oracle Database Gateway for WebSphere MQ

The following topics guide you through the basic concepts and preinstallation steps for Oracle Database Gateway for WebSphere MQ.

### 4.1 Preinstallation Tasks

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

#### 4.1.1 WebSphere MQ Software

This topic explains how to check for 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.

## 4.1.2 Setting Environment Variables

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

 **Note:**

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

### 4.1.2.1 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.

 **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.

#### Related Topics

- [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.

#### 4.1.2.1.1 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
<code>PATH</code>	Linux, AIX-based Systems, HP-UX Itanium, and Sun Solaris
<code>CLASSPATH</code>	Linux, AIX-based Systems, HP-UX Itanium, and Sun Solaris
<code>LD_LIBRARY_PATH</code>	Linux and Sun Solaris
<code>LIBPATH</code>	AIX-based Systems
<code>SHLIB_PATH</code>	HP-UX Itanium

**Note:**

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

#### 4.1.2.1.2 Setting `ORACLE_HOME`

This topic explain how to set the `ORACLE_HOME` environment variable.

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
```

#### 4.1.2.2 `ORACLE_SID`

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

##### 4.1.2.2.1 Setting `ORACLE_SID`

This topic explains how to set the `ORACLE_SID` environment variable.

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
```

### 4.1.2.3 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:

#### 4.1.2.3.1 On Server where the Installer is Running

This topic shows examples for using `DISPLAY` on a 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
```

#### 4.1.2.3.2 In Session on Your Workstation

This topic shows examples of in session on the workstation.

- C shell

```
prompt> xhost +server_name
```

- Bourne or Korn shell

```
prompt> xhost +server_name
```

### 4.1.2.4 TMP

During installation, Oracle Universal Installer uses a temporary directory for swap space.

This directory must meet the hardware requirements. 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
```

### Related Topics

- [Hardware Requirements for Oracle Database Gateway for WebSphere MQ](#)  
This table contains the hardware requirements for Oracle Database Gateway for WebSphere MQ.

## 4.1.3 Using Windows User Account as Oracle Home User

With Windows, you log in to a user with Administrator privileges to install the Oracle Database software. You can also specify an Oracle Home User (based on a low-privileged, non-administrative user account) during installation.

The following are the Windows User Accounts:

- Windows Local User account
- Windows Domain User account
- Windows Managed Services Account (MSA)
- Windows Built-in Account

### See Also:

"Using Oracle Home User on Windows" in *Oracle Database Platform Guide for Microsoft Windows*

## 4.2 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

### 4.2.1 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-UX Inanium 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.

## 4.2.2 Starting Oracle Universal Installer

This topic explains how to start 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. Run Oracle Universal Installer.

### 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((nbsp))Windows from the operating system Loader option. Log in to your MS((nbsp))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.
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.

#### **Related Topics**

- [Hardware Requirements for Oracle Database Gateway for WebSphere MQ](#)  
This table contains the hardware requirements for Oracle Database Gateway for WebSphere MQ.

# 5

## Installing Oracle Database Gateway for WebSphere MQ

The following topics guide you through the installation of the Enterprise Edition of Oracle Database Gateway for WebSphere MQ.

### 5.1 Installation

This table guides you through the installation process.

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

**Table 5-1 Installing Oracle Database Gateway for WebSphere MQ**

Oracle Universal Installer Screen	Response
Welcome	Click <b>Next</b> .
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 <code>ORACLE_HOME</code>. After you set the fields in the File Locations screen, as necessary, click <b>Next</b> to continue. After loading the necessary information from the CD-ROM, the installer displays the Available Products screen.</p>
Available Products	Select <b>Oracle Database 12.2</b> and click <b>Next</b> to continue. Oracle Universal Installer displays the Installation Types screen.
Installation Types	Select <b>Custom</b> and click <b>Next</b> 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 <b>Next</b> 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 <b>Local</b> if the MQM runs on the same system as the gateway, or select <b>Remote</b> if the MQM runs on a different system than the gateway. Click <b>Next</b> to continue.

