Oracle Procedural Gateway® Visual Workbench

for WebSphere MQ Installation and User's Guide

10*g* Release 2 (10.2) for Microsoft Windows (32-Bit)

B19082-01

August 2005

ORACLE®

Oracle Procedural Gateway Visual Workbench for WebSphere MQ Installation and User's Guide, 10*g* Release 2 (10.2) for Microsoft Windows (32-Bit)

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Preface

The Oracle Procedural Gateway Visual Workbench for WebSphere MQ (referred to in this guide as "Visual Workbench"), is a development tool that simplifies integrating Oracle applications with non-Oracle message queuing applications. It is used by developers who write Oracle applications that communicate with non-Oracle messaging and queuing applications, using a procedural gateway for a message queuing system.

Procedural gateways for message queuing enable Oracle applications to send and retrieve messages from message queuing systems. For more information, see the gateway installation guide for your platform.

The Oracle 10*g* release of the Oracle Procedural Gateway for WebSphere MQ provides access to WebSphere MQ services. Read this guide if you are responsible for tasks such as:

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

You must understand the fundamentals of your operating system, the procedural gateways, PL/SQL, the Oracle server, and MQSeries software before using this guide to install, configure, or administer the gateway.

Audience

This document is intended for application developers who install and use the Visual Workbench on their workstations.

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Product Name

The complete name for this product is Oracle Procedural Gateway Visual Workbench for WebSphere MQ. In this document, this product is also called the Visual Workbench and may be abbreviated as PG4MQ Visual Workbench.

Related Documents

Database administrators (DBAs) use this installation guide to create the Visual Workbench repository and install the Visual Workbench server. They also use the Oracle Open Gateways Guide for SQL-Based and Procedural Gateways.

You might also need Oracle server documentation or other related publications. Some references that you might find helpful are:

- *Oracle Database Platform Guide for Microsoft Windows (32-Bit)*
- *Oracle Database Administrator's Guide*
- *Oracle Database Application Developer's Guide - Fundamentals*
- *Oracle Database Concepts*
- *Oracle Database Error Messages*
- *Oracle Database Net Services Administrator's Guide*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1 Introduction

The Oracle Procedural Gateway Visual Workbench for WebSphere MQ is for developers who are writing Oracle applications that communicate with non-Oracle message queuing applications and who are using an Oracle Procedural Gateway for WebSphere MQ for message queuing.

For detailed information about Oracle Procedural Gateways for message queuing systems, and about message queuing systems in general, refer to the gateway installation guide for your platform.

The following topics are included:

- Message Queuing Systems
- The Oracle Procedural Gateway for Message Queuing Systems
- The PG4MQ Visual Workbench Development Environment

Message Queuing Systems

Message queuing systems enable communication between applications. In a message queuing system, an application stores messages in a queue that is accessible to another application. One application sends a message to a queue, and the other application asynchronously retrieves the message and processes the information it contains.

The Oracle Procedural Gateway for Message Queuing Systems

Oracle Procedural Gateways for message queuing systems enable Oracle applications to send messages to, and retrieve messages from, message queuing systems.

The gateway converts Oracle remote PL/SQL procedure calls into calls understood by the message queuing system's interface. Using the gateway, Oracle applications can access non-Oracle applications that are enabled for message queuing.

The Oracle Procedural Gateway for message queuing provides the basic mechanism that enables Oracle applications to communicate with non-Oracle applications using message queuing systems. To write these applications without a development tool like the PG4MQ Visual Workbench, you must:

- Write PL/SQL code to call the gateway remote procedure calls that provide communication with the message queuing system
- Often write code to handle incompatible data types between Oracle applications and target applications

The PG4MQ Visual Workbench automates these tasks for developers.

The PG4MQ Visual Workbench Development Environment

The PG4MQ Visual Workbench simplifies the development work necessary to access message queuing applications through the gateway. The PG4MQ Visual Workbench does this by handling data conversion between incompatible data types in messages exchanged between Oracle applications and non-Oracle message queuing applications.

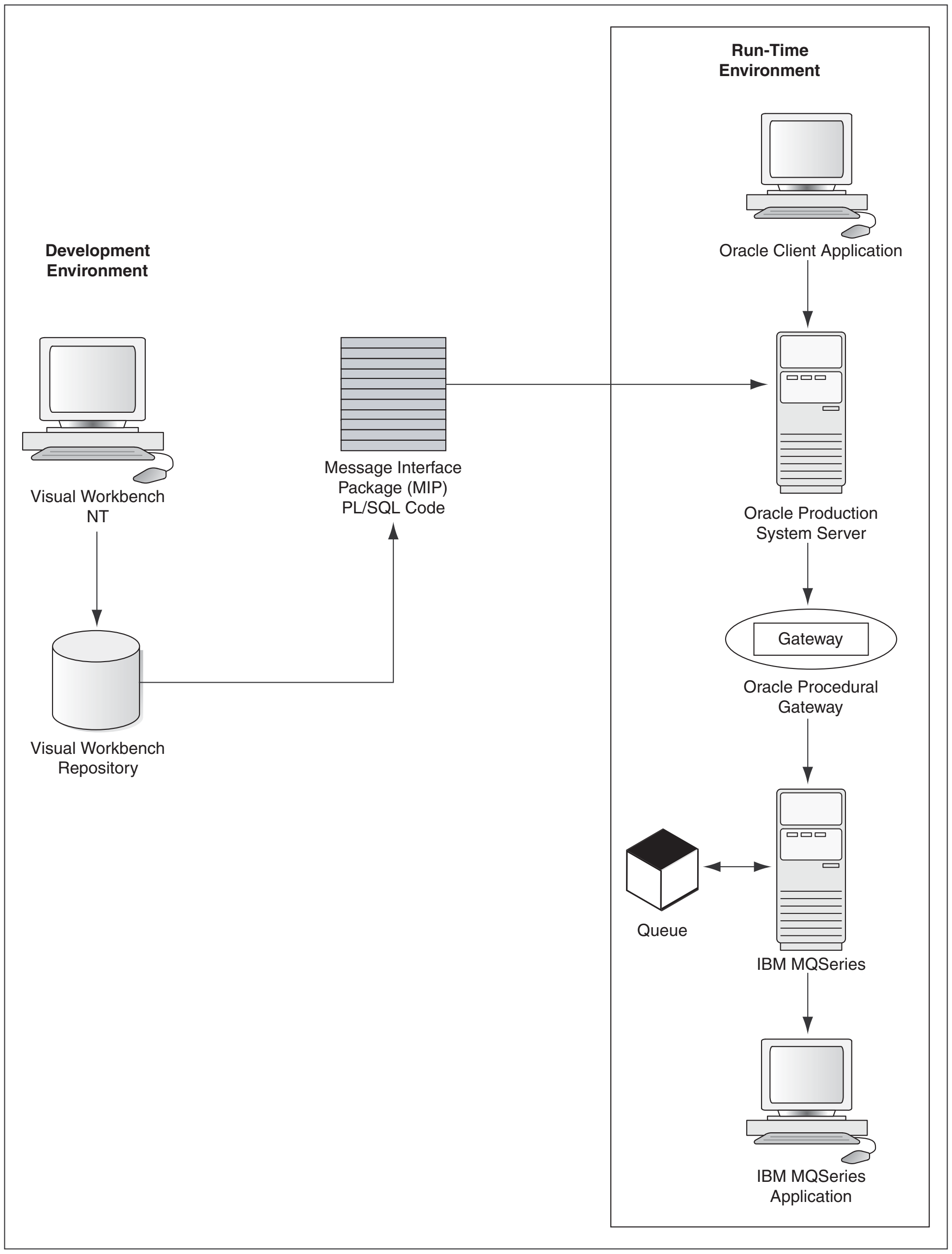
The PG4MQ Visual Workbench has two components:

- Visual Workbench
- Visual Workbench repository

Use the Visual Workbench to develop interface profiles that contain the information necessary to communicate with other message queuing applications. The Visual Workbench stores the interface profile information in the Visual Workbench repository. Using the Visual Workbench, you compile the interface profile, producing a MIP that contains the PL/SQL code needed for Oracle applications to communicate with non-Oracle message queuing applications in a run-time environment. You provide MIP templates as a starting point for your application to use the MIP, and then compile and test the MIP on the production server.

Figure 1–1 illustrates the PG4MQ Visual Workbench's development and run-time environments.

Figure 1–1 Development Environment


Run-Time Environment
Oracle Client Application
Development Environment
Visual Workbench NT
Message Interface Package (MIP) PL/SQL Code
Oracle Production System Server
Gateway
Oracle Procedural Gateway
Visual Workbench Repository
Queue
IBM MQSeries
IBM MQSeries Application

The PG4MQ Visual Workbench

The Visual Workbench (one for each developer) simplifies the work needed to access message queuing applications through the gateway. Use the Visual Workbench to:

- create data profiles
- create message queue profiles
- create interface profiles
- generate a MIP
- Test the gateway and compile the MIP in the development environment
- Provide MIP templates to use as a starting point for development

- Compile the MIP and test it on the production system

The MIP uses the profile information you provide, enabling communication between an Oracle application and a non-Oracle message queuing application.

Creating Data Profiles

The gateway and a message queuing system are the transport mechanisms for message data. They provide no data conversion capability. This means that usually you must supply code to convert data between Oracle data types and non-Oracle data types.

Using the Visual Workbench, you create data profiles that, when associated with an interface profile, automatically add the necessary conversion code before a message is sent or after a message has been retrieved. The Visual Workbench maintains the data profiles in the Visual Workbench repository.

To have the interface convert a COBOL structured message to PL/SQL, you create a COBOL data profile defining data conversion definitions. The Visual Workbench generates PL/SQL code to map between the COBOL data conversion definitions and those of PL/SQL. Currently, only COBOL version IBM VS/COBOLII is supported.

See Also: "Creating a Data Profile" on page 6-5 for details

Creating Message Queue Profiles

Using the Visual Workbench, you define the attributes of the message queues used to communicate between Oracle and non-Oracle applications. A message queue profile specifies how and where inter-application messages are sent to the message queuing system and are retrieved from it.

When a message queue profile is associated with an interface profile, the Visual Workbench generates the PL/SQL code necessary to access the message queuing gateway and stores it in the Visual Workbench repository. "Creating a Message Queue Profile" on page 6-9 for details

See Also: "Creating a Message Queue Profile" on page 6-9 for details

Creating Interface Profiles and Generating the MIP

Using the Visual Workbench Wizard, you combine one data profile and one message profile to define or update an interface profile. The interface profile:

- Defines how messages are exchanged with the non-Oracle application, using the gateway and the message queuing system
- Defines how message data is converted for communication between the applications

The Visual Workbench uses the interface profile information to generate a MIP, a PL/SQL package that provides a high-level interface between Oracle applications and non-Oracle message queuing applications. To create an interface profile you specify:

- One data profile
- One message queue profile
- A unique name for the interface

- The database link for communication between Oracle and a message queuing system, through the gateway

After you have defined the interface profile, the Visual Workbench automatically generates a MIP based on the interface profile information you specified. A MIP is a PL/SQL interface to send messages to, and retrieve messages from, a non-Oracle message queuing system.

When you generate a MIP, the Visual Workbench produces the MIP itself, data conversion code, and templates that show how to access the message queuing system using the MIP.

Using the Visual Workbench, you can install the generated MIP on any Oracle server where your application is running.

See Also: "Creating an Interface Profile and Generating a MIP" on page 6-14 and "About the Message Interface Package (MIP)" on page 7-1 for more information

Testing the Gateway

The PG4MQ Visual Workbench produces PL/SQL test code in addition to the generated MIP. Use the test code to verify the interaction with the procedural gateway before you compile the MIP on the target server. Using the test code before compiling the MIP helps identify any problems in the interaction with the gateway. It is easier to identify such problems before compiling than when testing the MIP itself.

See Also: "Testing the Gateway" on page 6-22 for more information

Compiling the MIP

The MIP and data conversion code must be compiled on an Oracle server before you can use them in your application. After completing the development and testing, use the Visual Workbench to compile the generated MIP on the server you choose for compiling.

See Also: "Compiling the MIP" on page 6-26" for more information

Using the MIP Templates

The PG4MQ Visual Workbench produces templates for the generated MIP. After you have verified the test code and compiled the interface, you can complete the templates and test them from the PG4MQ Visual Workbench. The templates can be used as a starting point for your application to use the MIP for sending and retrieving messages.

See Also: "Creating an Interface Profile and Generating a MIP" on page 6-14 and "About the Message Interface Package (MIP)" on page 7-1 for more information. For more complete MIP information, refer to Chapter 7, "Using the Generated MIP".

Preparing the MIP for Production

After completing development, you:

- Deploy the MIP on one or more production system servers where you plan to run your applications that use the MIP
- Compile the MIP on the production system
- Test the MIP on the production system

See Also: "Preparing the MIP for Production" on page 6-34 for more information

The PG4MQ Visual Workbench Repository

The Visual Workbench repository stores all data profiles, message queue profiles, interface profiles, and MIPs. The repository resides in an Oracle server and can be created in any Oracle server in the network. The Oracle server used for the repository need not be the same Oracle server that is used in the production system by the applications referencing the MIPs, it can be a different Oracle server.

2 Release Information

The Oracle Procedural Gateway Visual Workbench for WebSphere MQ is used with the Oracle Procedural Gateway for message queuing products. This release supports release 2 (10.2) of the Oracle Procedural Gateway for WebSphere MQ. For more information, see the *Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for Microsoft Windows* for your platform.

This release supports automatic data conversion between only two types of application, Oracle PL/SQL applications and IBM VS/COBOLII applications. You can add other data conversions manually.

This chapter contains the following sections:

- Product Set
- Migration Considerations
- Changes and Enhancements, Release 10.2.0.1.0
- Known Problems

Product Set

These components are included on the product installation media:

Product	**Release Number**
Oracle Universal Installer	2.0.1.6.0
Oracle Procedural Gateway Visual Workbench for WebSphere MQ	10.2.0.1.0
Oracle Net	10.2.0.1.0

This release replaces Oracle Procedural Gateway Visual Workbench for WebSphere MQ release 9.0.1.1.1 and earlier, which used a client/server system.

See Also: Figure 1–1, "Development Environment"

Migration Considerations

The message interface package (MIP) described in Chapter 7, "Using the Generated MIP", is not compatible with the MIP generated by the Visual Workbench release 9.0.1 and earlier. You must modify applications that use release 9.0.1 and earlier releases of the MIP.

The Visual Workbench repository is not compatible with the repository released with the Visual Workbench releases 9.0.1 and earlier. You must re-create interface profiles that were created and stored in the repository using releases 9.0.1 and earlier.

Changes and Enhancements, Release 10.2.0.1.0

There is only one enhancement in this release.

Accessing release 10.2.0.1.0 and all earlier releases of PG4MQ Visual Workbench Repositories.

The current release of the Oracle Procedural Gateway Visual Workbench for WebSphere MQ is enhanced to be able to access release 10.2.0.1.0 and all earlier releases of PG4MQ Visual Workbench repositories.

Known Problems

The description of problems includes suggestions for dealing with them when possible. If you have questions or concerns about the problems, then contact Oracle Support Services. A current list of problems is available online. Contact your local Oracle office for information about accessing this list.

Maximum Open Cursors

This error might appear during a PG4MQ Visual Workbench operation:

```
ORA-01000: Maximum open cursors exceeded
```

Most Visual Workbench operations do not work correctly after this error, and the error continues to appear. To resolve this problem, set the `CLOSE_CACHED_OPEN_CURSOR` initialization parameter to `TRUE` for the Oracle server where the Visual Workbench repository resides.

See Also: "Related Documents" on page -viii for a list of books that will provide more information about this parameter

Incorrect Precision of PL/SQL Data Types

The COBOL to PL/SQL map panel occasionally lists an incorrect precision for the PL/SQL data types shown. To see the correct PL/SQL precision, view the generated PL/SQL code of a MIP to which the COBOL data profile was added. Select the data mapping entry from the list on the PL/SQL Code panel for the MIP and click **View...**. The PL/SQL package specification includes the data type definitions generated and shows the correct precision of each data type.

See Also: "Viewing the Generated Code" on page 6-17 for more information

The MIP Is Too Large

When creating an interface profile or adding data profiles to an interface profile, the MIP can become larger than the PG4MQ Visual Workbench can handle. The PG4MQ Visual Workbench reports this error as follows:

```
ORA-20004: Message Interface Package getting too large.
```

3 Requirements

The Oracle Procedural Gateway Visual Workbench for WebSphere MQ is used with the Oracle Procedural Gateway for message queuing products. This release supports release 10.2 of the Oracle Procedural Gateway for WebSphere MQ. For more information, see the *Oracle Procedural Gateway for WebSphere MQ Installation and User's Guide for Microsoft Windows* for your platform.

This release supports automatic data conversion between only two types of application, Oracle PL/SQL applications and IBM VS/COBOLII applications. You can add other data conversions manually.

This chapter contains the following sections:

- Hardware Requirements
- Software Requirements

Hardware Requirements

The hardware requirements are described in this section.

Processor

An Intel Pentium III processor is required.

Memory

A minimum of 128 MB memory is required. 256 MB of memory is recommended.

Disk Space

The PG4MQ Visual Workbench requires 300 MB (one Visual Workbench per developer).

Software Requirements

The system software configuration described in these requirements is supported by Oracle as long as the underlying system software products are supported by their respective vendors. Verify the latest support status with your system software vendors.

PG4MQ Visual Workbench Components

The PG4MQ Visual Workbench development environment has two components:

- Visual Workbench (client and server)
- Visual Workbench repository

You install the PG4MQ Visual Workbench on your Microsoft Windows (32-bit) workstation.

The PG4MQ Visual Workbench repository may reside on a different platform than the PG4MQ Visual Workbench.

Caution: Before using the Visual Workbench for development, ensure that the repository exists.

Operating System

Microsoft Windows (32-bit) is required.

Oracle Procedural Gateway

This release supports release 10.2 of the Oracle Procedural Gateway for WebSphere MQ. For more information, see the gateway installation guide for your platform.

Oracle Server

An Oracle server is required to use the gateway and the PG4MQ Visual Workbench. For more information, refer to the gateway installation guide for your platform.

File Transfer

PG4MQ Visual Workbench requires a file transfer product (such as FTP) capable of moving files between systems.

4 Preinstallation

This chapter guides you through the basic concepts and preinstallation steps for Oracle Procedural Gateway Visual Workbench for WebSphere MQ 10*g* release 2(10.2). The following topics provide information about Oracle Procedural Gateway Visual Workbench for WebSphere MQ, environment variables settings, and starting Oracle Universal Installer:

- Preinstallation Tasks
- About Oracle Universal Installer

Preinstallation Tasks

Perform the following tasks before installing the current release of PG4MQ Visual Workbench:

1. Start your operating system.
2. Log on as a member of the Administrators group to the computer on which to install the current release of PG4MQ Visual Workbench.

   Note: Do not manually set `ORACLE_HOME` in the environment path. This is done automatically in the registry.

3. Stop all Oracle services (if any are running) for the Oracle home into which you want to install PG4MQ Visual Workbench:
   a. Choose **Start** > **Settings** > **Control Panel** > **Services**
   b. If any Oracle services (their names begin with Oracle) exist and have the status Started, then select the service and click **Stop**. In particular, ensure that the Oracle listener service is stopped.
   c. Click **Close** to exit the Services window.

About Oracle Universal Installer

Oracle Universal Installer is a Java-based graphical user interface (GUI) tool that enables you to install Oracle components from the installation media.

See Also: *Oracle Universal Installer and OPatch User's Guide* for more information about Oracle Universal Installer

5 Installation

The development environment for the Oracle Procedural Gateway Visual Workbench for WebSphere MQ has two components:

- PG4MQ Visual Workbench, one for each developer, which is installed on each developer's computer using the Oracle Universal Installer
- PG4MQ Visual Workbench repository scripts, shipped with the PG4MQ Visual Workbench installation media for message queuing systems

This chapter guides you through the installation of the Oracle Procedural Gateway Visual Workbench for WebSphere MQ , including detailed installation steps. The following topics are included:

- Installation
- Removing the Software
- Visual Workbench Installation Complete
- Installing the Visual Workbench Repository

Installation

This section describes the installation steps.

Starting the Oracle Universal Installer

To start the installer, insert the PG4MQ Visual Workbench installation media into your computer's installation media drive and perform the following steps:

1. Choose **Start > Run**.
2. Enter `drive:\setup.exe` in the **Open** field of the Run dialog box, where *`drive`* is the drive designation for the installation media drive that contains the PG4MQ Visual Workbench installation media. For example, if your installation media drive is `D:`, then you would enter `d:\setup.exe`.
3. Click **OK** to start the installer.

Installing Oracle Procedural Gateway Visual Workbench for WebSphere MQ

Once you have the installer up and running, you can proceed with the installation of Oracle Procedural Gateway Visual Workbench for WebSphere MQ. The installer is essentially a wizard that presents a number of pages to you so that you can complete the installation of the Visual Workbench.

The first page that the installer presents is the Welcome page. To continue with the installation, click **Next** to display the File Locations page.

The **Source** section of the File Locations page lets you specify the source location that the installer will use to install PG4MQ Visual Workbench. You should not have to edit the file specification in the Path field. The default setting for this field points to the installer file on your PG4MQ Visual Workbench installation media.

The Name and Path fields in the Destination section of the File Locations page let you specify the destination for your installation. Type in the Name and Path of your choice. After you have set the fields in the File Locations page as necessary, click **Next** to continue. After loading the necessary information from the installation media, the installer will display the Oracle Procedural Gateway for Messaging Queuing Visual Workbench Installer page.

Click **Next** to continue and display the Summary page. The Summary page lets you review a tree list of options and componets for this installation. Click **Install** to display the Install page, which shows the status of the installation as it proceeds and also displays the location of the installer log file for this installation session.

Depending on your computer's CPU, installation media drive, and hard drive, the installer might take quite some time to complete the installation process.

After the installer copies the Oracle software to your computer, the Configuration Tools page is displayed, and Oracle Net Configuration Assistant is then run to configure Oracle's networking product (Oracle Net).

In the Oracle Net Configuration Assistant Welcome page, click **Perform typical configuration** and then click **Next**. Let the Oracle Net Configuration Assistant guide you through the rest of the installation until the End of Installation page is displayed.

The final page of the installer is the End of Installation page. If your installation was successful, then you can click **Next** to exit the installer.

Removing the Software

This section describes how to use Oracle Universal Installer to remove Oracle components (which removes them from the Oracle Universal Installer inventory) instead of removing them manually.

WARNING: If you delete an Oracle home manually (for example, by deleting the directory structure with Microsoft Windows XP Explorer), then the components in the Oracle home remain registered in the Oracle Universal Installer inventory.

If you then attempt an installation in the same Oracle home, then some or all of the components selected may not be installed because Oracle Universal Installer determines that they are already installed.

Removing Oracle Procedural Gateway Visual Workbench for WebSphere MQ using Oracle Universal Installer:

This section describes how to remove PG4MQ Visual Workbench with Oracle Universal Installer.

Starting the Oracle Universal Installer

To start the installer, insert the PG4MQ Visual Workbench installation media into your computer's installation media drive and perform the following steps:

1. Choose **Start > Run**.
2. Enter `Drive:\setup.exe` in the **Open** field of the Run dialog box, where *`Drive`* is the drive designation for the installation media drive that contains the PG4MQ Visual Workbench installation media. For example, if your installation media drive is `D:`, then you would enter `d:\setup.exe`.
3. Click **OK** to start the installer.
4. Click **Deinstall Products.** The Inventory dialog box appears.
5. Expand the tree of installed components until you find the components to remove.
6. Check the boxes of the components to remove.
7. Click **Remove**. The Inventory Confirmation window appears.
8. Click **Yes** to remove the selected components.