Table 5-1 (Cont.) Installing Oracle Database Gateway for WebSphere MQ

Oracle Universal Installer 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 <b>Next</b> 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. 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 <code>CHANNEL_NAME</code> and <code>PROTOCOL</code> must be in uppercase, and <code>server_address</code> 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 <code>QM.INI</code> file. If no value is specified in the <code>QM.INI</code> 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: <code>CHANNEL1/TCP/Sales</code></p> <p>Click <b>Next</b> 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 <b>Install</b> 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 <b>Exit</b> to exit the installer.</p>

## 5.2 Running root.sh on UNIX Based Systems

This topic explains how to run 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.

# 6

## Removing Oracle Database Gateway for WebSphere MQ

The following topics describe how to remove Oracle Database Gateway for WebSphere MQ from an Oracle home directory.

### 6.1 Removing Oracle Database Gateway for WebSphere MQ

To remove Oracle Database Gateway for WebSphere MQ, perform these steps.

#### 6.1.1 About the Deinstallation Tool

The Deinstallation Tool (`deinstall`) is available in the installation media before installation, and is available in Oracle home directories after installation.

It is located in the path `$ORACLE_HOME/deinstall`.

The `deinstall` command stops Oracle software, and removes Oracle software and configuration files on the operating system.

The command uses the following syntax, where variable content is indicated by italics:

```
deinstall -home complete path of Oracle home [-silent] [-checkonly] [-local]
[-paramfile complete path of input parameter property file] [-params name1=value
name2=value . . .] [-o complete path of directory for saving files] [-help | -h]
```

The options are:

- `-silent`

Use this flag to run the command in silent or response file mode. If you use the `-silent` flag, then you must use the `-paramfile` flag, and provide a parameter file that contains the configuration values for the Oracle home that you want to deinstall or deconfigure.

You can generate a parameter file to use or modify by running `deinstall` with the `-checkonly` flag. The `deinstall` command then discovers information from the Oracle home that you want to deinstall and deconfigure. It generates the properties file, which you can then use with the `-silent` option.

You can also modify the template file `deinstall.rsp.tmpl`, located in the response folder.

- `-checkonly`

Use this flag to check the status of the Oracle software home configuration. Running the command with the `-checkonly` flag does not remove the Oracle configuration. The `-checkonly` flag generates a parameter file that you can use with the `deinstall` command.

- `-local`

Use this flag on a multinode environment to deconfigure Oracle software in a cluster.

When you run `deconfig` with this flag, it deconfigures and deinstalls the Oracle software on the local node (the node where `deconfig` is run). On remote nodes, it deconfigures Oracle software, but does not deinstall the Oracle software.

- `-paramfile` *complete path of input parameter property file*

Use this flag to run `deconfig` with a parameter file in a location other than the default. When you use this flag, provide the complete path where the parameter file is located.

The default location of the parameter file depends on the location of `deconfig`:

- From the installation media or stage location: `$ORACLE_HOME/inventory/response` for UNIX based system and `ORACLE_HOME\response` for Microsoft Windows.
- From a unzipped archive file from OTN: `/ziplocation/response` for UNIX based system and `ziplocation\response` for Microsoft Windows.
- After installation from the installed Oracle home: `$ORACLE_HOME/deinstall/response` for UNIX based system and `ORACLE_HOME\deinstall\response` for Microsoft Windows.

- `-params` [`name1=value name 2=value name3=value . . .`]

Use this flag with a parameter file to override one or more values that you want to change in a parameter file you have already created.

- `-o` *complete path of directory for saving response files*

Use this flag to provide a path other than the default location where the properties file (`deinstall.rsp.tpl`) is saved.

The default location of the parameter file depends on the location of `deconfig`:

- From the installation media or stage location before installation: `$ORACLE_HOME/` for UNIX based system and `ORACLE_HOME\` for Microsoft Windows
- From a unzipped archive file from OTN: `/ziplocation/response/` for UNIX based system and `\ziplocation\response\` for Microsoft Windows
- After installation from the installed Oracle home: `$ORACLE_HOME/deinstall/response` for UNIX based system and `ORACLE_HOME\deinstall\response` for Microsoft Windows

- `-help` | `-h`

Use the help option (`-help` or `-h`) to obtain additional information about the command option flags.

## 6.1.2 Removing Oracle Software

This topic explains how to remove Oracle software.

Complete the following procedure to remove Oracle software:

1. Log in as the installation owner.
2. Run the `deinstall` command, providing information about your servers as prompted.



## 6.2 Reinstalling Oracle Database Gateway for WebSphere MQ

To reinstall Oracle Database Gateway for WebSphere MQ over the same version, first remove, and then reinstall the product.

### Related Topics

- [Removing Oracle Database Gateway for WebSphere MQ](#)  
To remove Oracle Database Gateway for WebSphere MQ, perform these steps.

# 7

## Configuring Oracle Database Gateway for WebSphere MQ

After installing Oracle Database Gateway for WebSphere MQ, follow the instructions in the following topics to configure the gateway.

### 7.1 Configuration Overview

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

For example:

- 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.

### 7.2 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.

## 7.2.1 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:

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

## 7.2.2 Using the Gateway Without the Default Values

This topic explains how to modify 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](#)" and continue to the end of the chapter.

## 7.2.3 Changing Default Values

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

### 7.2.3.1 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.

### 7.2.3.2 Step 2: Customize the Gateway Initialization File

This topic explains how to customize the gateway initialization file.

The gateway initialization file (`initsid.ora`) supports all database gateway initialization parameters described in [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
```

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 [Gateway Running Environment](#) for more information on transaction and security models.

#### See Also:

*Oracle Database Net Services Administrator's Guide* and *Oracle Database Net Services Reference*

## 7.3 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.

### 7.3.1 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](#)".

### 7.3.2 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.

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

Configuring the `listener.ora` file.

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.
- *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=dg4mqc)
  (ORACLE_HOME=gateway_directory)
  (PROGRAM=dg4mqc)
)

```

For UNIX based systems:

```

(SID_DESC =
  (SID_NAME=dg4mqc)
  (ORACLE_HOME=/oracle/app/oracle/product/dg4mq)
  (PROGRAM=dg4mqc)
)

```

## Related Topics

- [Configuring Oracle Net for Oracle Database](#)  
You must configure the Oracle database so that it can communicate with the gateway by using Oracle Net.

### See Also:

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

## 7.3.2.2 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 12.2.0.1.0 - Beta
Start Date           14-Sep-16 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 12.2.0.1.0 - Production
Start Date           14-Sep-16 10:16:10
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
```

In the example, `dg4mqs` 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.

## 7.4 Configuring Oracle Net for Oracle Database

You must configure the Oracle database so that it can communicate with the gateway by using Oracle Net.

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.

### Related Topics

- [Configuration Overview](#)  
The gateway works with several components and products to communicate between the Oracle database and WebSphere MQ queues.
- [Configuring the Gateway](#)  
The gateway is installed and preconfigured using default values for the gateway SID, directory names, file names, and gateway parameter settings.

 **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.

### 7.4.1 Using Default Gateway Values

Oracle Universal Installer creates and preconfigures a `tnsnames.ora` file where `ORACLE_HOME` is the directory in which the gateway software is installed.

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.

## 7.4.2 Changing Default Gateway Values

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

### 7.4.2.1 TCP/IP Example

This is an example of using the TCP/IP protocol adapter.

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=
      (SERVICE_NAME=service_name)
    )
    (HS=OK)
  )
```

In this example:

- `tns_name_entry` is the `tns_name_entry` of the `CREATE DATABASE LINK` statement.
- 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.
- `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.
- `service_name` specifies the gateway service name and matches the SID specified in the `listener.ora` file of the Oracle Net Listener that listens for the gateway.

#### Related Topics

- [Creating Database Links](#)  
To create a database link, use the `CREATE DATABASE LINK` statement.
- [Step 1: Configure the Oracle Net Oracle Net Listener for the Gateway](#)  
Configuring the `listener.ora` file.

### 7.4.2.2 IPC Example

This is an example using the IPC protocol adapter.