   Note: A message may be displayed indicating that removing some components may cause other components to not perform properly.

   The components are removed from your computer. The Inventory dialog box appears without the removed components.
9. Click **Close** to close the Inventory dialog box.
10. Click **Exit** to exit Oracle Universal Installer.

Visual Workbench Installation Complete

When the installation is complete, the PG4MQ Visual Workbench icon appears in the Oracle for Microsoft Windows (32-bit) folder:

Figure 5–1 Visual Workbench Icon

You can start the Visual Workbench after you have created the repository.

See Also: "Installing the Visual Workbench Repository"

Installing the Visual Workbench Repository

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

Preinstallation Tasks

This section describes the preinstallation tasks.

Step 1: Choose a repository server

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

Step 2: Locate the installation scripts

The Visual Workbench repository installation scripts are installed with the Visual Workbench. If the repository is to be installed on the same computer as 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 that is to be the script directory. For example:

   ```
   > md ORACLE_HOME\pg4mq\admin\repo
   ```

2. Use a file transfer program to transfer the repository zip file (`repos`*`XXX`*`.zip`, where *`XXX`* is the release number) or move all script files with the suffix `.sql` from the script file directory `(NT=ORACLE_HOME\pg4mqvwb\server\admin)` on the Visual Workbench computer to the script file directory on the repository server computer.

Step 3: 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 user `SYS`, run the following statement:

```
SQL> DESCRIBE UTL_RAW.COMPARE
```

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 user `SYS`, run the `utlraw.sql` and `prvtrawb.plb` scripts that are in the `ORACLE_HOME\rdbms\admin` directory. You must run the `utlraw.sql` script first.

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

Step 4: Ensure that the DBMS_OUTPUT package is enabled

The sample programs and installation verification programs on the distribution installation media use the standard `DBMS_OUTPUT` package.

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

```
SQL> DESCRIBE DBMS_OUTPUT.PUT_LINE
```

If the `DESCRIBE` statement is successful, then your repository server has `DBMS_OUTPUT` installed, and you can proceed to Step 5.

If the `DESCRIBE` statement fails, then install `DBMS_OUTPUT`. Refer to your Oracle server DBA.

Step 5: Ensure that the caths.sql script has been run

Ensure that the caths.sql script has been run on the Oracle database server before starting the gateway. You can verify that this has been done by doing the following:

1. Use SQL*Plus to connect to the integrating server as user `SYS`.
2. Run the following statement from SQL*Plus:

   ```
   SQL> DESCRIBE HS_FDS_INST
   ```

If the `DESCRIBE` statement is successful, then it indicates that `caths.sql` has been run for the database server. Otherwise, you must run the `caths.sql` script first.

Step 6: Create a database link

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

If you do not already have a database link, then refer to the gateway installation guide for your platform for information about creating database links.

Visual Workbench Repository Installation Tasks

Use `pgvwbrepos.sql` to install the Visual Workbench Repository on the current release. To run `pgvwbrepos.sql`, ensure that you are currently in the `ORACLE_HOME\pg4mq\admin\repo` directory and then enter:

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

Note: If you are installing the Visual Workbench Repository on Oracle8*i* or earlier, then you need to use `pgvwbrepos8.sql`. All the examples in this section are provided with the assumption that you are installing on the current release.

The script takes you through the following steps:

Step 1: Enter the database connection information

Use the default of `LOCAL` by pressing Enter.

Next, you are prompted to enter the passwords for the `SYSTEM` and `SYS` accounts of the Oracle integrating server. Press Enter after entering each password.

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

Step 2: Check for existing Workbench Repository

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

If the data dictionary exists, then the script stops. Choose another Oracle integrating server and rerun the script, starting at "Step 1: Choose a repository server" on page 5-4.

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

A. Upgrade the existing private repository to public status and proceed to Step 3.

B. Replace the existing repository with the new private repository and proceed to Step 3.

C. Stop the script.

Step 3: Check for required PL/SQL packages

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

The script stops if this software does not exist. Refer to your Oracle integrating server DBA about the missing software. After the software is installed, rerun the script.

Step 4: Install the UTL_PG package

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

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

Step 5: Create the admin user and all repository tables

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

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

Step 6: Create public synonyms and development roles

This is an optional step to change the private access privileges of the Visual Workbench repository. The private status allows 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 allows the granting of access privileges to other users besides `PGMADMIN`. If you want to give the repository public status, then enter `Y` and press Enter.

After the Repository Is Created

After creating the Visual Workbench repository, there is one optional step:

Grant development privileges for the Visual Workbench repository to users.

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

- Ensure that the repository has a public status. It has this status if you created it by using Steps 1 through 6 of the `pgvwbrepos.sql` script. If you did not use Step 6, then rerun the script. When you get to Step 2 of the script, enter `A` at the prompt to upgrade the private repository to public status.
- Use SQL*Plus to connect to the repository as user `PGMADMIN` and grant the `PGMDEV` role to each user. For example:

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

Remove the Visual Workbench Repository

To remove a Visual Workbench repository on Oracle9*i*, use the repository script `pgvwbremove.sql`. To run this script, ensure that you are currently under the Oracle integrating server directory `ORACLE_HOME\pg4mq\admin\repo` (where you copied the scripts), and then enter:

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

Note: If you are removing the Visual Workbench Repository on Oracle8*i* or earlier, then you need to use `pgvwbremove8.sql`. All the examples in this section are provided with the assumption that you are installing on the current release.

The script takes you through the following steps:

Step 1: Enter the database connection information

Use the default of `LOCAL` by pressing Enter.

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

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

Step 2: Check for 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 under this step.

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

6

Using the Oracle Procedural Gateway Visual Workbench for WebSphere MQ

This chapter describes how to use the Oracle Procedural Gateway Visual Workbench for WebSphere MQ to connect to a PG4MQ Visual Workbench repository, create new data profiles, update and remove data profiles associated with an interface profile, create new message profiles, update and remove a message profile associated with an interface profile, create and update MIPs, test the message queuing gateway associated with a MIP, compile a MIP, use the MIP templates to test the generated MIP and the data conversion package, and prepare a MIP for production.

This chapter contains the following sections:

Overview of PG4MQ Visual Workbench Development

During a typical PG4MQ Visual Workbench development session, you do the following:

1. Start the Oracle Procedural Gateway Visual Workbench for WebSphere MQ by double-clicking its icon in the Start menu list of programs in the Oracle for Microsoft Windows (32-bit) folder, then connect to the PG4MQ Visual Workbench for WebSphere MQ.

See Also: "Starting the PG4MQ Visual Workbench and Connecting to a Repository" on page 6-3 for more information

2. Create one or more data profiles for the messages you want to exchange with a non-Oracle application. For example, for COBOL messages, import the corresponding COBOL copybook to create the data profile. The PG4MQ Visual Workbench maintains data profiles in a repository at the Oracle server.

   See Also: "Creating a Data Profile" on page 6-5 for more information

3. Create one message queue profile to specify how and where inter-application messages are to be sent or retrieved. The PG4MQ Visual Workbench stores the message queue profile in a repository.

   See Also: "Creating a Message Queue Profile" on page 6-9 for more information

4. Using the PG4MQ Visual Workbench Wizard, define the interface profile by selecting one or more data profiles and one message queue profile to associate with the interface. The PG4MQ Visual Workbench automatically generates the MIP.

   See Also: "Creating an Interface Profile and Generating a MIP" on page 6-14 for more information

5. Test the message queuing gateway associated with the MIP.

   See Also: "Testing the Gateway" on page 6-22 for more information

6. Compile the MIP in the PG4MQ Visual Workbench repository.

   See Also: "Compiling the MIP" on page 6-26 for more information

7. Complete the MIP procedures in the PG4MQ Visual Workbench repository.

   See Also: "Using the MIP Templates" on page 6-28 includes information about testing the MIP procedures.

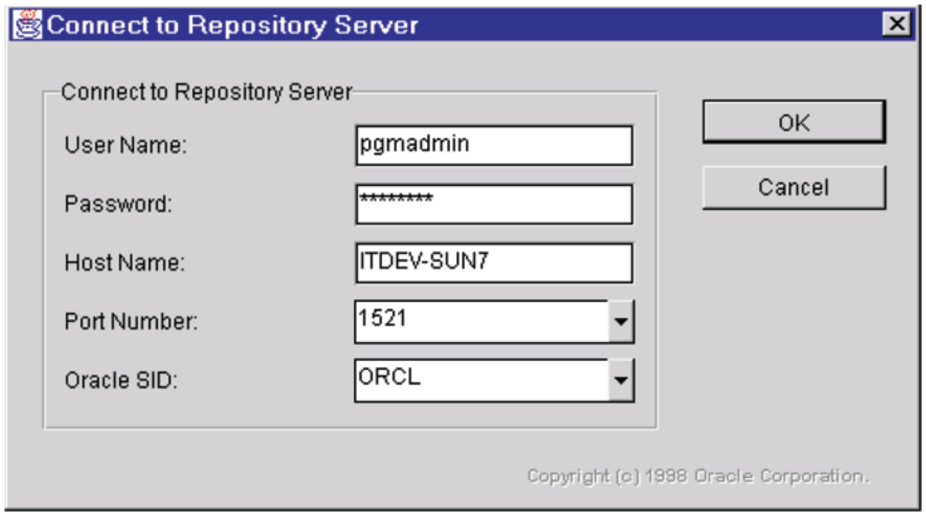
8. Compile the MIP on the production Oracle server, and test it there.

   See Also: "Preparing the MIP for Production" on page 6-34 for more information

Starting the PG4MQ Visual Workbench and Connecting to a Repository

Start the PG4MQ Visual Workbench by double-clicking its icon in the Start menu list of programs in the Oracle for Microsoft Windows (32-bit) folder. The Connect dialog box appears. (Refer to Figure 6–1)

Figure 6–1 Dialog Box to Connect to the Repository Server



Connect to Repository Server

User Name: pgmadmin

Password: ********

Host Name: ITDEV-SUN7

Port Number: 1521

Oracle SID: ORCL

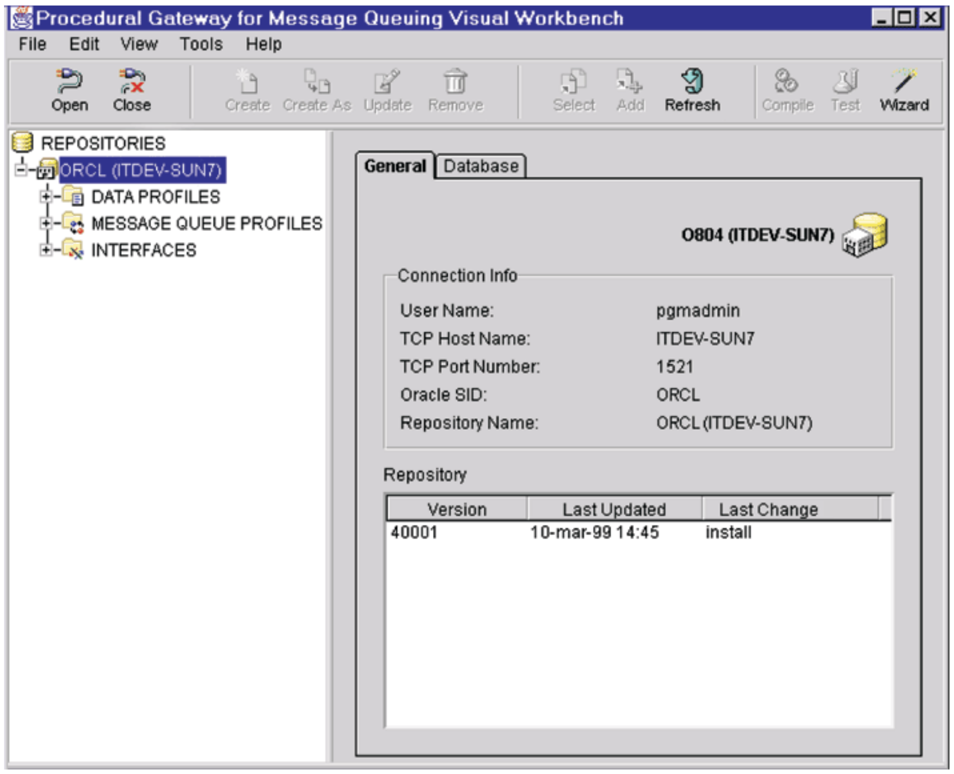
Copyright (c) 1998 Oracle Corporation.

Modify the fields in the Connect dialog box to identify the computer where the PG4MQ Visual Workbench repository is located, then click **OK**.

Terms	Description
User Name	Name under which you logged on. To use the PG4MQ Visual Workbench, you must have an account on the Oracle server where the PG4MQ Visual Workbench repository resides. The default is the `PGMADMIN` account, which is generated by the repository installation scripts.
Password	Password associated with the user name
Host Name	Name of the computer where the PG4MQ Visual Workbench repository resides. The default is the name of the computer from which you are running the PG4MQ Visual Workbench. If you do not know the name of the host computer, then ask your DBA. Depending on how your Microsoft Windows (32-bit) workstation is set up, the host file may not contain the host name. If the host file does not contain this name, then you must enter the IP address in the Host Name field or edit the host file to include the host name.
Port Number	Port number of the Oracle server where the repository resides. It is usually the default of 1521, the port number used for standard Oracle installations. If you have a custom Oracle installation, then ask the DBA (who installed the Oracle server) for the port number.
Oracle SID	System identifier (SID) for the Oracle server where the repository is installed. It is usually the default of `ORCL`, the SID used for standard Oracle installations. If you have a custom Oracle installation, then ask the DBA (who installed the Oracle server) for the correct SID.

After connecting to a PG4MQ Visual Workbench repository, the PG4MQ Visual Workbench window shows information about it. (Refer to Figure 6–2)

Figure 6–2 PG4MQ Visual Workbench Repository Window



User Name:	pgmadmin
TCP Host Name:	ITDEV-SUN7
TCP Port Number:	1521
Oracle SID:	ORCL
Repository Name:	ORCL (ITDEV-SUN7)

Version	Last Updated	Last Change
40001	10-mar-99 14:45	install

The example shows the expanded PG4MQ Visual Workbench repository directory tree and the General panel containing connect information and the repository's history of events. Select the Database tab to see information about the Oracle server where the PG4MQ Visual Workbench repository resides.

To connect to another repository, click the **Open** icon in the tool bar and enter the suitable connect information in the dialog box.

You can start actions in the PG4MQ Visual Workbench by clicking the suitable icons in the tool bar, or by opening the suitable drop-down list on the menu bar, then selecting a function from the menu. For example, to connect to a repository, you can open the File menu and select **Open Repository**.

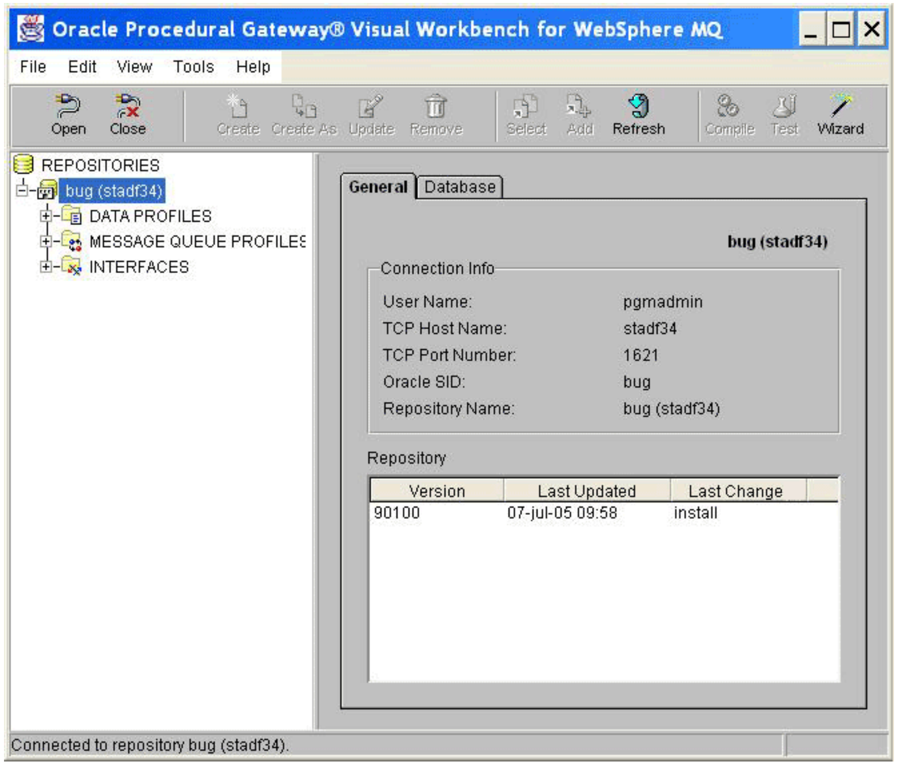
Creating a Data Profile

After connecting to a PG4MQ Visual Workbench repository, create one or more data profiles. **Data profiles** define the data definitions that the PG4MQ Visual Workbench uses to map between non-Oracle data types and PL/SQL data types. The PG4MQ Visual Workbench maintains these definitions in the repository at the Oracle server.

For example, to create a COBOL data profile in a PG4MQ Visual Workbench repository:

1. Open the repository by double-clicking the repository icon or by clicking the plus sign next to the repository icon.

Figure 6–3 Click the plus icon to open the repository



bug (stadf34)

Connection Info

User Name:	pgmadmin
TCP Host Name:	stadf34
TCP Port Number:	1621
Oracle SID:	bug
Repository Name:	bug (stadf34)

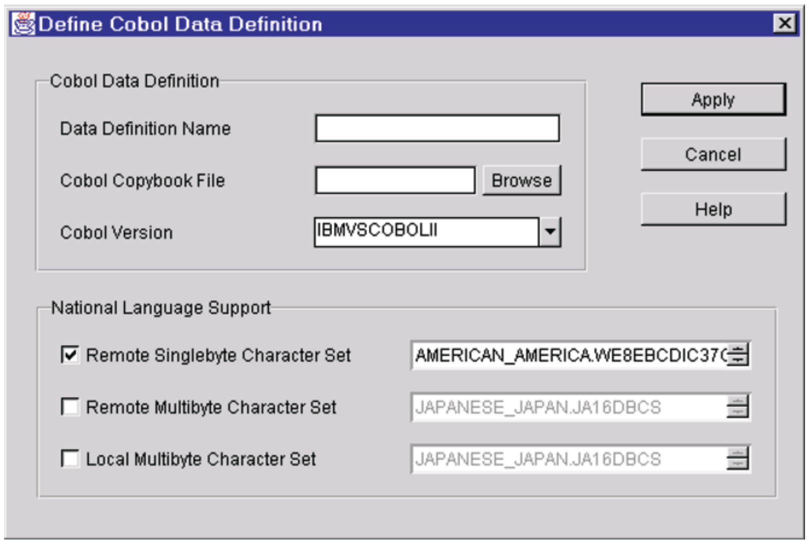
Repository

Version	Last Updated	Last Change
90100	07-jul-05 09:58	install

Connected to repository bug (stadf34).

2. Open the Data Profiles folder.
3. Select the COBOL folder by clicking it once.
4. Click the **Create** icon in the tool bar. The Define COBOL Data Definition dialog box appears. (Refer to Figure 6–4).

Figure 6–4 Dialog Box to Define COBOL Data Definition



Data Definition Name	
Cobol Copybook File	
Cobol Version	IBMVSCOBOLII

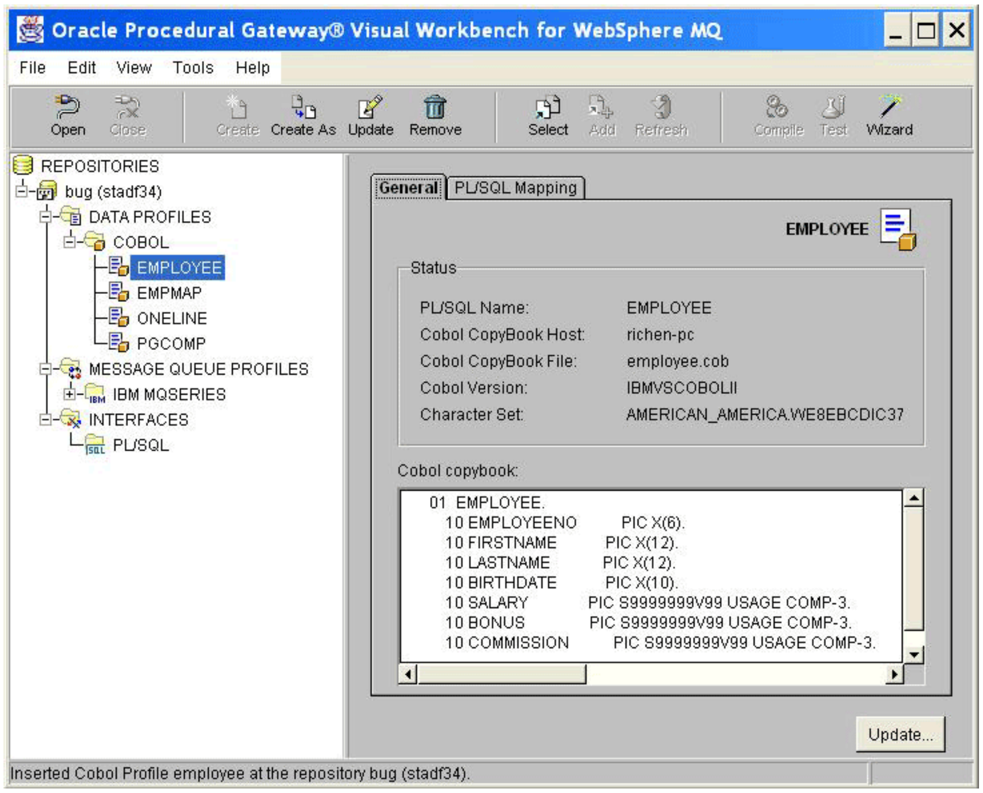
☑ Remote Singlebyte Character Set	AMERICAN_AMERICA.WE8EBCDIC37C
☐ Remote Multibyte Character Set	JAPANESE_JAPAN.JA16DBCS
☐ Local Multibyte Character Set	JAPANESE_JAPAN.JA16DBCS

Terms	Description
Data Definition Name	Name of the COBOL data definition to map to PL/SQL. The Data Definition Name: ■ Must be unique ■ Must be 1 to 22 characters in length ■ Can contain alphanumeric characters and the underscore (_) character ■ Is not case-sensitive
COBOL Copybook File	Name of the COBOL copybook file containing the structure of the COBOL data definition. The PG4MQ Visual Workbench uses this file to determine the correct mapping to PL/SQL. Use **Browse** to search your local computer for copybook files. The sample copybook files are in`ORACLE_HOME\pg4mqvwb\demo\cobol`, where `ORACLE_HOME` is the directory in which the PG4MQ Visual Workbench is installed. **See Also:** Chapter 5, "Installation" for more information.
COBOL Version	Must be `IBMVSCOBOLII`
National Language Support	Specifies the character sets for data conversion between the local and remote systems: ■ **Remote Singlebyte Character Set** specifies the Oracle national language support (NLS) name in which the remote system data for all single-byte character set fields are encoded. The default is `AMERICAN_AMERICA.WE8EBCDIC37C`, in the format `language_territory.charset`. If the remote system uses a different single-byte character set, then click **Remote Singlebyte Character Set** and select the appropriate set. ■ **Remote Multibyte Character Set** specifies the Oracle NLS name in which the remote system data for all multi-byte character set fields are encoded. The default is `JAPANESE_JAPAN.JA16DBCS`, in the format `language_territory.charset`. If the remote system uses a different multi-byte character set, then click **Remote Multibyte Character Set** and choose the appropriate set. ■ **Local Multibyte Character Set** specifies the Oracle NLS name in which the local system data for all multibyte character set fields are encoded. The default is `JAPANESE_JAPAN.JA16DBCS`, in the format `language_territory.charset`. If the local system uses a different multibyte character set, then click **Local Multibyte Character Set** and select the suitable set.

After entering the data definition information, click **Apply**. The PG4MQ Visual Workbench creates the data mapping to PL/SQL in the repository and displays the copybook and resulting mapping information.

The following example shows a newly created data profile named `EMPLOYEE` and its copybook file. (Refer to Figure 6–5).

Figure 6–5 Copybook and Mapping Information for EMPLOYEE Data Profile



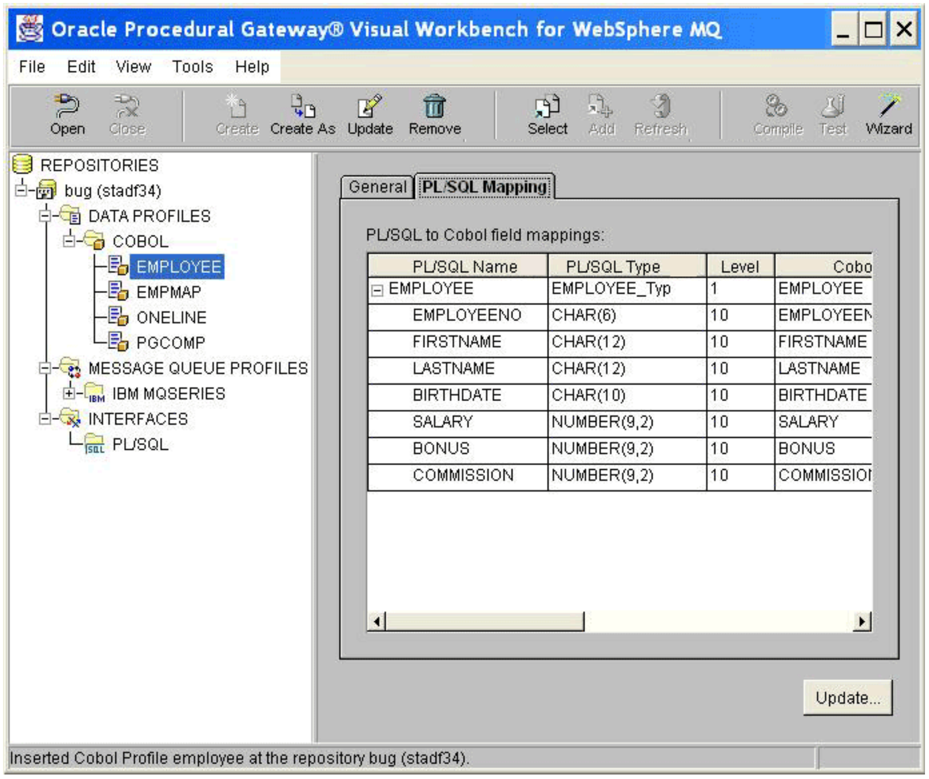
PL/SQL Name: EMPLOYEE
Cobol CopyBook Host: richen-pc
Cobol CopyBook File: employee.cob
Cobol Version: IBMVSCOBOLII
Character Set: AMERICAN_AMERICA.WE8EBCDIC37

```
 01  EMPLOYEE.
     10 EMPLOYEENO       PIC X(6).
     10 FIRSTNAME        PIC X(12).
     10 LASTNAME         PIC X(12).
     10 BIRTHDATE        PIC X(10).
     10 SALARY         PIC S9999999V99 USAGE COMP-3.
     10 BONUS          PIC S9999999V99 USAGE COMP-3.
     10 COMMISSION       PIC S9999999V99 USAGE COMP-3.
```

Inserted Cobol Profile employee at the repository bug (stadf34).

Select the **PL/SQL Mapping** tab to see the PL/SQL mapping for the new data profile. (Refer to Figure 6–6).

Figure 6–6 PL/SQL Mapping for EMPLOYEE Data Profile



PL/SQL to Cobol field mappings:

PL/SQL Name	PL/SQL Type	Level	Cobo
⊟ EMPLOYEE	EMPLOYEE_Typ	1	EMPLOYEE
EMPLOYEENO	CHAR(6)	10	EMPLOYEEN
FIRSTNAME	CHAR(12)	10	FIRSTNAME
LASTNAME	CHAR(12)	10	LASTNAME
BIRTHDATE	CHAR(10)	10	BIRTHDATE
SALARY	NUMBER(9,2)	10	SALARY
BONUS	NUMBER(9,2)	10	BONUS
COMMISSION	NUMBER(9,2)	10	COMMISSIOI

Inserted Cobol Profile employee at the repository bug (stadf34).

Updating a Data Profile

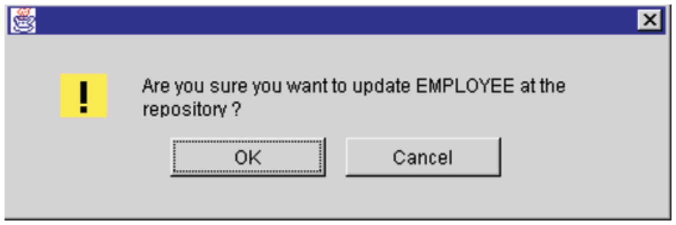
The following example describes how to update a COBOL data profile:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Data Profiles folder.
3. Open the COBOL folder.
4. Select the data profile to update by clicking it once.
5. Click the **Update** icon in the tool bar.
6. The Define COBOL Data Definition dialog box appears.

See Also: "Creating a Data Profile" on page 6-5 for details about this dialog box

7. Modify the properties as necessary, then click **Apply**.
8. A dialog box asks you to confirm the update. (Refer to Figure 6–7.)

Figure 6–7 Dialog Box to Update a Data Profile


Are you sure you want to update EMPLOYEE at the repository ?

9. Click **OK** to confirm the update.

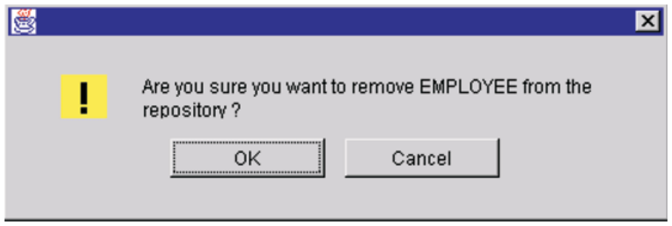
   Updating a data profile that is associated with an interface updates the interface profile and the generated MIP. Before updating the data profile, the PG4MQ Visual Workbench prompts you to confirm the change.

Removing a Data Profile

This example tells how to remove a COBOL data profile:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Data Profiles folder.
3. Open the COBOL folder.
4. Select the data profile to update by clicking it once.
5. Click the **Remove** icon in the tool bar.
6. A dialog box asks you to confirm the removal. (Refer to Figure 6–8.)

Figure 6–8 Dialog Box to Remove a Data Profile


Are you sure you want to remove EMPLOYEE from the repository ?

7. Click **OK** to remove the data profile.

   Removing a data profile that is associated with an interface removes the data profile both from that interface profile and from the generated MIP. Before removing the data profile, the PG4MQ Visual Workbench prompts you to confirm the removal.

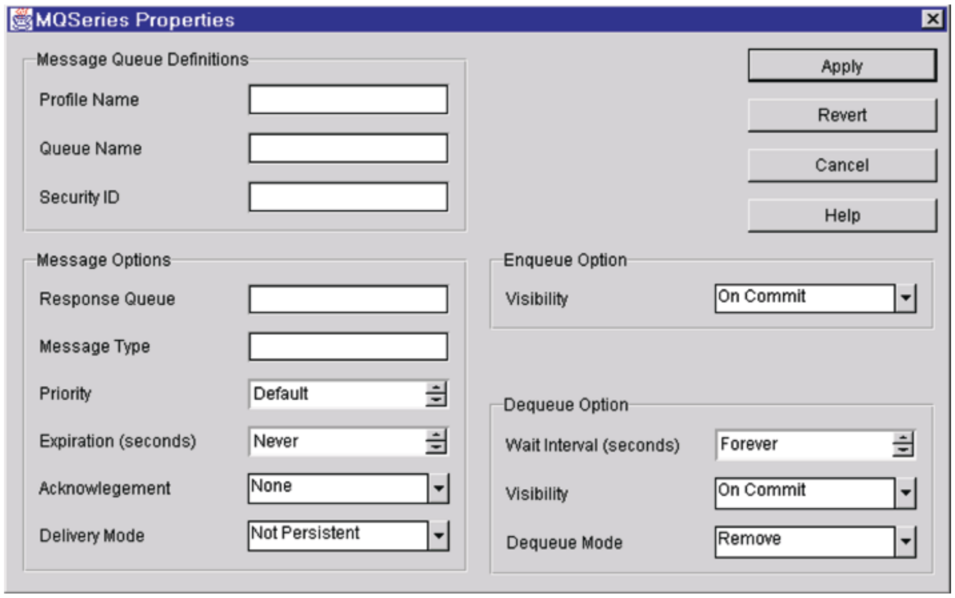
Creating a Message Queue Profile

After connecting to a PG4MQ Visual Workbench repository and creating one or more data profiles, create a message queue profile. The message queue profile specifies how and where inter-application messages are to be sent and retrieved. The PG4MQ Visual Workbench maintains these definitions in the PG4MQ Visual Workbench repository at an Oracle server, where the message queuing system accesses it using a message queuing gateway.

For example, to create a message queue profile for a WebSphere MQ system:

1. Open the PG4MQ Visual Workbench repository by double-clicking the repository icon or by clicking the plus sign next to the repository icon.
2. Open the Message Queue Profiles folder.
3. Select the WebSphere MQ folder by clicking it once.
4. Click the **Create** icon in the tool bar. The MQSeries Properties dialog box appears. (Refer to Figure 6–9.)

Figure 6–9 Dialog Box for MQSeries Properties



Message Queue Definitions
Profile Name
Queue Name
Security ID

Message Options
Response Queue
Message Type
Priority: Default
Expiration (seconds): Never
Acknowlegement: None
Delivery Mode: Not Persistent

Enqueue Option
Visibility: On Commit

Dequeue Option
Wait Interval (seconds): Forever
Visibility: On Commit
Dequeue Mode: Remove

Message Queue Definitions

Profile Name

Unique name you specify for this message queue definition. The **Profile Name**:

- Must be unique
- Can contain alphanumeric characters, plus the characters underscore (_), dollar sign ($), and number sign (#)
- Is not case-sensitive

Queue Name

Name of the message queue where messages are to be sent or retrieved. **Queue Name** is case-sensitive. You must enter the name in the correct case. **Queue Name** can be up to 48 characters long. The administrator who set up the message queuing system can supply this name.

Security ID

Security identity associated with the application that is sending (enqueuing) the message. The security identity is an optional password that might be used between applications. If the sending application uses a security ID, then the message queuing system forwards it from the sending application to the retrieving (dequeuing) application. **Security ID** can be up to 12 characters long.

Message Options

Response Queue

Name of the queue in which response messages are to be returned by the retrieving application. This queue name is forwarded by the message queuing system as is, from the enqueuing application to the dequeuing application.

The applications are responsible for usage of the specified response queue. **Response Queue** is case-sensitive and can be up to 48 characters long. A **Response Queue** must be specified if the **Acknowledgment** parameter is set to either **Positive** or **Negative**.

Message Queue Definitions

Message Type

Specifies an application-supplied, free-format description of the message forwarded by the message queuing system. **Message Type** indicators can be up to 8 characters long.

Priority

Specifies the priority of the message for an `ENQUEUE` operation. Refer to the documentation for your message queuing system for a definition of priority, because definitions vary according to the message queuing system you are using.

For the WebSphere MQ product, the minimum value is 0, and the maximum value is 9. **Default** is the default for the queue, as specified by the message queuing system.

Expiration

Specifies when the message expires, determining in seconds how long the message is available for dequeuing:

- **Never** specifies that the message does not expire and is available on the queue for an unlimited time.
- *nn* specifies the number of seconds the message remains on the queue. Depending on how the queues and the event handling of the message queuing system are configured, the message queuing system might place expired messages on dedicated event queues.

For the WebSphere MQ product, the minimum value is 1, and the maximum value is 231-1.

Acknowledgment

Specifies whether the enqueuing application receives an acknowledgment when the dequeuing application retrieves a message:

- **None** specifies no acknowledgment message.
- **Positive** specifies that an acknowledgment message is provided both when a message is retrieved and when it is not retrieved.
- **Negative** specifies that an acknowledgment message is provided only if the message is not retrieved.

The **Acknowledgment** message is delivered to the queue specified by the **Response Queue** parameter.

Delivery Mode

Specifies whether messages are kept on the queue after a system failure:

- **Not Persistent** specifies that the message is removed from the queue after a system failure. This is the default.
- **Persistent** specifies that a message is kept on the queue after a system failure.

Enqueue Option

Visibility

Specifies transaction behavior of the `ENQUEUE` requests:

- **On Commit** specifies that the `ENQUEUE` is part of the current transaction. The operation is completed when the transaction commits. **On Commit** is the default.
- **Immediate** specifies that the `ENQUEUE` is not part of the current transaction. The operation constitutes a transaction of its own.

Dequeue Option

Wait Interval

Defines the time, in seconds for a `DEQUEUE` operation to wait if no message is available on the queue. For the WebSphere MQ product, the minimum value is 0, and the maximum value is 231-1.

- **Forever** specifies that a `DEQUEUE` operation waits an unlimited time. **Forever** is the default.
- **No_Wait** specifies that a `DEQUEUE` operation does not wait if no message is available.
- *nn* specifies the wait time in seconds.

Visibility

Specifies transaction behavior of the `DEQUEUE` requests:

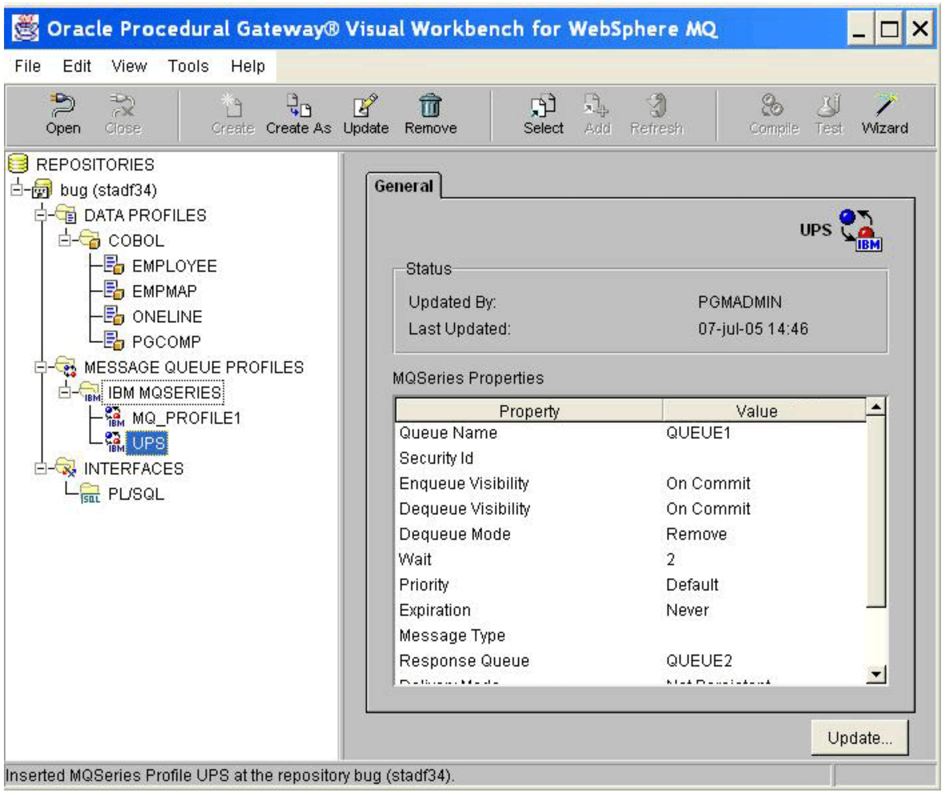
- **On Commit** specifies that the `DEQUEUE` is part of the current transaction. The operation is completed when the transaction commits. **On Commit** is the default.
- **Immediate** specifies that the `DEQUEUE` is not part of the current transaction. The operation constitutes a transaction of its own.

Message Queue Definitions	
Dequeue Mode	Specifies how messages are read from the queue: ■ **Remove** reads the message and removes it from the queue. **Remove** is the default. ■ **Browse** reads a message from the queue but does not remove it.

After entering the message queue information, click **Apply**.

The following example shows a newly created message queue profile named UPS and its properties. (Refer to Figure 6–10.)

Figure 6–10 Message Queue Profile Example



Status

Updated By: PGMADMIN
Last Updated: 07-jul-05 14:46

MQSeries Properties

Property	Value
Queue Name	QUEUE1
Security Id	
Enqueue Visibility	On Commit
Dequeue Visibility	On Commit
Dequeue Mode	Remove
Wait	2
Priority	Default
Expiration	Never
Message Type	
Response Queue	QUEUE2

Inserted MQSeries Profile UPS at the repository bug (stadf34).

Updating a Message Queue Profile

The following example describes how to update a message queue profile:

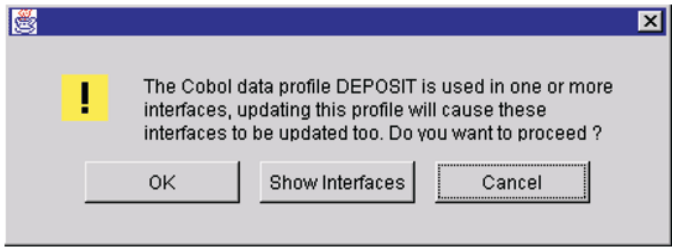
1. Open the PG4MQ Visual Workbench repository.
2. Open the Message Queue Profiles folder.
3. Open the WebSphere MQ folder.
4. Select the message queue profile to update by clicking it once.
5. Click the **Update** icon in the tool bar.
6. The Message Queue Properties dialog box appears.

See Also: "Creating a Message Queue Profile" on page 6-9 for details about this dialog box

7. Modify the properties as necessary, then click **Apply**.

Updating a message queue profile that is associated with an interface updates the interface profile and the generated MIP. If the message queue profile you are updating is being used by an interface profile, then a message prompts you to confirm the change. (Refer to Figure 6–11.)

Figure 6–11 Dialog Box to Confirm a Change

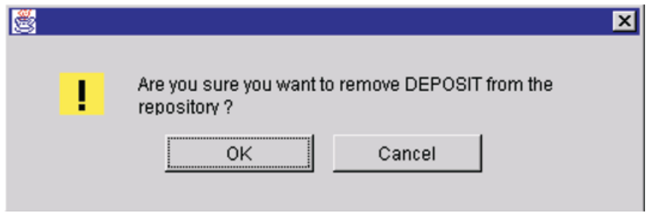

The Cobol data profile DEPOSIT is used in one or more interfaces, updating this profile will cause these interfaces to be updated too. Do you want to proceed ?

Removing a Message Queue Profile

The following example shows how to remove a message queue profile from the repository:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Message Queue Profiles folder.
3. Open the WebSphere MQ folder.
4. Select the message queue profile to update by clicking it once.
5. Click the **Remove** icon in the tool bar.
6. A dialog box asks you to confirm the removal. (Refer to Figure 6–12.)

Figure 6–12 Dialog Box to Confirm Removal of a Profile


Are you sure you want to remove DEPOSIT from the repository ?

Click **OK** to remove the message queue profile.

Removing a message queue profile that is associated with an interface removes the message queue profile both from that interface profile and from the generated MIP. If the message queue profile you are removing is being used by an interface profile, then a message prompts you to confirm the change.

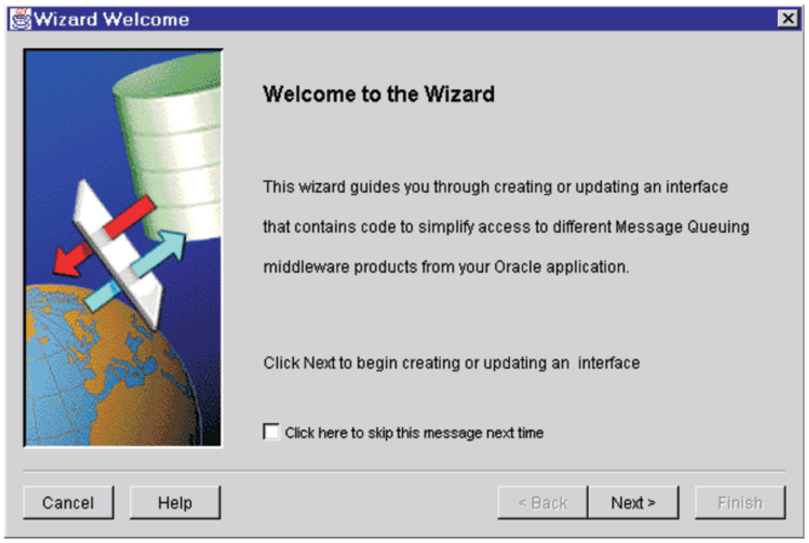
Creating an Interface Profile and Generating a MIP

After creating one or more data profiles and one message queue profile, you are ready to create an interface profile. To create an interface profile, you use the PG4MQ Visual Workbench Wizard to select one or more data profiles and one message queue profile. After you have selected the profiles, the PG4MQ Visual Workbench uses the profile information to generate a MIP. The MIP provides a PL/SQL interface that defines the exchange and conversion of messages between your Oracle application and the non-Oracle application.

You can start the Wizard by clicking the **Wizard** icon in the PG4MQ Visual Workbench tool bar to start the Wizard (for a description of another way to start the Wizard. The Welcome window appears. (Refer to Figure 6–13)

See Also: "Alternative method for starting the Wizard to create an interface" on page 6-16

Figure 6–13 Wizard Welcome Window



Wizard Welcome

Welcome to the Wizard

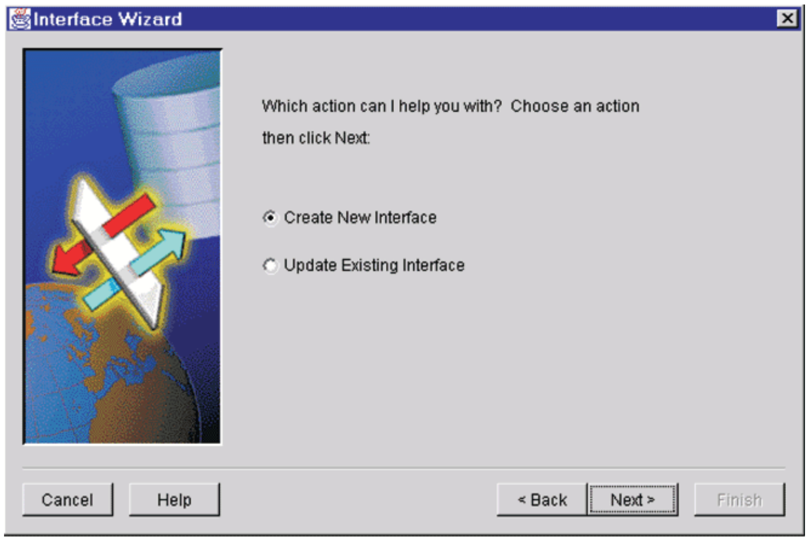
This wizard guides you through creating or updating an interface that contains code to simplify access to different Message Queuing middleware products from your Oracle application.