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=  
      (SERVICE_NAME=service_name)  
    )  
    (HS=OK)  
  )
```

where:

- *tns\_name\_entry* is the *tns\_name\_entry* of the `CREATE DATABASE LINK` statement.
- `IPC` specifies that the protocol used for connections is `IPC`.
- *key\_name* is the service name.
- *service\_name* specifies the gateway service name and matches the `SID` specified in the `listener.ora` file of the Oracle Net Listener that is listening for the gateway.

#### Related Topics

- [Creating Database Links](#)  
To create a database link, use the `CREATE DATABASE LINK` statement.

## 7.5 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, an additional configuration step is required.

This 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

#### 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.

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.

### Related Topics

- [Commit-Confirm Transactions](#)  
Commit-Confirm transactions are enhanced forms of single-site transactions and are supported for all WebSphere MQ environments and platforms.
- [Oracle Database Gateway for WebSphere MQ Initialization Parameters](#)
- [Authorization for WebSphere MQ Objects](#)  
This topic describes the access authorization for WebSphere MQ objects.

## 7.6 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*.

### 7.6.1 Using Database Links

Oracle Database Gateway for WebSphere MQ uses an alias library to access the shared library installed with Oracle Database Gateway for WebSphere MQ.

An alias library is a schema object that represents a library in PL/SQL. 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.

### 7.6.2 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.

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.

### Related Topics

- [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.

## 7.6.3 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:**

*Oracle Database SQL Language Reference* for more information about dropping database links.

## 7.6.4 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.

## 7.6.5 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:**

*Oracle Database Administrator's Guide* for more information about limiting the number of active database links.

## 7.6.6 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 DG4MQ 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`

## 7.6.7 Dropping Alias Library

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

## 7.7 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.

### Related Topics

- [Preparing the Production Oracle Database](#)  
These preparations include preparing, installing, and removing PL/SQL packages on the production database.

### 7.7.1 Preinstallation Tasks

These steps describe the preinstallation tasks.

#### 7.7.1.1 Step 1: Choose a Repository Server

This step explains how to choose a repository server.

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

#### 7.7.1.2 Step 2: Locate the Installation Scripts

This step explains how to 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.

### 7.7.1.3 Step 3: Upgrade the Visual Workbench Repository

This step explains how to upgrade your Visual Workbench repository installation scripts.

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.

### 7.7.1.4 Step 4: Ensure that the UTL\_RAW Package is Installed

The step explains how to 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
```

### 7.7.1.5 Step 5: Ensure that the DBMS\_OUTPUT Package is Enabled

This step explains how to 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:**

*Oracle Database Administrator's Guide* for more information.

### 7.7.1.6 Step 6: Create a Database Link

This step explains how to 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](#)" for more information about creating database links.

## 7.7.2 Visual Workbench Repository Installation Tasks

Use `pgvwbrepos.sql` to install the Visual Workbench Repository.

Use `pgvwbrepos.sql` to install the Visual Workbench Repository on Oracle10g or later. 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 earlier, 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:

### 7.7.2.1 Step 1: Enter the Database Connection Information

This step explains how to 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.

### 7.7.2.2 Step 2: Check for Existing Workbench Repository

This step explains how to check for an existing Visual 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](#)".

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.

### 7.7.2.3 Step 3: Check for The Required PL/SQL Packages

This step explains how to 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.

### 7.7.2.4 Step 4: Install the UTL\_PG Package

This step explains how to 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`.

### 7.7.2.5 Step 5: Create the Administrative User and All Repository Tables

This step explains how to create 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.

### 7.7.2.6 Step 6: Create Public Synonyms and Development Roles

This optional step explains how 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**.