Click Next to begin creating or updating an interface

☐ Click here to skip this message next time

Click **Next** to see the next Wizard window, and select **Create New Interface**. (Refer to Figure 6–14.)

Figure 6–14 Wizard Interface Window



Which action can I help you with? Choose an action then click Next:

[✓ Create New Interface]

Update Existing Interface

Click **Next** to begin the Wizard's step-by-step instructions to:

- Enter a PG4MQ Visual Workbench repository name
- Name the interface profile, which becomes the name of the generated MIP
- Specify a database link
- Add one data profile
- Add one message queue profile
- Click **Finish** after verifying your selections, signaling the PG4MQ Visual Workbench to generate the MIP code

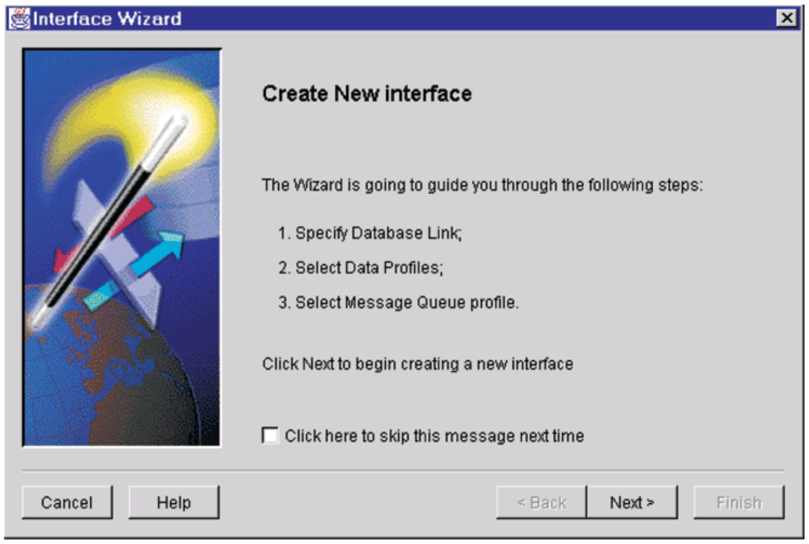
If you need help using the Wizard, then click **Help**.

Alternative method for starting the Wizard to create an interface

Another way to start the Wizard to create an interface is to:

1. Open a PG4MQ Visual Workbench repository
2. Open the Interfaces folder
3. Select the PL/SQL folder
4. Click the **Create** icon on the tool bar. The Create New Interface window of the Wizard appears. (Refer to Figure 6–15.)

Figure 6–15 Create New Interface Window of Wizard



Create New interface

The Wizard is going to guide you through the following steps:

1. Specify Database Link;
2. Select Data Profiles;
3. Select Message Queue profile.

Click Next to begin creating a new interface

☐ Click here to skip this message next time

Click **Next** to begin the Wizard's step-by-step instructions to:

- Name the interface profile, which becomes the name of the generated MIP
- Specify a database link
- Add one data profile
- Add one message queue profile
- Click **Finish** after verifying your selections, signaling the PG4MQ Visual Workbench to generate the MIP code

If you need help using the Wizard, then click **Help**.

Note: The MIP generated with this release of the PG4MQ Visual Workbench is not compatible with the MIP released with the PG4MQ Visual Workbench release 9.2.0.x.x and earlier. You must modify applications that use the Beta version of the MIP.

The PG4MQ Visual Workbench repository is not compatible with the MIP released with the PG4MQ Visual Workbench release 4.0.1.1.1 and earlier. You must re-create interface profiles that were created and stored in the repository with the beta release.

Viewing the Generated Code

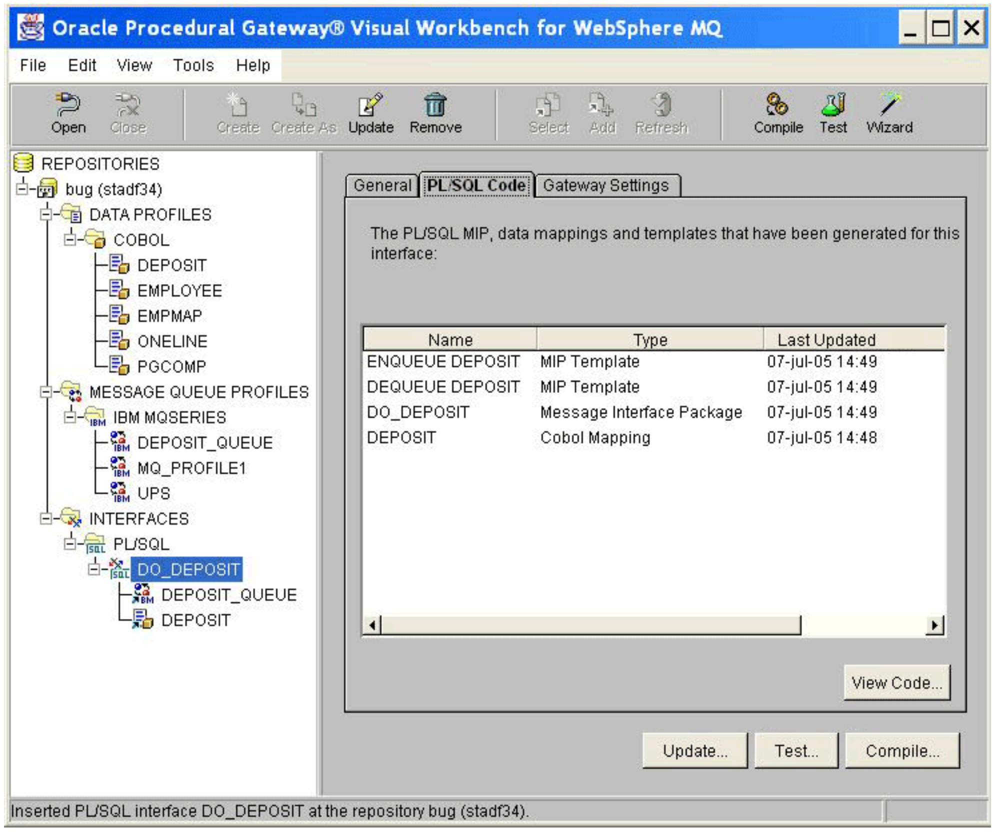
After you create an interface profile with the Wizard, the PG4MQ Visual Workbench generates:

- The new MIP
- One data mapping package for each data profile in the MIP
- MIP templates that show you how to use the generated MIP, the template code can be used as the starting point for development.

See Also: "Using the MIP Templates" on page 6-28 for more information about MIP templates

The following example shows generated code packages for a MIP named DO_DEPOSIT. (Refer to Figure 6–16.)

Figure 6–16 DO_DEPOSIT MIP Example



The PL/SQL MIP, data mappings and templates that have been generated for this interface:

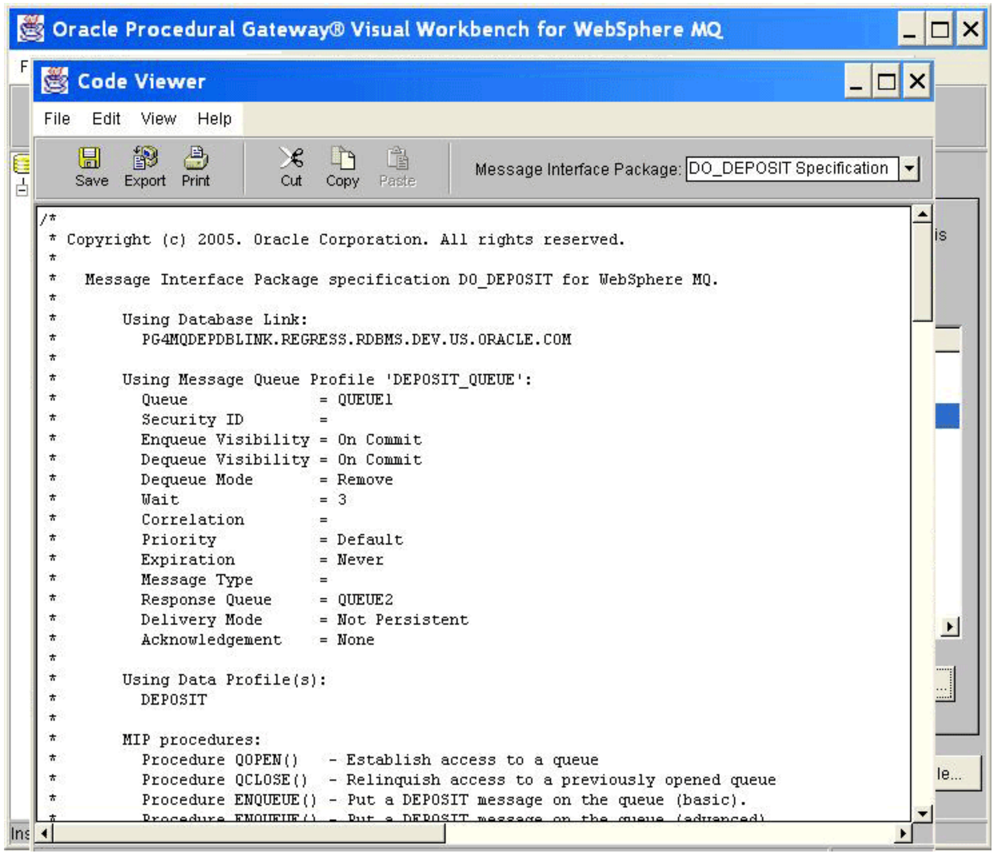
Name	Type	Last Updated
ENQUEUE DEPOSIT	MIP Template	07-jul-05 14:49
DEQUEUE DEPOSIT	MIP Template	07-jul-05 14:49
DO_DEPOSIT	Message Interface Package	07-jul-05 14:49
DEPOSIT	Cobol Mapping	07-jul-05 14:48

Inserted PL/SQL interface DO_DEPOSIT at the repository bug (stadf34).

To see the MIP or template code, select the **PL/SQL Code** tab. Select an entry from the PL/SQL code list by clicking its name once, andthen clicking **View Code...**. The Code Viewer window appears.

The example shown in Figure 6–17 illustrates the MIP specification for the MIP named `DO_DEPOSIT`.

Figure 6–17 Code Viewer Window


Oracle Procedural Gateway® Visual Workbench for WebSphere MQ
Code Viewer
File Edit View Help
Save Export Print
Cut Copy Paste
Message Interface Package: DO_DEPOSIT Specification

```
/*
 * Copyright (c) 2005. Oracle Corporation. All rights reserved.
 *
 *   Message Interface Package specification DO_DEPOSIT for WebSphere MQ.
 *
 *       Using Database Link:
 *         PG4MQDEPDBLINK.REGRESS.RDBMS.DEV.US.ORACLE.COM
 *
 *       Using Message Queue Profile 'DEPOSIT_QUEUE':
 *         Queue               = QUEUE1
 *         Security ID         =
 *         Enqueue Visibility  = On Commit
 *         Dequeue Visibility  = On Commit
 *         Dequeue Mode        = Remove
 *         Wait                = 3
 *         Correlation         =
 *         Priority            = Default
 *         Expiration          = Never
 *         Message Type        =
 *         Response Queue      = QUEUE2
 *         Delivery Mode       = Not Persistent
 *         Acknowledgement     = None
 *
 *       Using Data Profile(s):
 *         DEPOSIT
 *
 *       MIP procedures:
 *         Procedure QOPEN()    - Establish access to a queue
 *         Procedure QCLOSE()   - Relinquish access to a previously opened queue
 *         Procedure ENQUEUE()  - Put a DEPOSIT message on the queue (basic).
 *         Procedure ENQUEUE()  - Put a DEPOSIT message on the queue (advanced)
```

Updating a MIP

You might need to update a MIP if, for example, you need to add or remove data profiles or change the message queue profile. To update a MIP, start the PG4MQ Visual Workbench and connect to a repository.

See Also: "Starting the PG4MQ Visual Workbench and Connecting to a Repository" on page 6-3 for more information

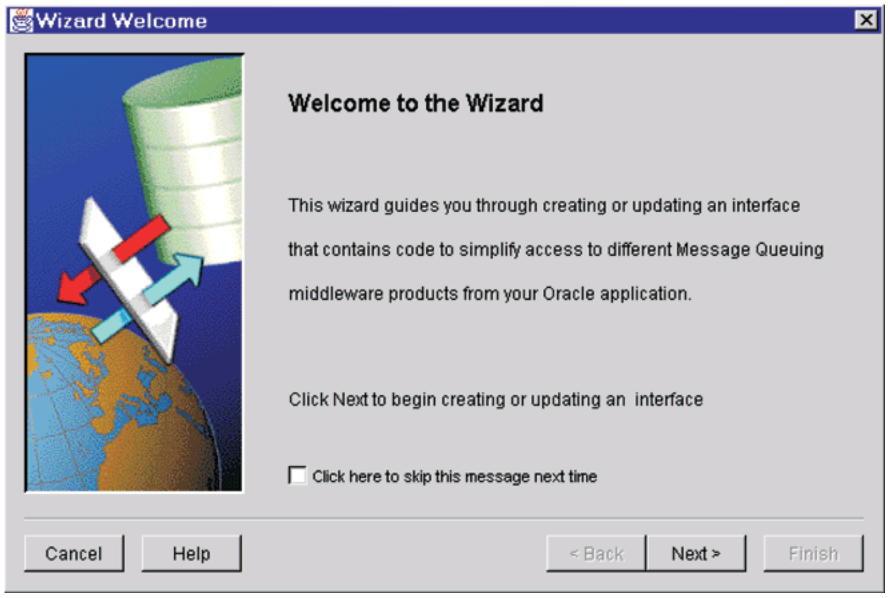
---

You can start the Wizard by clicking the **Wizard** icon in the PG4MQ Visual Workbench tool bar. The Welcome window appears. (Refer to Figure 6–18.)

See Also: "Alternative method for starting the Wizard to update an interface" on page 6-21 for a description of another way to start the Wizard

---

Figure 6–18 Wizard Welcome Window



Welcome to the Wizard

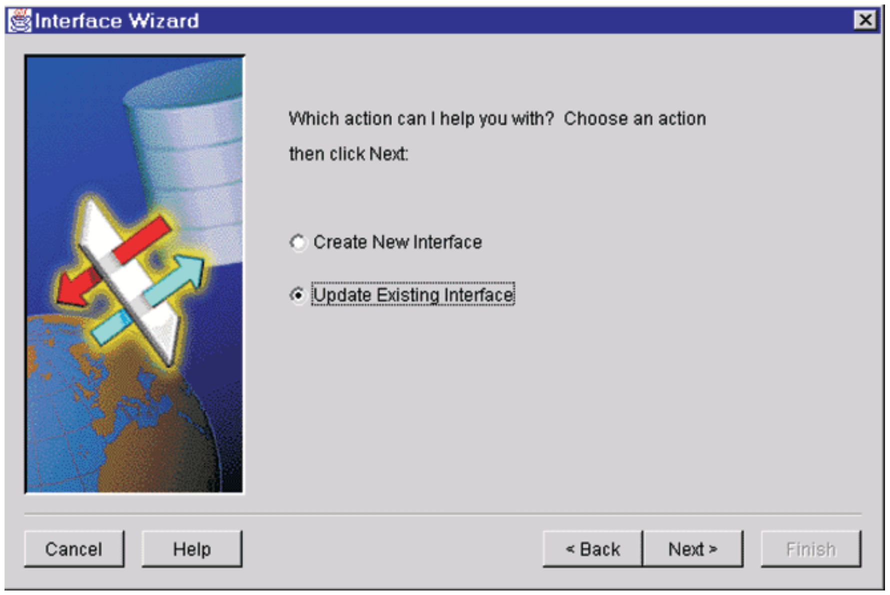
This wizard guides you through creating or updating an interface that contains code to simplify access to different Message Queuing middleware products from your Oracle application.

Click Next to begin creating or updating an interface

[ ] Click here to skip this message next time

Click **Next** to see the next Wizard window, and select **Update Existing Interface** (if you previously did not enable the Welcome window, then this is the first window you see). Refer to Figure 6–19.

Figure 6–19 Wizard Interface Window



Which action can I help you with? Choose an action then click Next:

○ Create New Interface

● Update Existing Interface

Click **Next** to begin the Wizard's step-by-step instructions to:

- Select the repository, programming language, and MIP to update
- Specify another database link if necessary
- Create a new data profile, or update the selected data profile as necessary
- Create a new message queue profile, or update the selected message queue profile

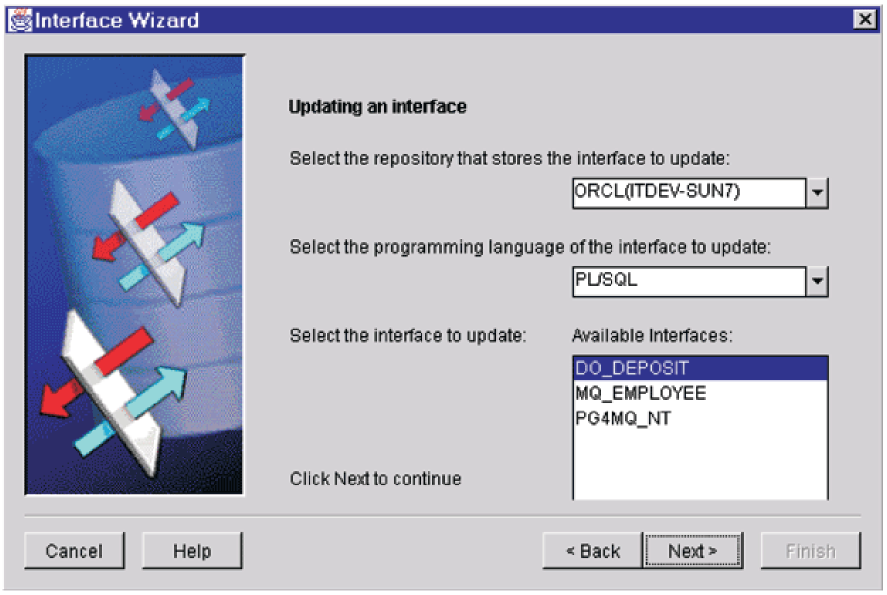
- Click **Finish** after verifying your selections, signaling the PG4MQ Visual Workbench to generate updated MIP code

Alternative method for starting the Wizard to update an interface

Another way to start the Wizard to update an interface is to:

1. Open a PG4MQ Visual Workbench repository
2. Open the Interfaces folder
3. Open the PL/SQL folder
4. Select the interface to update
5. Click the **Update** icon on the tool bar. The Update Interface window of the Wizard appears. (Refer to Figure 6–20.)

Figure 6–20 Updating an Interface Window for Wizard



Updating an interface

Select the repository that stores the interface to update: ORCL(ITDEV-SUN7)

Select the programming language of the interface to update: PL/SQL

Select the interface to update: Available Interfaces:

DO_DEPOSIT
MQ_EMPLOYEE
PG4MQ_NT

Click Next to continue

Click **Next** to begin the Wizard's step-by-step instructions to:

- Specify a database link
- Create a new data profile, or update the selected data profile as necessary
- Create a new message queue profile, or update the selected message queue profile
- Click **Finish** after verifying your selections, signaling the PG4MQ Visual Workbench to generate updated MIP code.

If you need help using the Wizard, then click **Help**.

Testing the Gateway

When you create a MIP, the PG4MQ Visual Workbench generates gateway test code. Use this code to test the message queuing gateway associated with the MIP.

To test the `ENQUEUE` operation, the gateway test code sends a string of numbers through the message queuing gateway to the queue specified by the message queue profile. The result of the test appears on a status panel.

To test the DEQUEUE operation, the gateway test code tries to retrieve a message, through the gateway, from the message queue specified by the message queue profile. The result of the test appears on a status panel.

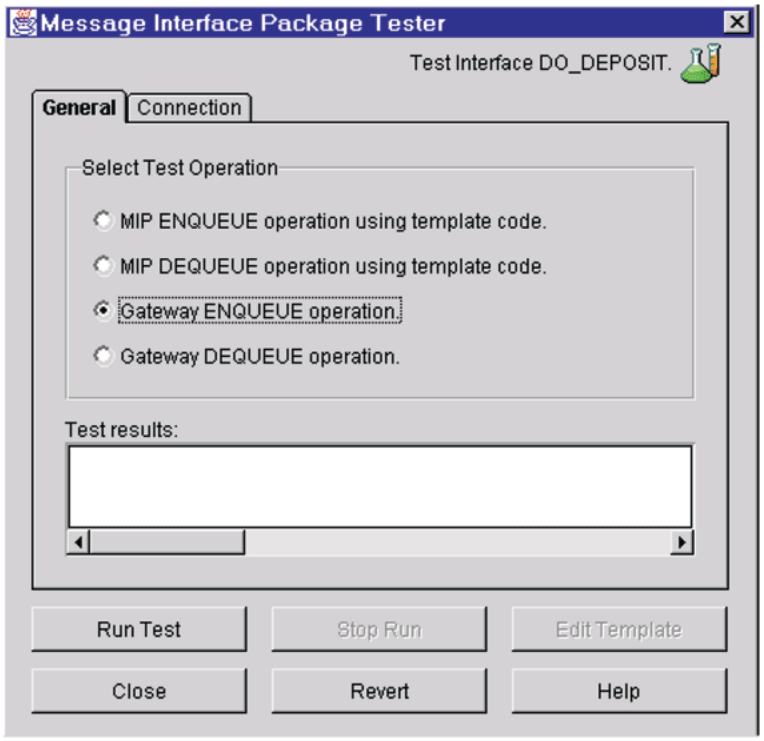
Note: The gateway test code does not call the data conversion package or the MIP.

To test the gateway:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Interfaces folder.
3. Open the PL/SQL folder.
4. Select a MIP by clicking it.
5. Click the **Test** icon in the tool bar or the **Test** button on a panel.

   The Message Interface Package Tester dialog box appears. By default, the PG4MQ Visual Workbench runs the gateway test on the computer where the repository resides. To conduct the test on a different server, select the **Connection** tab and modify the connection information.
6. On the **General** panel, select **Gateway ENQUEUE Operation**. (Refer to Figure 6–21.)

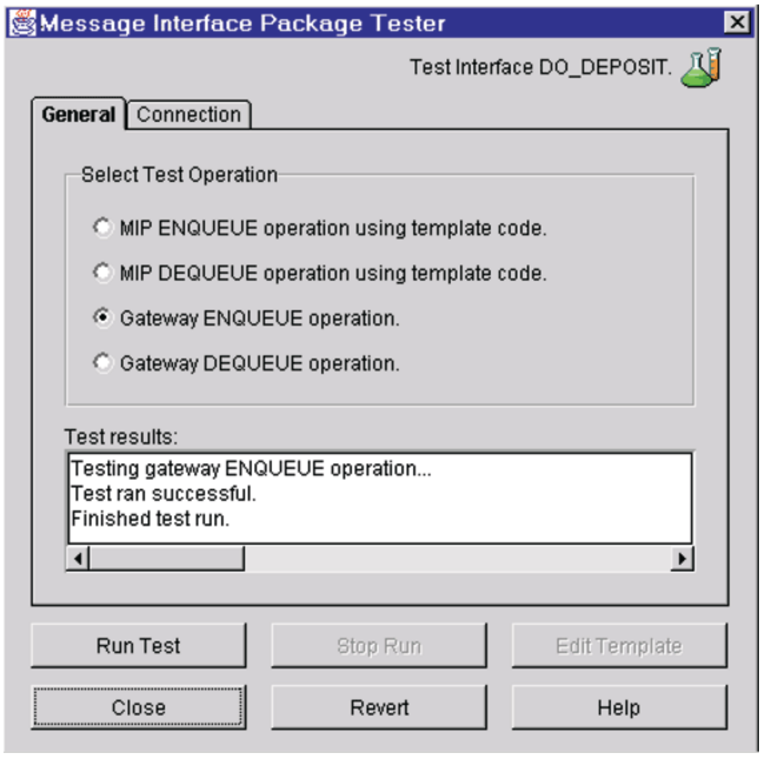
Figure 6–21 Dialog Box for Message Interface Package Tester


Message Interface Package Tester
Test Interface DO_DEPOSIT.
General
Connection
Select Test Operation
MIP ENQUEUE operation using template code.
MIP DEQUEUE operation using template code.
Gateway ENQUEUE operation.
Gateway DEQUEUE operation.
Test results:
Run Test
Stop Run
Edit Template
Close
Revert
Help

7. Click **Run Test**. The Message Interface Package Tester shows the result of the test. The test fails if the database link is not set correctly, or if the gateway is not functioning properly.

In the example shown in Figure 6–22, the `ENQUEUE` operation successfully sent a message to the local queue.

Figure 6–22 Dialog Box for Message Interface Package Tester



Select Test Operation

( ) MIP ENQUEUE operation using template code.

( ) MIP DEQUEUE operation using template code.

[✓ Gateway ENQUEUE operation.]

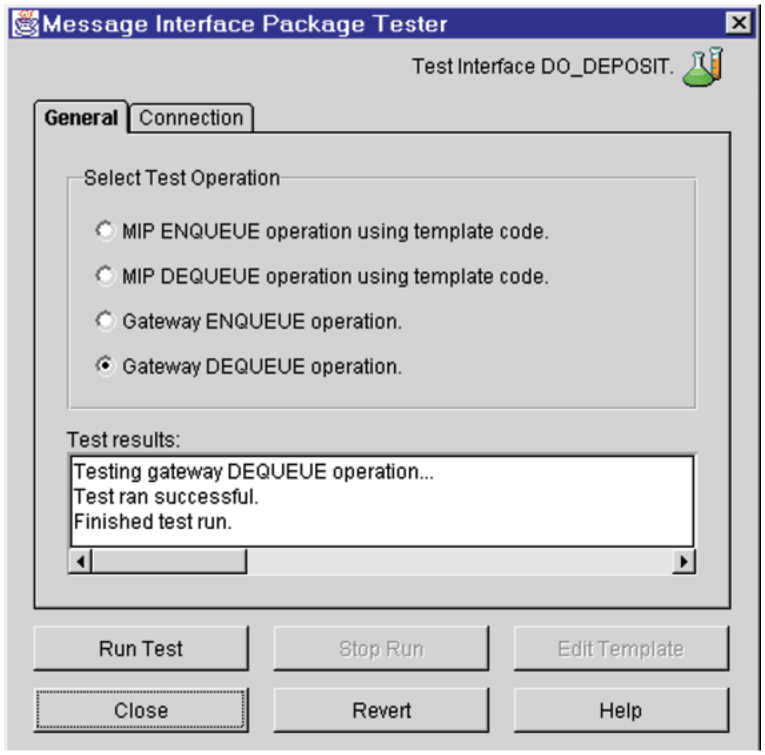
( ) Gateway DEQUEUE operation.

Test results:

```
Testing gateway ENQUEUE operation...
Test ran successful.
Finished test run.
```

8. Choose **Gateway DEQUEUE Operation**.
9. Click **Run Test**. The Message Interface Package Tester shows the result of the test. In the example shown in Figure 6–23, the `DEQUEUE` operation successfully retrieved a test message from the local queue.

Figure 6–23 Dialog Box for Message Interface Package Tester

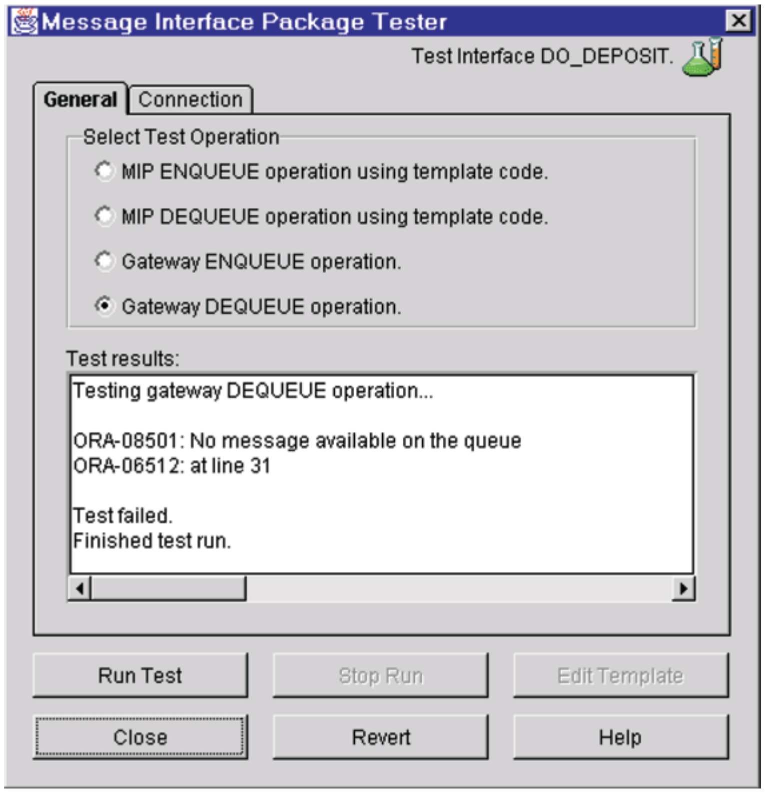

Message Interface Package Tester
Test Interface DO_DEPOSIT.
General
Connection
Select Test Operation
MIP ENQUEUE operation using template code.
MIP DEQUEUE operation using template code.
Gateway ENQUEUE operation.
Gateway DEQUEUE operation.
Test results:
Run Test
Stop Run
Edit Template
Close
Revert
Help

Selected: Gateway DEQUEUE operation.

```
Testing gateway DEQUEUE operation...
Test ran successful.
Finished test run.
```

10. Leave **Gateway DEQUEUE operation** set.
11. Click **Run Test** again, to test that the last `DEQUEUE` operation retrieved the message. The Message Interface Package Tester shows the result of the test. If the only message on the queue is the one you sent in step 7, then the `DEQUEUE` operation fails because that message had already been retrieved. (Refer to Figure 6–24)

Figure 6–24 Dialog Box for Message Interface Package Tester



Test Interface DO_DEPOSIT.

Select Test Operation

( ) MIP ENQUEUE operation using template code.
( ) MIP DEQUEUE operation using template code.
( ) Gateway ENQUEUE operation.
[✓ Gateway DEQUEUE operation.]

Test results:

```
Testing gateway DEQUEUE operation...

ORA-08501: No message available on the queue
ORA-06512: at line 31

Test failed.
Finished test run.
```

Compiling the MIP

After testing the message queue profile against the gateway, compile the MIP. After compiling the MIP, you can use the template code to test it.

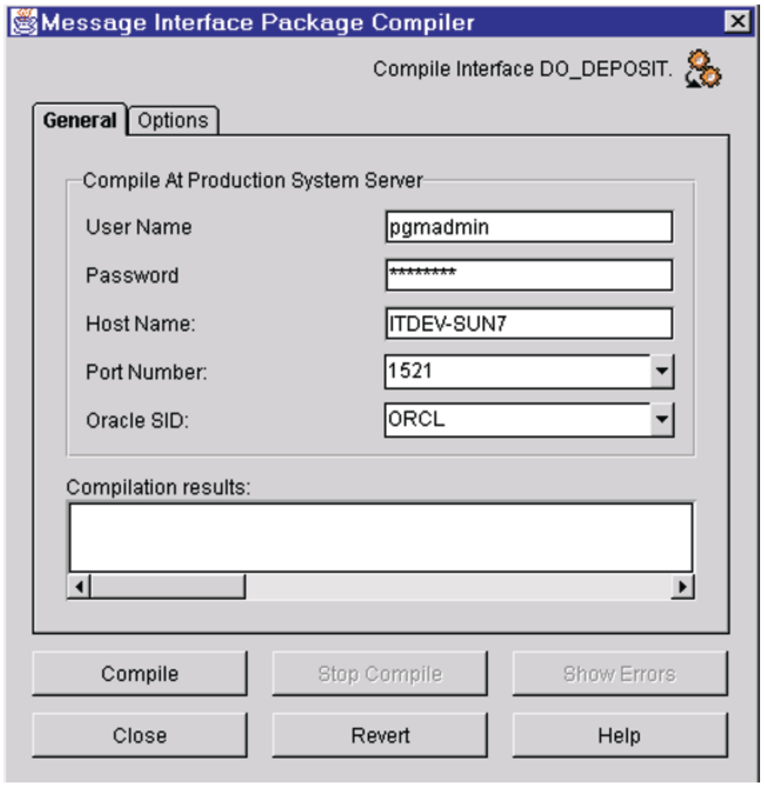
Note: "Using the MIP Templates" on page 6-28 for more information about MIP templates

---

To compile a MIP:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Interfaces folder.
3. Open the PL/SQL folder.
4. Select the MIP to compile by clicking it.
5. Click the **Compile** icon in the tool bar or the **Compile** button on a panel. The Message Interface Package Compiler dialog box appears:

Figure 6–25 Dialog Box for Message Interface Package Compiler


Message Interface Package Compiler

Compile Interface DO_DEPOSIT.

Compile At Production System Server

User Name	pgmadmin
Password	*********
Host Name:	ITDEV-SUN7
Port Number:	1521
Oracle SID:	ORCL

Compilation results:

By default, the PG4MQ Visual Workbench compiles the MIP on the Oracle server where the repository resides. Verify that the connection information is correct for the Oracle server on which you will compile the MIP, and modify it if necessary.

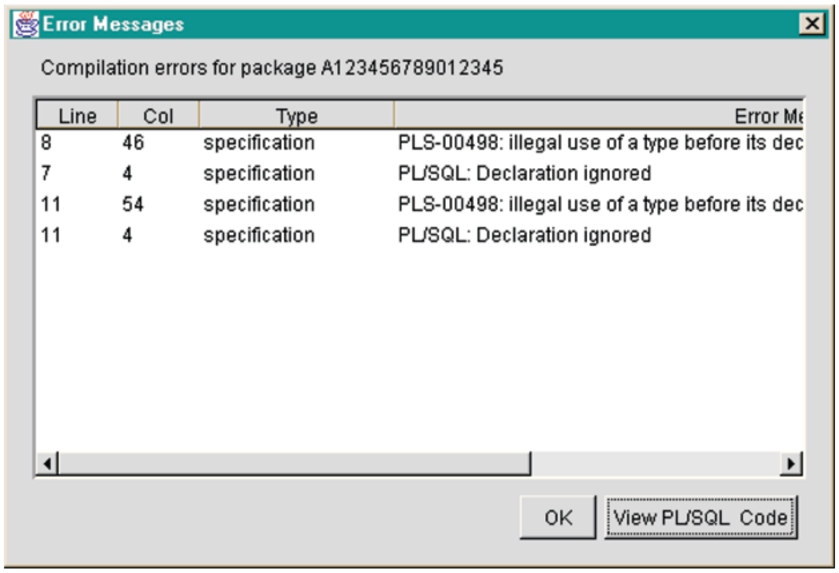
6. Select the **Options** tab if you want to set a compile option that removes generated packages if there are compile errors.

7. Click **Compile**. The Compilation Results window shows the progress of the compile. After the MIP is compiled with no errors, it is ready for use.

See Also: "Using the MIP Templates" on page 6-28 and Chapter 5, "Installation" for more information

If the compile fails, then click **Show Errors** to see the list of compilation errors. Figure 6–26 shows the Error Messages dialog box.

Figure 6–26 Dialog Box for Error Messages



Compilation errors for package A12345678901 2345

Line	Col	Type	Error Me
8	46	specification	PLS-00498: illegal use of a type before its dec
7	4	specification	PL/SQL: Declaration ignored
11	54	specification	PLS-00498: illegal use of a type before its dec
11	4	specification	PL/SQL: Declaration ignored

Click **View PL/SQL Code** to see the PL/SQL code location of the error.

Using the MIP Templates

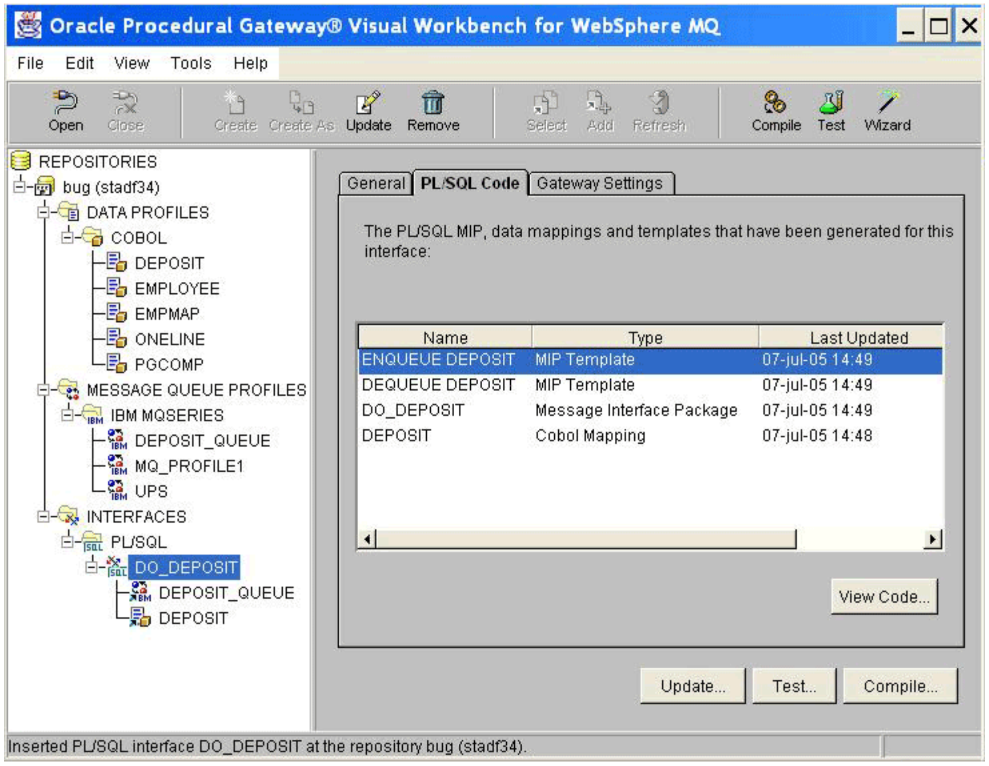
When you create a MIP, the PG4MQ Visual Workbench generates a template for each ENQUEUE and DEQUEUE procedure specified in the MIP. The templates demonstrate how the MIP is used in a PL/SQL program and how it can be used to verify the generated MIP and the data conversion package.

See Also: Chapter 7, "Using the Generated MIP" for more information

To see the MIP templates:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Interfaces folder.
3. Open the PL/SQL folder.
4. Select the interface whose templates you want to see, by clicking it once.
5. Select a template from the list in the PL/SQL code panel by clicking its name. In the example shown in Figure 6–27, the ENQUEUE DEPOSIT template is selected for the MIP named DO_DEPOSIT.

Figure 6–27 ENQUEUE DEPOSIT template for MIP named DO_DEPOSIT



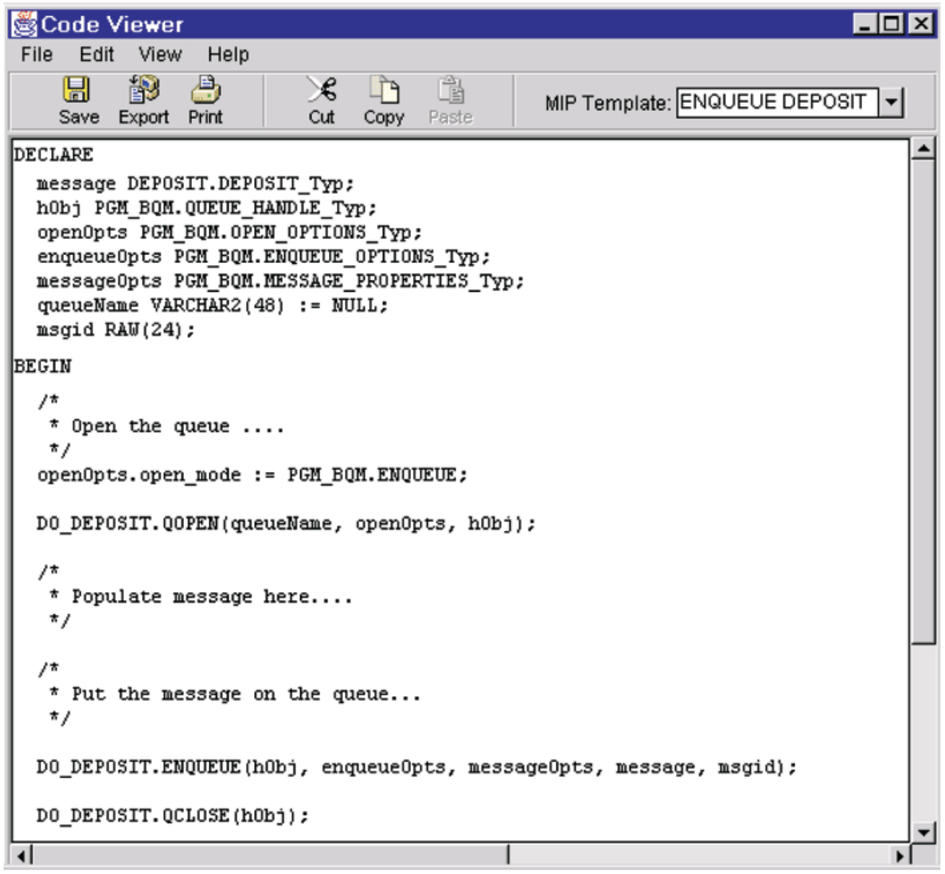
The PL/SQL MIP, data mappings and templates that have been generated for this interface:

Name	Type	Last Updated
ENQUEUE DEPOSIT	MIP Template	07-jul-05 14:49
DEQUEUE DEPOSIT	MIP Template	07-jul-05 14:49
DO_DEPOSIT	Message Interface Package	07-jul-05 14:49
DEPOSIT	Cobol Mapping	07-jul-05 14:48

Inserted PL/SQL interface DO_DEPOSIT at the repository bug (stadf34).

To see the template code, click **View Code**. Figure 6–28 shows the sample `ENQUEUE DEPOSIT` template code for the MIP named `DO_DEPOSIT`.

Figure 6–28 Code Viewer with Sample ENQUEUE DEPOSIT Template Code


Code Viewer
File Edit View Help
Save Export Print Cut Copy Paste
MIP Template: ENQUEUE DEPOSIT

```
DECLARE
  message DEPOSIT.DEPOSIT_Typ;
  hObj PGM_BQM.QUEUE_HANDLE_Typ;
  openOpts PGM_BQM.OPEN_OPTIONS_Typ;
  enqueueOpts PGM_BQM.ENQUEUE_OPTIONS_Typ;
  messageOpts PGM_BQM.MESSAGE_PROPERTIES_Typ;
  queueName VARCHAR2(48) := NULL;
  msgid RAW(24);
BEGIN
  /*
   * Open the queue ....
   */
  openOpts.open_mode := PGM_BQM.ENQUEUE;

  DO_DEPOSIT.QOPEN(queueName, openOpts, hObj);

  /*
   * Populate message here....
   */

  /*
   * Put the message on the queue...
   */

  DO_DEPOSIT.ENQUEUE(hObj, enqueueOpts, messageOpts, message, msgid);

  DO_DEPOSIT.QCLOSE(hObj);
```

Before you use the MIP template code, you must first:

1. Compile the MIP on the Oracle server where the template code will be run.

   See Also: "Compiling the MIP" on page 6-26 for more information

2. Add code to the template.

   See Also: "Completing the Templates" on page 6-30

Completing the Templates

Before testing an `ENQUEUE` template, complete the template code by filling in the message variable fields. Testing the `ENQUEUE` template fails if the fields of the message variable are not set before calling the `ENQUEUE` procedure. A `DEQUEUE` template can run if you do not modify it, but you usually add code to process the retrieved message after the `DEQUEUE` procedure is called.

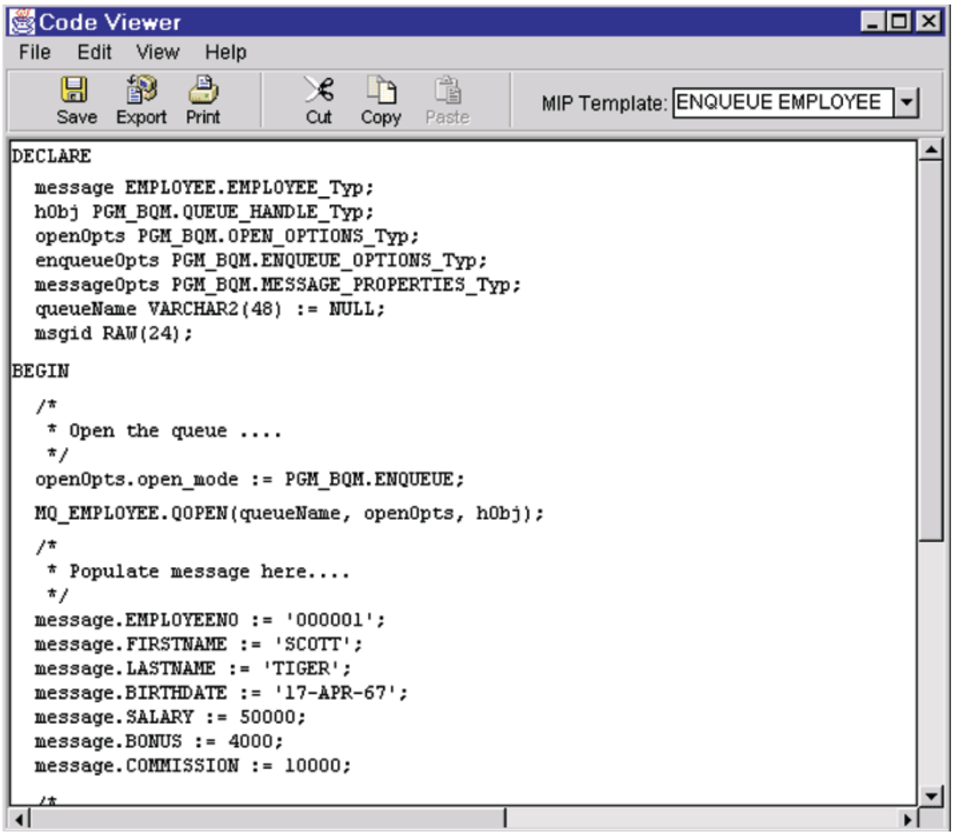
To add code to the sample:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Interfaces folder.
3. Open the PL/SQL folder.

4. Select a MIP by clicking it.
5. Select the **PL/SQL Code** tab.
6. Select a MIP template from the list and click **View Code...**. The Code Viewer appears.
7. Fill in the message buffer for each data profile. Use the MIP Template drop-down list to open the template for each data profile in the MIP.
8. Click the **Save** icon in the tool bar to save your changes in the repository.