## 7.7.3 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:

1. 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.
2. 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;
```

## 7.7.4 Deinstall the Visual Workbench Repository

Use the repository script `pgvwbremove.sql` to deinstall a Visual Workbench.

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:

### 7.7.4.1 Step 1: Enter the Database Connection Information

This step explains how to 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.

### 7.7.4.2 Step 2: Check for the Existing Workbench Repository

This step explains how to 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.

## 7.8 Preparing the Production Oracle Database

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

### 7.8.1 Introduction

This section describes how to run the `pgmdeploy.sql` and `pgmundeploy.sql` scripts.

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.

### 7.8.2 Verifying and Installing PL/SQL Packages

This topic describes 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.

## 7.8.3 Removing the PL/SQL Packages

This topic describes removing 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.

# 8

## Oracle Database Gateway for WebSphere MQ Running Environment

The following topics describe the Oracle Database Gateway for WebSphere MQ running environment:

### 8.1 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.

#### Related Topics

- [Oracle Database Gateway for WebSphere MQ Initialization Parameters](#)

#### 8.1.1 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.

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

**Related Topics**

- [Authorization for WebSphere MQ Objects](#)  
This topic describes the access authorization for WebSphere MQ objects.

## 8.1.2 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.

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

**Related Topics**

- [Authorization for WebSphere MQ Objects](#)  
This topic describes the access authorization for WebSphere MQ objects.

### 8.1.2.1 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.

### 8.1.2.2 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.

## 8.1.3 Authorization for WebSphere MQ Objects

This topic describes the access 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.

## 8.2 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.

## 8.2.1 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.

## 8.2.2 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.

---

Type	Description
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-stop, 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-stop, 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-stop, and prepare, but do not support commit-confirm, because they have no distributed transaction memory.
Two-phase commit-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-stop, prepare, and commit-confirm.

## 8.2.3 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:

### 8.2.3.1 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.

### 8.2.3.2 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.

#### Related Topics

- [Oracle Database Gateway for WebSphere MQ Initialization Parameters](#)

## 8.3 Troubleshooting

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

### 8.3.1 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.

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.

For Example:

```
ORA-29400: data cartridge error  
MQI MQCONNX 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.

### Related Topics

- [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.

 **See Also:**

*Oracle Database Error Messages*

## 8.3.1.1 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.

## 8.3.2 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, it does 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..

## 8.3.3 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.

**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.

**Related Topics**

- [Oracle Database Gateway for WebSphere MQ Initialization Parameters](#)

### 8.3.3.1 LOG\_DESTINATION Parameter

This is a gateway initialization parameter.

#### 8.3.3.1.1 Gateway

SQL-based and procedural

#### 8.3.3.1.2 Default Value

The default value is `SID_agt_PID.trc`.

#### 8.3.3.1.3 Range of Values

None

#### 8.3.3.1.4 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.

## 8.3.4 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.
- A database link exists between the Oracle database and the gateway was created.



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
```

### Related Topics

- [Configuring Oracle Net for the Gateway](#)  
The gateway requires Oracle Net to provide transparent data access to and from the Oracle database.
- [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.

# A

## 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 DG4MQ deployment environment is created.

The following topics discuss the `PGM`, `PGM_UTL8`, and `PGM_SUP` packages:

### Related Topics

- [Installing the Oracle Visual Workbench Repository](#)  
Install the Oracle Visual Workbench repository following the steps in this section.
- [Preparing the Production Oracle Database](#)  
These preparations include preparing, installing, and removing PL/SQL packages on the production database.

## A.1 PGM Package, DG4MQ 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 DG4MQ 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.

## A.1.1 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
MQPUT	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
MQGET	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.

## A.1.2 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, mqgmo, 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 `mqgmo`.
- `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.



#### See Also:

*Oracle Database PL/SQL Language Reference*

## A.1.3 MQI Calls Performed by the Gateway

These MQI calls have no equivalent procedures in 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.

## A.1.4 Unsupported MQI Calls

These MQI calls are not supported by the gateway.

They are:

- MQINQ
- MQPUT1
- MQSET

## A.1.5 Migration Tips

This section provides information about how to upgrade Oracle9i DG4MQ and existing customized PL/SQL application programs to use Oracle Database Gateway for WebSphere MQ features.

DG4MQ data types and RPC API prototypes are changed to meet the requirements of the gateway infrastructure.

When upgrading DG4MQ to Oracle 10g release 2 or higher, Oracle recommends that you install the newer version of DG4MQ 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 DG4MQ Releases 8 and 9 PL/SQL Applications

To migrate DG4MQ releases 8 and 9 PL/SQL applications:

1. In the PL/SQL declarative section, remove `dblink` references from the following DG4MQ 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.MQGMO;
hobj         PGM.MQOH;

```

3. In the PL/SQL executable section, remove `dblink` references from the following DG4MQ 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 DG4MQ 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 DG4MQ 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);
mqgmoRaw := PGM_UTL8.TO_RAW(getmsgopts);
PGM8.MQGET@dblink(hobj, mqmdRaw, mqgmoRaw, putbuffer);
getmsgopts := PGM_UTL8.RAW_TO_MQGMO(mqgmoRaw);
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 DG4MQ Release 4.0.1.\* PL/SQL Applications

To migrate applications:

1. In the PL/SQL declarative section, remove `dblink` references from the following DG4MQ data types:

- PGM.MQOD
- PGM.MQMD
- PGM.MQPMO
- PGM.MQGMO

2. In the PL/SQL executable section, remove `dblink` references from the following DG4MQ 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);
```

## A.2 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. 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);
```

### Related Topics

- [MQCLOSE Values](#)  
These topics provide information about MQCLOSE values.

## A.3 MQGET Procedure

The MQGET procedure 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.
- `mqgmo` is 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.
- `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.

### A.3.1 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 <code>PGM_SUP</code> constant to assign a value. Refer to <a href="#">REPORT Field</a> .	RAW(4)	<code>PGM_SUP.MQRO_ NONE</code>

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

Field Name	Description	PL/SQL Data Type	Initial Value
MSGTYPE	Specifies the message type: reply message, report message, or normal message (datagram). Use a PGM_SUP constant to assign a value. Refer to <a href="#">MSGTYPE Field</a> .	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 <a href="#">EXPIRY Field</a> .	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 <a href="#">FEEDBACK Field</a> .	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 <a href="#">ENCODING Field</a> .	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 <a href="#">CODEDCHARSETID Field</a> .	BINARY_INTEGER	PGM_SUP.MQCCSI_DEFAULT
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 <a href="#">FORMAT Field</a> .	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 <a href="#">PRIORITY Field</a> .	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 <a href="#">PERSISTENCE Field</a> .	BINARY_INTEGER	PGM_SUP.MQPER_PERSISTENCE_AS_Q_DEF

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

Field Name	Description	PL/SQL Data Type	Initial Value
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
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

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

Field Name	Description	PL/SQL Data Type	Initial Value
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 <a href="#">PUTAPPLTYPE Field</a> .	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 HHMMSSSTH. 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

### A.3.2 PGM.MQGMO Type Definition

Use PGM.MQGMO to specify option and control information about how the message is retrieved from a queue.

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 <a href="#">OPTIONS Field</a> .	BINARY_INTEGER	<code>PGM.MQGMO_SYNCPOINT</code> (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

## A.4 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](#).

- `options` specifies the kind of open. Refer to [MQOPEN Values](#). 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);
```

## A.4.1 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 <a href="#">OBJECTTYPE Field</a> .	<code>BINARY_INTEGER</code>	<code>PGM_SUP.MQOT_Q</code> (queue)
DBLINKNAME	Specifies the database link name.	<code>CHAR(64)</code>	NULL
OBJECTNAME	Specifies the local name of the object as defined by the queue manager.	<code>CHAR(48)</code>	NULL



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

## A.5 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](#).
- `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](#).
- `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;
/

```

## A.5.1 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".	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

## A.6 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*.

### A.6.1 PGM.MQGMO Values

These topics provide information about PGM.MQGMO values.

#### A.6.1.1 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;

### A.6.1.2 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;

### A.6.1.3 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;

### A.6.1.4 WAITINTERVAL

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

## A.6.2 PGM.MQMD Values

These topics provide information about PGM.MQOD values.

### A.6.2.1 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;

### A.6.2.2 ENCODING Field

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

### A.6.2.3 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';

### A.6.2.4 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';
```

### A.6.2.5 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) := 'fffff000';
```

### A.6.2.6 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';
```

### A.6.2.7 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;
```

### A.6.2.8 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;
```

### A.6.2.9 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_EXTENTION 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  ';

```

### A.6.2.10 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;

```

### A.6.2.11 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;

```

### A.6.2.12 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;

```

### A.6.2.13 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;
```

### A.6.2.14 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';
```

### A.6.2.15 VERSION Field

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

### A.6.2.16 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';
```

## A.6.3 PGM.MQOD Values

These topics provide information about PGM.MQOD values.