   Figure 6–29 shows that code has been added to the `ENQUEUE` sample code to specify employee information.

Figure 6–29 Code Viewer with ENQUEUE Sample of Employee Information



MIP Template: ENQUEUE EMPLOYEE

```
DECLARE
  message EMPLOYEE.EMPLOYEE_Typ;
  hObj PGM_BQM.QUEUE_HANDLE_Typ;
  openOpts PGM_BQM.OPEN_OPTIONS_Typ;
  enqueueOpts PGM_BQM.ENQUEUE_OPTIONS_Typ;
  messageOpts PGM_BQM.MESSAGE_PROPERTIES_Typ;
  queueName VARCHAR2(48) := NULL;
  msgid RAW(24);
BEGIN
  /*
   * Open the queue ....
   */
  openOpts.open_mode := PGM_BQM.ENQUEUE;
  MQ_EMPLOYEE.QOPEN(queueName, openOpts, hObj);
  /*
   * Populate message here....
   */
  message.EMPLOYEENO := '000001';
  message.FIRSTNAME := 'SCOTT';
  message.LASTNAME := 'TIGER';
  message.BIRTHDATE := '17-APR-67';
  message.SALARY := 50000;
  message.BONUS := 4000;
  message.COMMISSION := 10000;
```

Using a Template to Test the MIP

Before testing a template, ensure that the MIP has been compiled on the Oracle server where you will run the test and that you have added code for all the data profiles in the MIP.

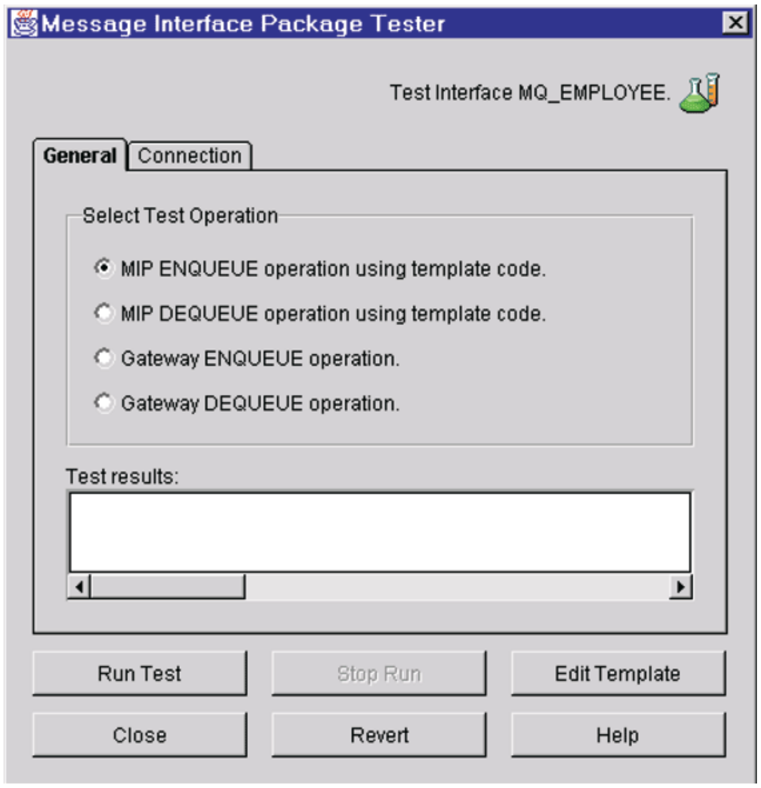
See Also: "Compiling the MIP" on page 6-26 and "Completing the Templates" on page 6-30 for more information

Testing the ENQUEUE Procedure Template

1. Open the Interfaces folder.
2. Open the PL/SQL folder.

3. Select a MIP by clicking it.
4. Click the **Test** icon on the tool bar or the **Test...** button on a panel. The Message Interface Package Tester dialog box appears. By default, the PG4MQ Visual Workbench runs the test on the Oracle server where the repository resides. To conduct the test on a different server, select the **Connection** tab and modify the connection information.
5. On the **General** panel, choose **MIP ENQUEUE operation using template code**. (Refer to Figure 6–30.)

Figure 6–30 Dialog Box for Message Interface Package Tester


Message Interface Package Tester
Test Interface MQ_EMPLOYEE.
General
Connection
Select Test Operation
MIP ENQUEUE operation using template code.
MIP DEQUEUE operation using template code.
Gateway ENQUEUE operation.
Gateway DEQUEUE operation.
Test results:
Run Test
Stop Run
Edit Template
Close
Revert
Help

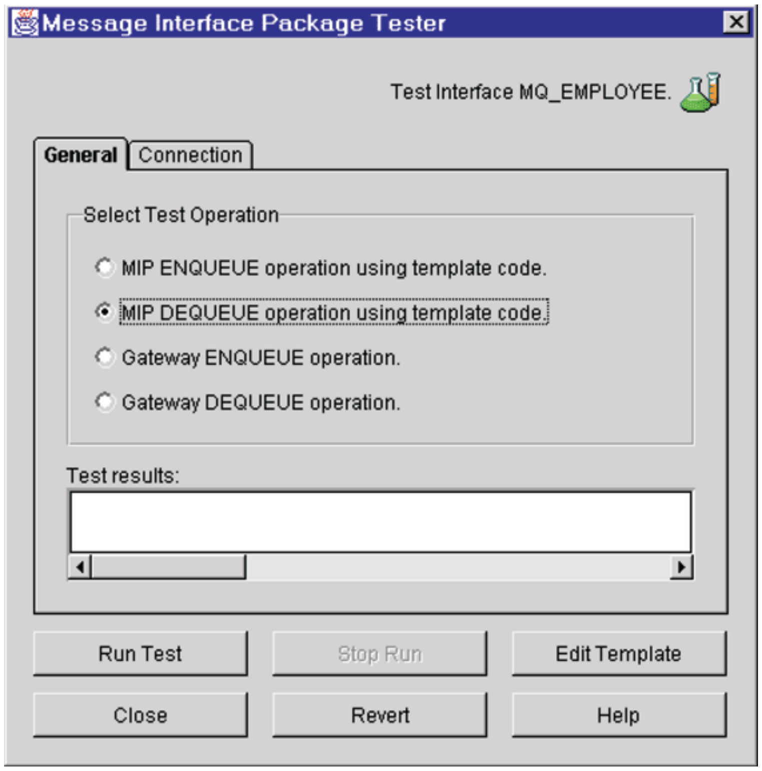
6. Click **Run Test**. When the test completes, the results appear in the Test Results window. To see the test code for details of the test, click **Edit Code**.

Testing the DEQUEUE Procedure Template

1. Open the Interfaces folder.
2. Open the PL/SQL folder.
3. Select a MIP by clicking it.
4. Click the **Test** icon on the tool bar or the **Test...** button on a panel. The Message Interface Package Tester dialog box appears. By default, the PG4MQ Visual Workbench runs the test on the Oracle server where the repository resides. To conduct the test on a different server, select the **Connection** tab and modify the connection information.

   On the **General** panel, choose **MIP DEQUEUE operation using template code**, as illustrated in Figure 6–31.

Figure 6–31 Dialog Box for Message Interface Package Tester


Message Interface Package Tester
Test Interface MQ_EMPLOYEE.
General
Connection
Select Test Operation
MIP ENQUEUE operation using template code.
MIP DEQUEUE operation using template code.
Gateway ENQUEUE operation.
Gateway DEQUEUE operation.
Test results:
Run Test
Stop Run
Edit Template
Close
Revert
Help

5. Click **Run Test**. When the test completes, the results appear in the Test Results window. To see the test code for details of the test, click **Edit Code**.

Note: The `DEQUEUE` test reports success when it has retrieved a message from the queue. All exceptions are reported in the test results panel. A "no messages available" exception appears when an application tries to dequeue a message when there are no more messages on the queue.

The "no messages available" exception might result if the Wait Interval is set in the message queue profile and there are no more messages on the queue:

- The `DEQUEUE` test waits the specified amount of time and then reports the exception.
- If the Wait Interval is not set and no messages are on the queue, then the `DEQUEUE` test waits forever (the default).

See Also: "Creating a Message Queue Profile" on page 6-9 for information about the Wait Interval.

Preparing the MIP for Production

After completing the development phase, deploy the MIP to one or more production Oracle servers where you plan to run your applications that use the MIP. Follow the instructions in this chapter to prepare the MIP for use in a production system.

Before You Compile the MIP on the Production Oracle Server

You must compile the MIP on the Oracle production server before your applications can use the MIP. The following requirements must be met before you compile a MIP at the production Oracle server:

- A SQL*Net listener for the production Oracle server must be running. Refer to your Oracle SQL*Net documentation for information.
- The `tnsnames.ora` file on the production Oracle server must contain an entry specifying the procedural gateway. Refer to the gateway installation guide for your platform for information.
- A database link to the procedural gateway must be created at the production Oracle server to match the name of the database link that was used when you defined the interface profile for the MIP. Refer to the gateway installation guide for your platform for information about creating database links.
- The PL/SQL packages `DBMS_OUTPUT`, `DBMS_PIPE` and `UTL_RAW` must exist in the production Oracle server. If they are not present, then see your DBA about installing these packages.
- The PL/SQL packages `PGM`, `PGM_BQM`, `PGM_SUP`, and `UTL_PG` are also required in the production Oracle server. If they are not present, then run the deployment script on the production Oracle server before compiling the MIP.

See Also: Appendix A, "Preparing the Production Oracle Server" for more information

If any of these requirements are not met, then the PG4MQ Visual Workbench reports an error when you try to compile.

Compiling the MIP for the Production Oracle Server

When you compile the MIP for a production Oracle server, the PG4MQ Visual Workbench reads the MIP code from the repository, establishes a connection with the designated production Oracle server, compiles the MIP, and stores the compiled MIP as an object in the production Oracle server.

To compile the MIP for the production system server:

1. Open the PG4MQ Visual Workbench repository.
2. Open the Interfaces folder.
3. Open the PL/SQL folder.
4. Select the MIP to compile by clicking it.
5. Click the **Compile** icon in the tool bar or the **Compile** button on a panel. The Message Interface Package Compiler dialog box appears ("Compiling the MIP" on page 6-26 shows this dialog box).
6. Change the **User Name**, **Password**, **Host Name**, **Port Number**, and **SID** fields to specify the production Oracle server.
7. Decide if you want to grant execution privileges to other Oracle users for this MIP before you compile or after you compile the MIP:

- **Grant before compiling:** Select the **Options** tab of the Message Interface Package Compiler dialog box and select the Grant public access to the packages option. Go to step 8.
- **Grant after compiling**: Continue to step 8 to compile the MIP.

See Also: "Granting Execution Privileges to a MIP" on page 6-35 for more information

8. Click **Compile**.

Granting Execution Privileges to a MIP

The MIP packages are compiled on the production Oracle server in the schema of the user specified with the connection information. If the compiled MIP packages are used by other Oracle users, or by applications that are run by another user, then you must grant execution privileges to those users.

You can grant execution privileges during the MIP compilation procedure as described under "Compiling the MIP for the Production Oracle Server" on page 6-35 or use the `GRANT` statement at the computer where the production Oracle server resides. `GRANT` has this syntax:

```
GRANT EXECUTE ON MIP_name TO {user_name | PUBLIC}
```

See Also: *Oracle Database SQL Reference* for more information about `GRANT`

Testing the MIP on a Production System

After you have successfully compiled the MIP on a production Oracle server, you can test it there. The PG4MQ Visual Workbench reads the test code package from the PG4MQ Visual Workbench repository and runs it on the production system.

See Also: "Testing the Gateway" on page 6-22 for information about navigating to the Message Interface Package Tester dialog box

Modify the connection information in the Message Interface Package Tester dialog box to specify the production Oracle server for the test, instead of using the default Oracle server where the repository resides.

See Also: "Using a Template to Test the MIP" on page 6-31 for instructions on running the test

7

Using the Generated MIP

This chapter describes the contents of a MIP specification, the MIP procedures, examples of how to use a MIP in an Oracle application, the contents, and use of the data conversion package.

This chapter contains the following sections:

About the Message Interface Package (MIP)

A MIP is a PL/SQL package that provides a high-level interface for Oracle applications to communicate with non-Oracle message queuing systems. Every time you create or update an interface profile, the Visual Workbench generates a MIP from the interface profile information you supply.

Note: "Creating Interface Profiles and Generating the MIP" on page 1-4 for more information

Note: The MIP described in this chapter is not compatible with the MIP released with the Visual Workbench release 4.0.1.1.1 and earlier. You must modify applications that use the beta version of the MIP.

The Visual Workbench repository is not compatible with the MIP released with the Visual Workbench release 4.0.1.1.1 and earlier. You must re-create interface profiles that were created with the beta release.

What's in a MIP?

A MIP contains the code needed to interact with the message queuing system:

- The database link connects the MIP to a procedural gateway that can communicate with a non-Oracle message queuing system. The MIP includes all the code needed to communicate with the gateway.
- A data profile defines the data types for messages exchanged between the Oracle and non-Oracle applications. The Visual Workbench generates data-mapping code according to these definitions, and the MIP calls this code to convert messages.

See Also: "Data Conversion Package" on page 7-19 for more information about data profiles and data mapping

- The message queue profile describes message properties and queuing operations. The MIP translates the properties and operations into gateway calls that control the message queuing system when sending or retrieving messages.

The MIP contains four interface procedures that can be called from any Oracle application: `QOPEN`, `ENQUEUE`, `DEQUEUE`, and `QCLOSE`.

Each data profile attached to the MIP has its own set of `ENQUEUE` and `DEQUEUE` procedures in the MIP. The `ENQUEUE` procedure takes a message on input, formatted according to the PL/SQL type created for the data profile. The `DEQUEUE` procedure delivers a message as output, formatted according to the PL/SQL type created for the data profile.

Note: "MIP Procedures" on page 7-6 for more information

QOPEN and QCLOSE

`QOPEN` opens a specified queue. You must call `QOPEN` before calling the advanced `ENQUEUE` and `DEQUEUE` procedures.

See Also: "Type Definitions" on page 7-14 for more information

`QCLOSE` closes an open queue. You must call `QCLOSE` after processing messages with the advanced `ENQUEUE` and `DEQUEUE` procedures.

See Also: "QCLOSE Procedure" on page 7-7 for more information

ENQUEUE and DEQUEUE

The ENQUEUE procedure ends a message to the queue specified in the message queue profile.

See Also: "ENQUEUE Procedure" on page 7-7 for more information

The DEQUEUE procedure retrieves a message from the previously opened queue.

See Also: "DEQUEUE Procedure" on page 7-11 for more information

The MIP contains a basic and an advanced version of the ENQUEUE and DEQUEUE procedures for each data profile associated with the MIP:

- The basic version takes all options and properties from the message queue profile. It requires one argument, a message-content buffer identified as payload, in the syntax described in this chapter.
- The advanced version has additional parameters that let the calling application control how to send or retrieve a message. The calling application can override the options and properties specified in the message queue profile and can set other options.

Each data profile attached to the MIP has its own set of ENQUEUE and DEQUEUE procedures in the MIP. The ENQUEUE procedure takes a message on input, formatted according to the PL/SQL type created for the data profile. The DEQUEUE procedure delivers a message as output, formatted according to the PL/SQL type created for the data profile.

MIP Specification Example

This example shows a MIP specification generated for the interface profile named HIRE, a message queue profile named HR that is configured for WebSphere MQ, and a data profile named EMPLOYEE:

```
/*
 * Copyright (c) 1999. Oracle Corporation. All rights reserved.
 *
 *   Message Interface Package specification HIRE for WebSphere MQ.
 *
 *       Using Database Link:
 *         GTWMQ.WORLD
 *
 *       Using Message Queue Profile 'HR':
 *         Queue              = QUEUE1
 *         Security ID        =
 *         Enqueue Visibility = On Commit
 *         Dequeue Visibility = On Commit
 *         Dequeue Mode       = Remove
 *         Wait               = No Wait
 *         Correlation        =
 *         Priority           = Default
 *         Expiration         = Never
 *         Message Type       =
 *         Response Queue     = QUEUE1
 *         Delivery Mode      = Not Persistent
 *         Acknowledgement    = None
 *
 *       Using Data Profile(s):
 *         EMPLOYEE
 *
 *       MIP procedures:
 *         Procedure QOPEN()   - Establish access to a queue
 *         Procedure QCLOSE()  - Relinquish access to a previously opened queue
 *         Procedure ENQUEUE() - Put a EMPLOYEE message on the queue (basic).
 *         Procedure ENQUEUE() - Put a EMPLOYEE message on the queue (advanced).
 *         Procedure DEQUEUE() - Get a EMPLOYEE message from the queue (basic)
 *         Procedure DEQUEUE() - Get a EMPLOYEE message from the queue (advanced).
 *
 *   Generated 16-MAR-1999 10:51 by pgmadmin.
 */

CREATE OR REPLACE PACKAGE HIRE AS:

  /*
   *  NAME
   *    Procedure QOPEN() - Establish an access to a queue object
   *  DESCRIPTION
   *    This function takes on input the name of the
   *    queue to open and an open option parameter.
   *    The open mode field in the open options structure
   *    is always a constant, ENQUEUE, when the queue is open
   *    for enqueueing. The open mode field  can take values
   *    REMOVE or BROWSE when the queue is open for dequeueing.
   *  NOTES
   *    If the procedure fails an exception is raised.
   *  RETURNS
   *    queue_handle -  A structure containing the handle to the
   *    queue and the mode in which the queue is open.
   */

  PROCEDURE QOPEN(queue_name IN VARCHAR2,
                 open_options IN PGM_BQM.OPEN_OPTIONS_Typ,
                 queue_handle OUT PGM_BQM.QUEUE_HANDLE_Typ);

  /*
   *  NAME
   *    Procedure QCLOSE() - Relinquish access to a previously open queue
   *  DESCRIPTION
   *    This procedure takes on input a queue handle structure
   *    and relinquishes the access to the queue. After QCLOSE the
   *    handle becomes invalid and cannot be used for the
   *    enqueue or dequeue calls any more.
   *  NOTES
   *    If the procedure fails an exception is raised.
   *  RETURNS
   *    void
   */

  PROCEDURE QCLOSE(queue_handle IN OUT PGM_BQM.QUEUE_HANDLE_Typ);

  /*
   *  NAME
   *    Procedure ENQUEUE() - Put a EMPLOYEE message on the queue (basic).
   *  DESCRIPTION
   *    This procedure takes on input a payload parameter of PL/SQL
   *    type EMPLOYEE.EMPLOYEE_Typ, converts it to the
   *    native format understood by the remote application
   *    and sends it to the queue defined for this interface.
   *    The procedure uses the options and properties defined by the
   *    message queue profile HR.
   *  NOTES
   *    If the procedure fails an exception is raised.
   *  RETURNS
   *    void
   */

  PROCEDURE ENQUEUE(payload IN EMPLOYEE.EMPLOYEE_Typ);

  /*
   *  NAME
   *    Procedure ENQUEUE() - Put a EMPLOYEE message on the queue (advanced).
   *  DESCRIPTION
   *    This procedure takes on input a payload parameter of PL/SQL
   *    type EMPLOYEE.EMPLOYEE_Typ, converts it to the
   *    native format understood by the remote application
   *    and sends it to the queue defined for this interface.
   *
   *    Using the input parameters queue_handle, enqueue_options
   *    and message_properties the caller controls how
   *    the enqueue operation should operate.
   *
   *    If the input parameters or their respective fields are null, the procedure
   *    uses the options and properties as defined by the
   *    message queue profile HR.
   *
   *    The message identification as generated by the message queuing
   *    system for the message is returned in the msgid output parameter. This
identifier
   *    can be used to identify the message at dequeue time.
   *  NOTES
   *    If the procedure fails an exception is raised.
   *  RETURNS
   *    void
   */

  PROCEDURE ENQUEUE(queue_handle IN PGM_BQM.QUEUE_HANDLE_Typ,
                    enqueue_options IN PGM_BQM.ENQUEUE_OPTIONS_Typ,
                    message_properties IN PGM_BQM.MESSAGE_PROPERTIES_Typ,
                    payload IN EMPLOYEE.EMPLOYEE_Typ,
                    msgid OUT RAW);

  /*
   *  NAME
   *    Procedure DEQUEUE() - Get a message EMPLOYEE from the queue (basic).
   *  DESCRIPTION
   *    This procedure reads the next message from the queue
   *    defined for this interface and converts it to the PL/SQL
   *    type EMPLOYEE.EMPLOYEE_Typ output parameter named payload.
   *
   *    The procedure uses the options and properties defined by the
   *    message queue profile HR.
   *  NOTES
   *    If the function fails, an exception is raised.
   *  RETURNS
   *    void
   */
  PROCEDURE DEQUEUE(payload OUT EMPLOYEE.EMPLOYEE_Typ);

  /*
   *  NAME
   *    Procedure DEQUEUE() - Get a message EMPLOYEE from the queue (advanced).
   *  DESCRIPTION
   *    This routine reads the next message from the queue
   *    defined for this interfaceand converts it to the PL/SQL
   *    type EMPLOYEE.EMPLOYEE_Typ output parameter named payload.
   *
   *    Using the input parameters queue_handle and dequeue_options
   *    the caller controls how the dequeue operation should operate.
   *
   *    If any of the input parameters or their respective fields
   *    are NULL, the function will use the settings defined by the
   *    message queue profile HR.
   *
   *    The properties of the dequeued message are returned in the message_
properties
   *    output parameter.
   *
   *    The message identification as generated by the message queuing
   *    system for the message is returned in the msgid output parameter.
   *  NOTES
   *    If the function fails, an exception is raised.
   *  RETURNS
   *    void
   */

  PROCEDURE DEQUEUE(queue_handle IN PGM_BQM.QUEUE_HANDLE_Typ,
                    dequeue_options IN PGM_BQM.DEQUEUE_OPTIONS_Typ,
                    message_properties OUT PGM_BQM.MESSAGE_PROPERTIES_Typ,
                    payload OUT EMPLOYEE.EMPLOYEE_Typ,
                    msgid OUT RAW);

END HIRE;
```

MIP Procedures

The MIP contains `QOPEN`, `QCLOSE`, and both a basic and an advanced version of the `ENQUEUE` and `DEQUEUE` procedures for each data profile associated with the MIP:

- The basic version takes all options and properties from the message queue profile. It requires one argument, a message-content buffer identified as *`payload`* in the syntax described in this chapter.
- The advanced version has additional parameters that let the calling application control how to send or retrieve a message. The calling application can override the options and properties specified in the message queue profile and can set other options.

See Also: "ENQUEUE Procedure" on page 7-7 and "DEQUEUE Procedure" on page 7-11 for more information

QOPEN Procedure

The QOPEN procedure establishes access to a queue. It returns a queue handle that is used as an input parameter in the advanced versions of the ENQUEUE and DEQUEUE procedures.

It is not necessary to perform a QOPEN before calling the basic ENQUEUE or DEQUEUE procedures. The basic ENQUEUE and DEQUEUE procedures open the queue before sending and retrieving messages.

QOPEN Syntax

```
PROCEDURE QOPEN(queue_name IN VARCHAR2,
                open_options IN PGM_BQL.OPEN_OPTIONS_Typ,
                queue_handle OUT PGM_BQL.QUEUE_HANDLE_Typ);
```

The following table describes the parameters that must be specified:

Parameter	Description
queue_name	Name of the queue to be opened. If the value is NULL, then the queue name from the message queue profile is used.
open_options	Defines the open options that the calling application can specify when calling QOPEN. **See Also:** "PGM_BQM Package" on page 7-17 for more information. NULL is an invalid parameter.
queue_handle	Returns the handle specified by *queue_name*

QOPEN returns the handle to the queue to be opened. If you call QOPEN multiple times in sequence, then a new queue handle is returned each time and the previous handle becomes invalid.