### A.6.3.1 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;
```

### A.6.3.2 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;

```

### A.6.3.3 VERSION Field

```

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

```

## A.6.4 PGM.MQPMO Values

These topics provide information about PGM.MQPMO values.

### A.6.4.1 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;

```

### A.6.4.2 VERSION Field

```

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

```

## A.6.5 MQCLOSE Values

These topics provide information about MQCLOSE values.

### A.6.5.1 *hobj* Argument

```

PGM_SUP.MQHO_UNUSABLE_HOBJ CONSTANT BINARY_INTEGER := -1;

```

### A.6.5.2 *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;

```

## A.6.6 MQOPEN Values

These topics provide information about MQOPEN values.

### A.6.6.1 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;

## A.6.7 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;

```

## A.6.8 Error Code Definitions

This topic describes some error code definitions.

### Error Code -29400: Data Cartridge Error

This error code indicates that the MQI opcode implemented in DG4MQ 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;
```

```
/
```

# B

## 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.

### 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.

### B.2 UTL\_RAW Functions

This topic describes the `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.

## B.2.1 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.

## B.2.2 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*.

## B.2.3 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.

## B.2.4 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`.

## B.2.5 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`.

## B.2.6 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.

## B.2.7 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`.

## B.2.8 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'`.

## B.2.9 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.

## B.2.10 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.

## B.2.11 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.

## B.2.12 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.

## B.2.13 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'`.

## B.2.14 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.

## B.2.15 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.

## B.2.16 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`.

## B.2.17 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

## B.2.18 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'`.

# C

## Oracle Database Gateway for WebSphere MQ Initialization Parameters

The Oracle Database Gateway for WebSphere MQ has its own initialization parameters, which are described in this the following topics, and supports the initialization parameters for Oracle Database Gateways.

### 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.

### C.2 Gateway Parameters

These topics describe gateway parameters, listing the default value, range of values, and the syntax for usage.

#### C.2.1 LOG\_DESTINATION

The following table describes the `LOG_DESTINATION` parameter:

<b>LOG_DESTINATION</b>	<b>Use</b>
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.

#### C.2.2 AUTHORIZATION\_MODEL

The following table describes how to use the `AUTHORIZATION_MODEL` parameter:

<b>AUTHORIZATION_MODEL</b>	<b>Use</b>
Syntax	<code>AUTHORIZATION_MODEL = {RELAXED STRICT}</code>
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](#)" for more information about effective user IDs.

## C.2.3 QUEUE\_MANAGER

The following table describes the `QUEUE_MANAGER` parameter:

QUEUE_MANAGER	Use
Syntax	<code>QUEUE_MANAGER = manager_name</code>
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](#)" for more information about effective user IDs.

## C.2.4 TRACE\_LEVEL

The following table describes the `TRACE_LEVEL` parameter:

TRACE_LEVEL	Use
Syntax	<code>TRACE_LEVEL = level</code>
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.

Trace Level	Description
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.

## C.2.5 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](#)" for more information.

## C.2.6 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
<code>COMMIT_CONFIRM</code>	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 <code>RECOVERY_USER</code> , <code>RECOVERY_PASSWORD</code> , and <code>TRANSACTION_LOG_QUEUE</code> parameters.
<code>SINGLE_SITE</code>	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.

## C.2.7 TRANSACTION\_RECOVERY\_PASSWORD

The following table describes `TRANSACTION_RECOVERY_PASSWORD`.

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

`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](#)" 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.

### 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.

## C.2.8 TRANSACTION\_RECOVERY\_USER

The following table describes how to use the `TRANSACTION_RECOVERY_USER` parameter:

Item	Description
Syntax	<code>TRANSACTION_RECOVERY_USER = rec_user</code>
Default value	None.

Item	Description
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](#)" for more information.

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