QCLOSE Procedure

QCLOSE relinquishes access to a queue object. You must call QCLOSE after all messages have been processed using the advanced ENQUEUE and DEQUEUE procedures.

It is not necessary to perform a QCLOSE after processing messages using the basic ENQUEUE and DEQUEUE procedures. The basic version ENQUEUE and DEQUEUE close the queue after sending and retrieving messages.

QCLOSE Syntax

```
PROCEDURE QCLOSE(queue_handle IN OUT queue_handle_typ)
```

where, *queue_handle* specifies the handle of the queue being closed

After QCLOSE is called, the queue handle becomes invalid and cannot be used for subsequent ENQUEUE or DEQUEUE procedures.

If QCLOSE fails, then it raises a PL/SQL exception. The application calling the procedure is responsible for handling the exception.

ENQUEUE Procedure

The MIP ENQUEUE procedure:

- Converts a message from PL/SQL format to native format according to the specifications of a data profile
- Sends the converted message to a queue of a non-Oracle message queuing system according to the specifications of a message queue profile or the input arguments of the procedure

ENQUEUE Naming and Name Resolution

Because the `ENQUEUE` procedures are part of a MIP, applications must specify this fully qualified name when calling the procedure:

```
schema_name.mip_name.ENQUEUE
```

The following table describes the parameters that need to be specified:

Parameter	Description
schema_name	Name of the Oracle user that compiled the MIP
mip_name	Name you specified when you created the MIP

PL/SQL runs the correct `ENQUEUE` procedure based on the parameters provided. For example, if only the *payload* output parameter is specified, the basic `ENQUEUE` procedure is run.

When more than one data profile is added to a MIP and multiple versions of basic and advanced `ENQUEUE` procedures are generated for the MIP, the type of *payload* parameter used determines which `ENQUEUE` procedure in the MIP is selected.

Basic ENQUEUE Procedure

The basic `ENQUEUE` procedure converts the message content of *payload* according to the specifications of the data profile, and sends the message to a queue according the specifications of the message queue profile.

If the basic `ENQUEUE` procedure fails, then it raises a PL/SQL exception. Exceptions can be raised for various reasons, such as an error occurring during conversion or a problem reported by the message queuing system. The application calling the procedure is responsible for handling the exception.

Syntax

```
PROCEDURE ENQUEUE(payload IN type_definition)
```

The following table describes the parameters that need to be specified:

Parameter	Description
payload	Must be specified according to *type_definition*. `NULL` is an invalid value.
type_definition	**See Also:** "Type Definitions" on page 7-14 and "Data Conversion Package" on page 7-19.

Example

In this example, message contains an employee record defined by a data profile named `EMPLOYEE`. It is populated with data, then passed to the basic `ENQUEUE` procedure of a MIP named `HIRE`.

When it is called, the MIP converts the employee record according to the rules of the data profile and delivers the employee record to the specified queue using the ENQUEUE options and message properties of the message queue profile.

```
DECLARE
  message EMPLOYEE.EMPLOYEE_Typ;
BEGIN
  message.EMPLOYEENO := '123456';
  message.FIRSTNAME  := 'SCOTT';
  message.LASTNAME   := 'TIGER';
  message.BIRTHDATE  := '01-01-71';
  message.SALARY     := 50000;
  message.BONUS      := 4000;
  message.COMMISSION := 0;
  HIRE.ENQUEUE(message);
  COMMIT;
EXCEPTION WHEN OTHERS THEN
  ROLLBACK;
  RAISE;
END;
```

Advanced ENQUEUE Procedure

The advanced ENQUEUE procedure converts the message content of *payload* according to the specifications of the data profile, and sends the message to a queue.

The *queue_name*, *enqueue_operations* and *message_properties* parameters enable the calling application to control the ENQUEUE operation. If a parameter or its fields are NULL, then the ENQUEUE procedure uses the corresponding setting of the message queue profile associated with the MIP.

The *msgid* parameter returns the message identifier of the enqueued message. It can be used in the advanced dequeue procedure to select the message to be retrieved.

If the advanced ENQUEUE procedure fails, then it raises a PL/SQL exception. Exceptions can be raised for various reasons, such as an error occurring during message conversion or a problem reported by the message queuing system. Providing an invalid value for one of the input parameters also causes a PL/SQL exception. The application calling the procedure is responsible for handling the exception.

See Also: "PGM_BQM Package" on page 7-17 for more information

Syntax

```
PROCEDURE ENQUEUE(queue_name IN VARCHAR2,
                    enqueue_options IN PGM_BQM.ENQUEUE_OPTIONS_Typ,
                    message_properties IN PGM_BQM.MESSAGE_PROPERTIES_Typ,
                    payload IN type_definition,
                    msgid OUT RAW)
```

The following table describes the parameters that need to be specified:

Parameter	Description
queue_name	Name of the queue to send the message.
enqueue_options	Defines the ENQUEUE options that can be specified by the calling application. **See Also:** "ENQUEUE_OPTIONS_Typ" on page 7-15.

Parameter	Description
message_ properties	Defines the message options for a message. **See Also:** "MESSAGE_ PROPERTIES_Typ" on page 7-16.
payload	Must be specified according to the *type_definition*. NULL is an invalid value.
type_definition	**See Also:** "Type Definitions" on page 7-14 and "Data Conversion Package" on page 7-19.
msgid	Identifier generated by the message queuing system for the message.

Example

In this example, the queue to which messages are to be sent is opened with QOPEN. The openOpts.open_mode parameter is set to ENQUEUE, to open the queue for input. This parameter must be specified. A NULL value is invalid. A handle to the queue is returned and is used as an input parameter in each ENQUEUE call.

In this example, the message contains an employee record defined by a data profile named EMPLOYEE. It is populated with data, and then passed to the advanced ENQUEUE procedure of a MIP named HIRE. The priority and expiration of the message are set by the calling application and passed in using the values specified by enqueueOpts and msgProps.

After the messages are enqueued, the QCLOSE procedure is called.

When called, the MIP converts the employee record according to the specifications of the data profile and sends the employee record to the specified queue using the passed-in queue name, priority, and expiration, taking the other options and properties from the message queue profile.

The message property priority (msgProps.priority) directs the ENQUEUE procedure to give the message a priority of 4 when enqueuing the message, instead of using the value set by the message queue profile. The expiration property (msgProps.expiration) specifies that the message is to remain on the queue unless it is dequeued again.

```
DECLARE
  message      EMPLOYEE.EMPLOYEE_Typ;
  enqueueOpts  PGM_BQM.ENQUEUE_OPTIONS_Typ;
  msgProps     PGM_BQM.MESSAGE_PROPERTIES_Typ;
  msgid        RAW(24);
  queueHandle  PGM_BQM.QUEUE_HANDLE_Typ;
  queueName    VARCHAR2(48)
  CURSOR C1 IS SELECT EMP_NO EMP_FNAME FROM EMP;
BEGIN
  msgProps.priority := 4;
  msgProps.expiration := PGM_BQM.NEVER;
  openOpts.open_mode := PGM_BQM.ENQUEUE;
  queueName := 'emp';
  HIRE.QOPEN(queueName openOpts queueHandle);
  OPEN C1;
  LOOP
    FETCH C1 into message.employeeno, message.firstname;
    EXIT when C1 %NOTFOUND;
    HIRE.ENQUEUE(queueHandle,
                 queueName,
                 enqueueOpts,
                 msgProps,
               message,
               msgid);
  ENDLOOP;
  CLOSE C1;
  HIRE.QCLOSE(queueHandle);
  COMMIT;
EXCEPTION WHEN OTHERS THEN
  HIRE.QCLOSE(queueHandle);
  ROLLBACK;
  RAISE;
END;
```

DEQUEUE Procedure

The `DEQUEUE` procedure:

- Retrieves a message from a queue at a non-Oracle message queuing system according to the specifications of a message queue profile or the input arguments of the procedure
- Converts the retrieved message contents of *`payload`* from native to PL/SQL format, according to the specifications of a data profile

DEQUEUE Naming and Name Resolution

Because the `DEQUEUE` procedures are part of a MIP, applications must specify this fully qualified name when calling the procedure:

schema_name.*mip_name*.DEQUEUE

The following table describes the parameters that need to be specified:

Parameter	Description
schema_name	Name of the Oracle user that compiled the MIP.
mip_name	Name you specified when you created the MIP.

PL/SQL runs the correct `DEQUEUE` procedure based on the parameters provided upon invocation. For example, if only a *`payload`* output parameter is specified, the basic `DEQUEUE` procedure is run.

When more than one data profile is added to a MIP and multiple versions of basic and advanced `DEQUEUE` procedures are generated for the MIP, the type of payload used determines which `DEQUEUE` procedure in the MIP is selected.

Basic DEQUEUE Procedure

The basic `DEQUEUE` procedure retrieves the message from a queue according to the specifications of the message queue profile, converts the message according to the specifications of the data profile, and returns the result in the payload output parameter.

If the basic `DEQUEUE` procedure fails, then it raises a PL/SQL exception. Exceptions can be raised for various reasons, such as an error occurring during conversion or a problem reported by the message queuing system. The application calling the procedure is responsible for handling the exception.

Syntax

```
PROCEDURE DEQUEUE(payload OUT type_definition)
```

The following table describes the parameters that need to be specified:

Parameter	Description
payload	Returns the message data, formatted according to the *type_definition*. NULL is an invalid value.
type_definition	**See Also:** "Type Definitions" on page 7-14 and "Data Conversion Package" on page 7-19.

Example

In this example, message contains an employee record defined by a data profile named EMPLOYEE. It is passed as an output argument to the basic DEQUEUE procedure of a MIP named HIRE.

When it is called, the MIP retrieves a message from the specified queue using the DEQUEUE options of the message queue profile. After the message is retrieved, it is converted from native to PL/SQL format according to the specifications of the data profile and returned in the output parameter message. In this example, the application uses the dequeued message to obtain the employee's first name.

```
DECLARE
  firstName    VARCHAR2(30);
  message      EMPLOYEE.EMPLOYEE_Typ;
BEGIN
  HIRE.DEQUEUE(message);
  firstName := message.FIRSTNAME;
  COMMIT;
EXCEPTION WHEN OTHERS THEN
  ROLLBACK;
  RAISE;
END;
```

Advanced DEQUEUE Procedure

The advanced DEQUEUE procedure retrieves a message from the message queue, converts the *payload* value from native to PL/SQL format according to the specifications of the data profile, and returns the result in the *payload* output parameter.

The *queue_name* and *dequeue_options* parameters enable the calling application to control the DEQUEUE operation. If a parameter or its fields are NULL, then the DEQUEUE procedure uses the corresponding setting of the message queue profile associated with the MIP.

The *message_properties* parameter returns the properties of the message as set by the enqueing application or the message queuing system.

The *msgid* parameter returns the message identifier of the dequeued message.

If the advanced DEQUEUE procedure fails, thenit raises a PL/SQL exception. Exceptions can be raised for various reasons, such as an error occurring during conversion, or a problem reported by the message queuing system, or providing an invalid value for one of the input parameter. The application calling the procedure is responsible for handling the exception.

See Also: "PGM_BQM Package" on page 7-17

Syntax

```
PROCEDURE DEQUEUE(queue_name IN VARCHAR2,
                  dequeue_options IN PGM_BQM.DEQUEUE_OPTIONS_Typ,
                  message_properties OUT PGM_BQM.MESSAGE_PROPERTIES_Typ,
                  payload OUT type_definition,
                  msgid OUT RAW)
```

The following table describes the parameters that need to be specified:

Parameter	Description
queue_name	Name of the queue from which to retrieve the message
dequeue_options	Defines the DEQUEUE options that can be specified by the calling application. **See Also:** "DEQUEUE_OPTIONS_Typ" on page 7-15.
message_properties	Returns the message options for a message. **See Also:** "MESSAGE_PROPERTIES_Typ" on page 7-16
payload	Returns the message data, formatted according to *type_definition*.
type_definition	**See Also:** "Data Conversion Package" on page 7-19 for information.
msgid	Identifier generated by the message queuing system for the message.

Example

In this example, the queue from which messages are to be retrieved is opened using QOPEN. In the example, openOpts.open_mode is set to REMOVE, so that each time an ENQUEUE procedure is called, messages are removed permanently from the queue. You can set openOpts.open_mode to BROWSE to enable reading a message from the queue and not removing it. A handle to the queue is returned and is used as an input parameter in each DEQUEUE call.

In this example, the message contains an employee record defined by a data profile named EMPLOYEE. It is passed as an output argument to the advanced DEQUEUE procedure of a MIP named HIRE. The queue name and the DEQUEUE mode are explicitly specified by the calling application and passed in using the queue and dequeueOpts input parameters. In this example, dequeueOpts directs the DEQUEUE procedure to get the next message from the queue but not remove it from the queue.

The DEQUEUE procedure is called in a loop to retrieve a message from the specified queue using the passed-in queue name and DEQUEUE mode, taking the other options and properties from the message queue profile. When the exception PGM_BQM.NO_MORE_MESSAGE is raised, QCLOSE is called and the transaction is committed.

The message is converted from native to PL/SQL format according to the specifications of the data profile and returned in the output parameter message. In this example, the application uses the dequeued message to obtain the employee's first name.

```
DECLARE
  message       EMPLOYEE.EMPLOYEE_Typ;
  dequeueOpts   PGM_BQM.DEQUEUE_OPTIONS_Typ;
  msgProps      PGM_BQM.MESSAGE_PROPERTIES_Typ;
  msgid         RAW(24);
  openOptions  PGM_BQM.OPEN_OPTIONS_Typ;
  queueName    VARCHAR2 (48)
  queueHandle  BINARY_INTEGER
BEGIN
  queueName := 'emp'
  openOpts.open_mode := PGM_BQM.REMOVE;
  HIRE.QOPEN(queueName, openOpts, queueHandle);
  LOOP
    HIRE.DEQUEUE(queueHandle,
                 queueName,
                 dequeueOpts,
                 msgProps,
                 message(count),
                 msgid);
    INSERT into emp (firstname)
    VALUES (message.firstname)
  END LOOP;
EXCEPTION
  WHEN PGM_BQM.NO_MORE_MESSAGES THEN
    HIRE.QCLOSE(queueHandle);
    COMMIT;
  WHEN OTHERS THEN
    HIRE.QCLOSE(queueHandle);
    ROLLBACK;
    RAISE;
END;
```

Type Definitions

This section describes the data structures used in the MIP procedures and the supporting packages that define these structures.

OPEN_OPTIONS_Typ

This type defines the open options by an application when it calls QOPEN. This structure type is used for the *open_options* parameter in the open call.

Syntax

```
TYPE OPEN_OPTIONS_Typ IS RECORD (open_mode binary_integer default null)
```

The *open_mode* parameter specifies in which mode the queue is open:

- ENQUEUE puts messages into the queue (can be used in combination with REMOVE and BROWSE).
- REMOVE reads and removes the message from the queue (can be used in combination with ENQUEUE).
- BROWSE reads a message from the queue but does not remove it (can be used in combination with ENQUEUE).
- NULL is an invalid value.

You must set the *open_mode* when you call the advanced ENQUEUE and DEQUEUE procedures. The advanced DEQUEUE procedure does not use the value specified in the **Dequeue Mode** field in the Visual Workbench. You must specify REMOVE or BROWSE dequeue mode in the advanced DEQUEUE procedure.

ENQUEUE_OPTIONS_Typ

This type defines the ENQUEUE options that can be specified by the calling application. The structure type is used for the enqueue_options parameter of the advanced ENQUEUE procedure. If the fields of this parameter contain values, then they override the settings of the message queue profile.

Syntax

```
TYPE ENQUEUE_OPTIONS_Typ IS RECORD (visibility binary_integer
                                    default null)
```

where *visibility* specifies the transaction behavior of the ENQUEUE requests. Choose one of the these modes:

- ON_COMMIT

  Specifies that the ENQUEUE is part of the current transaction. The operation is completed when the transaction is committed. ON_COMMIT is the default.

- IMMEDIATE

  Specifies that the ENQUEUE is not part of the current transaction. The operation constitutes a transaction of its own.

DEQUEUE_OPTIONS_Typ

This type defines the DEQUEUE options that can be specified by the calling application. The structure type is used for the *dequeue_options* parameter of the advanced DEQUEUE procedure. If the fields of this parameter contain values, then they override the settings of the message queue profile.

Syntax

```
TYPE DEQUEUE_OPTIONS_Typ IS
      RECORD (dequeue_mode binary_integer default null,
              visibility   binary_integer default null,
              wait         binary_integer default null,
              msgid        raw(24) default null,
              correlation  varchar2(128) default null)
```

The following table describes the parameters that need to be specified:

Parameter	Description
dequeue_mode	Specifies how messages are read from the queue: ■ REMOVE reads the message and removes it from the queue. REMOVE is the default. ■ BROWSE reads a message from the queue but does not remove it.
visibility	Specifies the transaction behavior of the DEQUEUE request: ■ ON_COMMIT specifies that the ENQUEUE is part of the current transaction. The visibility parameter is ignored when DEQUEUE_MODE is set to BROWSE. The operation is completed when the transaction commits. ON_COMMIT is the default. ■ IMMEDIATE specifies that the DEQUEUE is not part of the transaction. The operation constitutes a transaction of its own.

Parameter	Description
wait	Specifies the wait time if no message is available on the queue: ■ FOREVER specifies an unlimited wait time. This is the default. ■ NO_WAIT specifies that there is no wait time. ■ *nn* specifies the time to wait in seconds.
msgid	Specifies the message identifier of the message to be dequeued.
correlation	Specifies the correlation identifier of the message to be dequeued.

MESSAGE_PROPERTIES_Typ

This type defines or obtains the message options for a message by the calling application. The structure type is used for the message_properties input parameter of the advanced ENQUEUE procedure and is an output parameter for the DEQUEUE procedure.

If the fields of this parameter contain values on input for the advanced ENQUEUE procedure, then they override the settings of the message queue profile. On output for the advanced DEQUEUE procedure, the fields reflect the message properties given to the message either by the enqueuing application or the message queuing system.

Syntax

```
TYPE MESSAGE_PROPERTIES_Typ is record (
    priority            binary_integer default null,
    expiration          binary_integer default null,
    correlation         varchar2(128) default null,
    message_type        varchar2(256) default null,
    response_queue      varchar2(128) default null,
    delivery_mode       binary_integer default null,
    acknowledgement     binary_integer default null,
    security_id         varchar2(128) default null)
```

The following table describes the parameters that need to be specified:

Parameter	Description
priority	Specifies the message priority: ■ DEFAULT_PRIORITY specifies the priority as the default priority of the message queuing system. ■ *nn* specifies a numeric priority range from 0 up. The smaller the number, the higher the priority.
expiration	Specifies when the message expires, determining in seconds how long the message is available for dequeuing: ■ NEVER specifies that the message does not expire and is available on the queue for an unlimited time. ■ *nn* specifies the number of seconds the message remains available on the queue. Depending on how the queues and event handling of the message queuing system are configured, the message queuing system might place expired messages on dedicated event queues.
correlation	Specifies an application-supplied identification for the message.

Parameter	Description
message_type	Specifies an application-supplied, free-format description of the message. The description is forwarded by the message queuing system as is from the enqueuing application to the dequeuing application. Applications are responsible for the usage of the specified response queue.
response_queue	Name of the response queue for the message. The response queue name is forwarded by the message queuing system as is from the enqueuing application to the dequeuing application. Applications are responsible for the usage of the specified response queue. A response queue is required if acknowledgment is specified as either POSITIVE or NEGATIVE.
delivery_mode	Specifies whether enqueued messages survives a system failure: ■ PERSISTENT specifies that messages survive a system failure. ■ NOT_PERSISTENT specifies that messages do not survive a system failure.
acknowledgment	Specifies whether the enqueing application receives an acknowledgment upon receipt of the message by the dequeuing application: ■ NONE specifies that no acknowledgment message is provided. ■ POSITIVE specifies that an acknowledgment message is provided both when a message is retrieved and when it is not retrieved. ■ NEGATIVE specifies that an acknowledgment message is provided only if the message is not retrieved. The acknowledgment message is delivered to the queue specified by *response_queue*.
security_id	Security identity associated with the application enqueuing the message. The property is forwarded by the message queuing system, as is, from the enqueuing application to the dequeuing application. Applications are responsible for the usage of the specified response queue.

PGM_BQM Package

The type definitions and constants described in "Type Definitions" on page 7-14 are defined in the PGM_BQM package. This package must be installed on the production Oracle server before you deploy MIPs.

See Also: "Preparing the MIP for Production" on page 1-6 for more information

Exceptions

Applications are responsible for handling these PL/SQL exceptions:

- When an application assigns an invalid value to a type definition field, the MIP procedures raise this PL/SQL exception:

```
INVALID_BGM_VALUE EXCEPTION
PRAGMA EXCEPTION_INIT(INVALID_BGM_VALUE, -20002)
```

- When an application tries to dequeue a message when there are no more messages on the queue, the MIP procedures raise this exception:

```
NO_MORE_MESSAGES_EXCEPTION;
PRAGMA EXCEPTION_INIT(NO_MORE_MESSAGES, -20003);
```

See Also: "Using the MIP for WebSphere MQ" on page 7-18 for more information

Naming

You must prefix the type definitions, constants and exceptions with PGM_BQM. No schema name need be provided, because the package has a public synonym. Example:

```
DECLARE
  message      EMPLOYEE.EMPLOYEE_Typ;
  dequeueOpts  PGM_BQM.DEQUEUE_OPTIONS_Typ;
  msgProps     PGM_BQM.MESSAGE_PROPERTIES_Typ;
  msgid        RAW(24);
  firstName    VARCHAR2(30);
BEGIN
  dequeueOpts.DEQUEUE_MODE := PGM_BQM.BROWSE;
  HIRE.DEQUEUE('QUEUE2', dequeueOpts, msgProps, message, msgid);
  firstName := message.FIRSTNAME;
  COMMIT;
EXCEPTION WHEN OTHERS THEN
  ROLLBACK;
  RAISE;
END;
```

Using the MIP for WebSphere MQ

This section describes how to use the MIP for WebSphere MQ.

PGM_SUP Package

To access a WebSphere MQ system, you must install the PGM_SUP package before deploying the MIP. PGM_SUP contains definitions that are required for using the Oracle Procedural Gateway for WebSphere MQ.

When the Visual Workbench generates a MIP, it uses the definitions of the PGM_SUP package in the package body of the MIP. Oracle applications using the MIP procedures do not access these definitions directly, but need only be granted access to them.

See Also: "Preparing the MIP for Production" on page 1-6 for more information

Exceptions

When applications assign a value that is supported by the PGM_BQM package but not supported by WebSphere MQ, the MIP procedures raise this exception for WebSphere MQ:

```
INVALID_MQSERIES_VALUE EXCEPTION
PRAGMA EXCEPTION_INIT(INVALID_MQSERIES_VALUE, -20001)
```

Applications are responsible for handling these exceptions.

See Also: "MIP Restrictions" for more information

MIP Restrictions

The following table lists the restrictions that apply when using the MIP procedures or the associated type definitions for WebSphere MQ:

Parameter	Restriction
correlation	Its value is limited to a length of 24 characters.
message_type	Its value is limited to a length of 8 characters.
msgid	Its value is limited to a length of 24 bytes.
priority	Its value range is between 0 and 9.
queue_name	Its value is limited to a length of 48 characters.
response_queue	Its value is limited to a length of 48 characters.
security_id	Its value is limited to a length of 12 characters.

The MQSeries profile complies with these restrictions because the Visual Workbench verifies all input when entering the message queue profile properties. You can, however, override the profile using the advanced ENQUEUE and DEQUEUE procedures, possibly causing the MIP to raise an exception at runtime.

See Also: "OPEN_OPTIONS_Typ" on page 7-14 for more information about overrides

Data Conversion Package

The data conversion package generated by the Visual Workbench provides PL/SQL mapping for non-Oracle data types. It includes one or more user-defined types in PL/SQL that are mapped to the non-Oracle data type, and functions to convert between them.

Data conversion packages have two parts, a specification and a body. The specification declares the types, functions, and other information available for use by developers, and the body provides the implementation for the specification.

You use the data conversion package and so does the generated MIP:

- You can use the generated PL/SQL type in the data conversion package specification to fill out information on a message. The message is then passed to the ENQUEUE operation and sent over the message queuing system to the non-Oracle application. It is the same structure you use to retrieve messages from the non-Oracle application through the DEQUEUE operation and to interpret the message information.
- The generated MIP uses the data conversion functions to convert data. Because the data conversion is handled in the generated MIP, you need not call these conversion functions directly.

Read the generated package specification to learn about the PL/SQL types that were created. In most cases, you need not look at the package body.

```
01  EMPLOYEE.
    10 EMPLOYEENOPIC X(6).
    10 FIRSTNAME           PIC X(12).
    10 LASTNAME            PIC X(12).
    10 BIRTHDATE           PIC X(10).
    10 SALARY              PIC S9999999V99 USAGE COMP-3.
    10 BONUS                PIC S9999999V99 USAGE COMP-3.
    10 COMMISSION           PIC S9999999V99 USAGE COMP-3.
```

"Creating a Data Profile" on page 6-5 describes how to use the Visual Workbench to create a data profile. Use the Visual Workbench Wizard to add them to an interface profile.

See Also: "Creating an Interface Profile and Generating a MIP" on page 6-14 for more information

The corresponding generated data conversion package EMPLOYEE for COBOL data profile EMPLOYEE contains the PL/SQL type used to map to the COBOL data type, and two functions to convert between the PL/SQL mapping data type and the COBOL data type. This is the package specification for the package EMPLOYEE:

```
 *  Copyright (c) 1999 Oracle Corporation.  All rights reserved.
 *
 *  PL/SQL and Cobol Data Mapping Package Body EMPLOYEE.
 *
 *      PG DD  release 4.0.1.0.0
 *      PGMAU  release 8.0.4.1.0
 *
 *  Generated 11-MAR-99 at 15:06:33 by PGMADMIN
 */

CREATE or REPLACE PACKAGE EMPLOYEE IS

   /*------------------------------------------------------------*/
   /* EMPLOYEE                public definitions          */
   /*------------------------------------------------------------*/

   TYPE MQGET_BUFFER IS TABLE OF RAW(32767) INDEX BY BINARY_INTEGER;
   TYPE MQPUT_BUFFER IS TABLE OF RAW(32767) NOT NULL INDEX BY BINARY_INTEGER;

   TYPE EMPLOYEE_Typ is RECORD (
       EMPLOYEENO            CHAR(6),
       FIRSTNAME             CHAR(12),
       LASTNAME              CHAR(12),
       BIRTHDATE             CHAR(10),
       SALARY                NUMBER(9,2),
       BONUS                 NUMBER(9,2),
       COMMISSION            NUMBER(9,2));


   FUNCTION raw2EMPLOYEE(message IN MQGET_BUFFER,
                         EMPLOYEE OUT EMPLOYEE_Typ,
                         mipdiag IN CHAR) RETURN INTEGER;

   FUNCTION EMPLOYEE2raw(EMPLOYEE IN EMPLOYEE_Typ,
                         message OUT MQPUT_BUFFER,
                         mipdiag IN CHAR) RETURN INTEGER;

END EMPLOYEE;
```

The data conversion functions require these PL/SQL packages:

- DBMS_OUTPUT
- UTL_PG

- `UTL_RAW`

These PL/SQL packages must be installed on the production Oracle server when data conversion packages are used in run-time environments.

See Also: "Preparing the MIP for Production" on page 6-34 and Appendix A, "Preparing the Production Oracle Server" for more information

---

You can view the data conversion package by using the Code Viewer. Select the Cobol Mapping entry from the list and click **View Code**. The Code Viewer appears.

See Also: "Viewing the Generated Code" on page 6-17

Note: You can view the body of the data conversion package. Do not modify the package body or specification, as it might cause the calling Oracle application to malfunction or lead to unrecoverable errors.

COBOL Data Type Conversion

The Visual Workbench supports IBM VS COBOL II, specified as `IBMVSCOBOLII` when defining data profiles.

PIC X

Visual Workbench converts the COBOL `X` data type to a PL/SQL `CHAR` data type of the same character length. NLS character-set conversion is also performed.

COBOL lacks a data type specifically designated for variable-length data. Such data is represented in COBOL as a subgroup containing a `PIC 9` length field followed by a `PIC X` character field.

For example:

```
10 NAME.
   15 LENGTH PIC S9(4).
   15 LETTERS PIC X(30).
```

It cannot be guaranteed that all instances of an `S9(4)` field followed by an `X` field are always variable-length data. Instead of converting the COBOL group `NAME` to a PL/SQL `VARCHAR` in the example, the Visual Workbench constructs a nested PL/SQL record:

```
TYPE NAME_typ is RECORD {
        LENGTH NUMBER(4,0),
        LETTERS CHAR(30)
);

TYPE … is RECORD (
         ...
         NAME NAME_type,
         ...
);
```

It is the client application's responsibility to extract `NAME.LENGTH` characters from `NAME.LETTERS` and assign the result to a PL/SQL `VARCHAR` data type, if `VARCHAR` is desired. This requires specific knowledge of the remote host data.

Character-set conversion is performed for single-byte encoding:

- For remote host character data, select a character set from the character set drop-down list in the COBOL Data Definition dialog box for all single-byte character fields in the data profile.

See Also: "Creating a Data Profile" on page 6-5 for more information

- For local Oracle character data, set the language character set on the Oracle server for all character fields in the data profile.

PIC G

Visual Workbench converts the COBOL `G` data type to a PL/SQL `VARCHAR2` data type of the same length, allowing two bytes for every character position.

The alphanumeric and double-byte character set editing field positions are listed in the following table:

Symbol	Data Content
`B`	Blank (one byte single-byte character set; two bytes double-byte character set, depending on `USAGE`)
`0`	Zero (one byte single-byte character set)
`/`	Slash (one byte single-byte character set)

The presence of the editing symbols means that the remote host field contains the data content and length indicated. The editing positions are included in the length of the data field, but all field positions are converted as a single string and no special scanning or translation is done for edited byte positions.

Edited positions in data retrieved from the remote host are converted along with the entire field and passed to the client application in the corresponding PL/SQL output variable defined as a `VARCHAR2` data type. For example:

- `PIC XXXBBXX`: Alphanumeric field 7 bytes long and is converted in a single conversion call. No testing or translation is done on the contents of the byte positions indicated by `B`. Although VS COBOL II language rules indicate that these positions contain "blank" in the character set specified for the remote host, the data that is present is the user's responsibility.
- `PIC GGBGGG:` Double-byte character set field 12 bytes long and is converted in a single conversion call. No testing or translation is done on the contents of the byte positions indicated by `B`. Although VS COBOL II language rules indicate that these positions contain "blank" in the character set specified for the remote host, the data that is present is the user's responsibility

PIC 9

The Visual Workbench converts the COBOL 9 data type to a PL/SQL `NUMBER` data type of the same precision and scale. NLS character-set translation is also performed on signs, currency symbols, and spaces. These data types are supported:

- `COMPUTATIONAL` (binary)
- `COMPUTATIONAL-3` (packed decimal)

- COMPUTATIONAL-4 (binary)
- DISPLAY (zoned decimal)

  For DISPLAY data types, these sign specifications are supported:

  – SEPARATE [CHARACTER]

  – LEADING

  – TRAILING

COMPUTATIONAL-1 and COMPUTATIONAL-2 (floating point) data types are not supported.

FILLER

The Visual Workbench recognizes COBOL FILLER fields by the spelling of the element name FILLER. The Visual Workbench does not generate any data conversion for such elements, but does require that their space be properly allocated to preserve offsets within the records exchanged with the remote host translation.

If a RENAMES or REDEFINES definition covers a FILLER element, then the Visual Workbench generates data conversion statements for the same area when it is referenced as a component of the RENAMES or REDEFINES variable. Such data conversion reflects only the format of the RENAMES or REDEFINES definition and not the bounds of the FILLER definition.

COBOL Format Conversion

This section describes COBOL format conversion.

JUSTIFIED and JUSTIFIED RIGHT

JUSTIFIED and JUSTIFIED RIGHT cause remote host transaction data to be converted as a PL/SQL CHAR data type according to character data type for both IN and OUT parameters:

- Input data passed from the application is stripped of its right-most blanks and are left-padded as required, and are sent to the remote host
- Output data is aligned as it is received from the remote host and left- padded with blanks as required, and are sent to the application.

See Also: "COBOL Data Type Conversion" on page 7-21 for more information

JUSTIFIED LEFT

JUSTIFIED LEFT causes warnings in the Visual Workbench when the data conversion package is being generated. No alignment is performed. The remote host transaction data is converted as a PL/SQL CHAR data type according to character data type for both IN and OUT parameters.

Note: "COBOL Data Type Conversion" on page 7-21 for more information

OCCURS n TIMES

OCCURS *n* TIMES causes conversion of n instances of a set of PL/SQL variables to or from a repeating group area within the remote host record. The size of the area equals the group length multiplied by *n* repetitions. The data conversion packages generated by the Visual Workbench use PL/SQL RECORDs of TABLEs to implement an array-like subscript on fields in a repeating group. Because PL/SQL supports a single dimension TABLE, the Visual Workbench supports only a single level of an OCCURS group. It does not support nested OCCURS groups. Conversion and formatting are dictated by the COBOL data type of each subfield defined in the repeating group.

OCCURS m TO n TIMES DEPENDING ON field-2

This causes conversion of at least m and not more than n instances of a set of PL/SQL variables to or from a repeating group area within the remote host record. The size of the area equals the group length multiplied by the repetition count contained in the named field. The data conversion packages generated by the Visual Workbench use PL/SQL RECORDs of TABLEs to implement an array-like subscript on fields in a repeating group. Because PL/SQL supports a single dimension TABLE, the Visual Workbench supports only a single level of an OCCURS group. It does not support nested OCCURS groups. Conversion and formatting are dictated by the COBOL data type of each sub-field defined in the repeating group. The data conversion packages generated by the Visual Workbench use a FOR … LOOP algorithm with a range of 1 to the specified upper limit of TIMES.

RENAMES item-2 THRU item-3

A single PL/SQL variable declaration corresponds to a RENAMES definition. If all the subfields covered by a RENAMES definition are PIC X, the PL/SQL variable is data type VARCHAR2. Otherwise, any non-PIC X subfield causes the PL/SQL variable data type to be RAW. Lengths of renamed fields do not contribute to the overall parameter data length because the original fields dictate the lengths.

RENAMES item-2 WHEN item-3=value

WHEN *item-3* = *value* is an Oracle extension to the COBOL copybook data definition as stored in the Visual Workbench repository. This extension exists only in the Visual Workbench context and is not valid IBM VS COBOL II syntax.

The gateway administrator or application developer can use this extension to specify the criteria by which to apply the redefinition. For example, a record-type field is often present in a record, and different record formats apply depending on which record type is being processed. The specification of which type values apply to which redefinition is typically contained in the application programming logic, not in the data definition. The WHEN criterion is included in data definitions to specify which conversion to perform on redefined formats in the data conversion package.

The Visual Workbench generates PL/SQL nested record declarations which correspond in name and data type to the subordinate elements covered by the REDEFINED definition.

LEVEL 01 REDEFINE is ignored, permitting remote host copybooks to include definitions which REDEFINE other transaction working storage buffers without having to define such buffers in the data conversion package or alter the copybook used as input for the definition.

SYNCHRONIZED and SYNCHRONIZED RIGHT

`SYNCHRONIZED` and `SYNCHRONIZED RIGHT` cause the numeric field to be aligned on boundaries as dictated by the remote host environment, compiler language, and data type.

Numeric conversion is performed on the aligned data fields according to numeric data type for `IN` and `OUT` parameters.

See Also: "COBOL Data Type Conversion" on page 7-21 for more information

SYNCHRONIZED LEFT

`SYNCHRONIZED LEFT` causes warnings to be displayed on the Visual Workbench during the generation of data conversion package, and no realignment is performed.

Numeric conversion is performed on the aligned data fields according to numeric data type for `IN` and `OUT` parameters.

See Also: "COBOL Data Type Conversion" on page 7-21 for more information

PL/SQL Naming Algorithm

This section describes the PL/SQL naming algorithm.

Delimiters

Special COBOL characters in record, group, and element names are translated when data profiles are created using the Visual Workbench:

- Hyphen (`-`) is translated to underscore (`_`)
- Period (`.`) is deleted

Qualified Compound Names

PL/SQL variable names are fully qualified and composed from:

- PL/SQL record name as the leftmost qualifier corresponding to level 01 or 77 COBOL record name
- PL/SQL nested record names corresponding to COBOL group names
- PL/SQL nested fields corresponding to COBOL elements of data type
- `CHAR` or `NUMBER` corresponding to nonrepeating COBOL elements
- `TABLE` corresponding to COBOL elements which fall within an `OCCURS` or `OCCURS DEPENDING ON` group (COBOL repeating fields correspond to PL/SQL nested `RECORD`s of `TABLE`s)

When referencing PL/SQL variables from calling applications, the data conversion package name (the data profile name created in the Visual Workbench) must be prefixed as the leftmost qualifier. These examples show the fully qualified reference to the PL/SQL variable:

```
BIRTHDAY is: EMPLOYEE.EMPLOYEE_Typ.BIRTHDAY
BONUS is: EMPLOYEE.EMPLOYEE_Typ.BONUS
```

Truncated and Non-Unique Names

The Visual Workbench truncates field names and corresponding PL/SQL variable names when the name exceeds:

- 26 bytes for fields within an aggregate record or group. This is because each field or PL/SQL variable name must have the suffix `_Typ` for group names and `_Tbl` for element names with a repeating group.
- 30 bytes because of a PL/SQL limitation for any name

The rightmost four characters are truncated, imposing the restriction that names be unique to 26 characters.

Duplicate Names

COBOL allows repetitive definition of the same group or element names within a record, and the context of the higher-level groups uniquely qualifies names. However, because data conversion packages generated by the Visual Workbench declare PL/SQL record variables that reference nested PL/SQL records for subordinate groups and fields, such nested record types can have duplicate names.

Given this COBOL definition, `ZIP` is uniquely qualified in COBOL, but the corresponding PL/SQL declaration would have a duplicate nested record type for `ZIP`. (The PL/SQL declaration is shown in "Generated PL/SQL" on page 7-26).

Example 7–1   COBOL definition

```
01  EMPREC.
      05 HIREDATE          PIC X(8).
      05 BIRTHDATE         PIC X(8).
      05 SKILL             PIC X(12)OCCURS 4.
      05 EMPNO             PIC 9(4).
      05 EMPNAME.
         10 FIRST-NAME     PIC X(10).
         10 LAST-NAME      PIC X(15).
      05 HOME-ADDRESS.
         10 STREET         PIC X(20).
         10 CITY           PIC X(15).
         10 STATE          PIC XX.
         10 ZIP.
            15 FIRST-FIVE  PIC X(5).
            15 LAST-FOUR   PIC X(4).
      05 DEPT              PIC X(45).
      05 OFFICE-ADDRESS.
         10 STREET         PIC X(20).
         10 CITY           PIC X(15).
         10 STATE          PIC XX.
         10 ZIP.
            15 FIRST-FIVE  PIC X(5).
            15 LAST-FOUR   PIC X(4).
      05 JOBTITLE          PIC X(20).
```

Generated PL/SQL

The Visual Workbench avoids declaring duplicate nested record types, and generates this PL/SQL based on the COBOL definition in "COBOL definition" on page 7-26:

```
SKILL_Key BINARY_INTEGER;

TYPE SKILL_Tbl is TABLE of CHAR(12)
   INDEX by BINARY_INTEGER;
```

```
TYPE EMPNAME_Typ is RECORD (
   FIRST_NAME       CHAR(10),
   LAST_NAME        CHAR(15));

TYPE ZIP_Typ is RECORD (
   FIRST_FIVE       CHAR(5),
   LAST_FOUR        CHAR(4));

TYPE HOME_ADDRESS_Typ is RECORD (
   STREET                CHAR(20),
   CITY                  CHAR(15),
   STATE                 CHAR(2),
   ZIP                   ZIP_Typ);

TYPE OFFICE_ADDRESS_Typ is RECORD (
   STREET                CHAR(20),
   CITY                  CHAR(15),
   STATE                 CHAR(2),
   ZIP                   ZIP_Typ);

TYPE EMPREC_Typ is RECORD (
   HIREDATE             CHAR(8),
   BIRTHDATE            CHAR(8),
   SKILL                SKILL_Tbl,
   EMPNO                NUMBER(4,0),
   EMPNAME              EMPNAME_Typ,
   HOME_ADDRESS         HOME_ADDRESS_Typ,
   DEPT                 CHAR(45),
   OFFICE_ADDRESS       OFFICE_ADDRESS_Typ,
   JOBTITLE             CHAR(20));
```

However, multiple nested groups might have the same name but have different sub-fields, as in the COBOL definition in Example 7–2.

Example 7–2 COBOL definition

```
01  EMPREC.
      05 HIREDATE           PIC X(8).
      05 BIRTHDATE          PIC X(8).
      05 SKILL              PIC X(12) OCCURS 4.
      05 EMPNO              PIC 9(4).
      05 EMPNAME.
         10 FIRST-NAME      PIC X(10).
         10 LAST-NAME       PIC X(15).
      05 HOME-ADDRESS.
         10 STREET          PIC X(20).
         10 CITY            PIC X(15).
         10 STATE           PIC XX.
         10 ZIP.
            15 LEFTMOST-FIVE   PIC X(5).
            15 RIGHTMOST-FOUR  PIC X(4).
       05 DEPT              PIC X(45).
       05 OFFICE-ADDRESS.
          10 STREET         PIC X(20).
          10 CITY           PIC X(15).
          10 STATE          PIC XX.
          10 ZIP.
             15 FIRST-FIVE  PIC X(5).
             15 LAST-FOUR   PIC X(4).
       05 JOBTITLE          PIC X(20).
```

In a COBOL definition where multiple nested groups have the same name but different subfields, the Visual Workbench alters the name of the PL/SQL nested record type for each declaration in which the subfields differ in name, data type, or options, as shown in Example 7–3.

Example 7–3 COBOL definition

```
SKILL_Key BINARY_INTEGER;

TYPE SKILL_Tbl is TABLE of CHAR(12)
   INDEX by BINARY_INTEGER;

TYPE EMPNAME_Typ is RECORD (
   FIRST_NAME       CHAR(10),
   LAST_NAME        CHAR(15));

TYPE ZIP_Typ is RECORD (
   LEFTMOST_FIVE    CHAR(5),
   RIGHTMOST_FOUR   CHAR(4));

TYPE HOME_ADDRESS_Typ is RECORD (
   STREET           CHAR(20),
   CITY             CHAR(15),
   STATE            CHAR(2),
   ZIP              ZIP_Typ);

TYPE ZIP_Typ02 is RECORD (
   FIRST_FIVE       CHAR(5),
   LAST_FOUR        CHAR(4));

TYPE OFFICE_ADDRESS_Typ is RECORD (
   STREET            CHAR(20),
   CITY              CHAR(15),
   STATE             CHAR(2),
   ZIP               ZIP_Typ02);

TYPE EMPREC_Typ is RECORD (
   HIREDATE          CHAR(8),
   BIRTHDATE         CHAR(8),
   SKILL             SKILL_Tbl,
   EMPNO             NUMBER(4,0),
   EMPNAME           EMPNAME_Typ,
   HOME_ADDRESS      HOME_ADDRESS_Typ,
   DEPT              CHAR(45),
   OFFICE_ADDRESS    OFFICE_ADDRESS_Typ,
   JOBTITLE          CHAR(20));
```

In Example 7–3, note that the `02` appended to the second declaration (`ZIP_Typ02`) and its reference in `OFFICE_ADDRESS`, and the fully qualified reference to the PL/SQL variable that corresponds to the following:

- `HOME_ADDRESS.ZIP` is:

  ```
  packagename.EMPREC_Typ.HOME_ADDRESS.ZIP.LEFTMOST_FOUR
  packagename.EMPREC_Typ.HOME_ADDRESS.ZIP.RIGHTMOST_FIVE
  ```

- `OFFICE_ADDRESS.ZIP` is:

  ```
  packagename.EMPREC_Typ.OFFICE_ADDRESS.ZIP.FIRST_FIVE
  packagename.EMPREC_Typ.OFFICE_ADDRESS.ZIP.LAST_FOUR
  ```

The nested record type name `ZIP_Typ02` is not used in the reference but is implicit within PL/SQL's association of the nested records.

A
Preparing the Production Oracle Server

Specific PL/SQL packages must be present on your production Oracle server before you can compile MIPs on that server. This appendix describes how to run scripts `pgmdeploy.sql` and `pgmundeploy.sql` and how to later remove any PL/SQL packages that are not needed on your system. The following topics are included:

Introduction

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

- `DBMS_PIPE`, `DBMS_OUTPUT`, and `UTL_RAW`

  These packages are shipped with each Oracle server and are usually already installed.

- `PGM`, `PGM_BQM`, `PGM_SUP`, and `UTL_PG`

  These packages are shipped with your Oracle Procedural Gateway for message queuing. They are installed during the creation process of the Visual Workbench repository. Do not run deployment script on the Oracle server with an installed Visual Workbench repository. If the Oracle server used for the repository is different than the Oracle server used in the production environment, then you must install these packages on the production Oracle server.

This section describes how to run:

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

Note: If your production Oracle server is Oracle8*i* or earlier, you need to use `pgmdeploy8.sql` to install the current release of PG4MQ Visual Workbench deployment packages, and you need to use `pgmundeploy8.sql` to remove previous release of PG4MQ Visual Workbench deployment packages.

All of the examples in this section are provided with the assumption that you are installing on the current release.

Verifying and Installing PL/SQL Packages

1. Locate the necessary scripts:
   - `pgm.sql`
   - `pgmbqm.sql`
   - `pgmdeploy.sql`
   - `pgmsup.sql`
   - `pgmundeploy.sql`
   - `prvtpg.sql`
   - `utlpg.sql`

   These scripts are installed with the gateway, in the directory `ORACLE_HOME\pg4mq\admin\deploy`, where `ORACLE_HOME` is the gateway home directory.
2. If your production Oracle server is on a different computer than the gateway, you need to use a file transfer method, such as ftp, to transfer files in the directory `ORACLE_HOME\pg4mq\admin\deploy`, where `ORACLE_HOME` is the gateway home directory on your gateway computer. On your production Oracle server computer, change directory to the directory containing the deployment scripts you just transferred and skip to step 4.
3. If your production Oracle server is on the same computer as the gateway, then change directory to `ORACLE_HOME\pg4mq\admin\deploy`, where `ORACLE_HOME` is the gateway home directory.
4. Run the deployment script by entering:

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

After the script verifies the `SYS` account password, it connects to the production Oracle server. The script verifies and reports on which PL/SQL packages are installed there:

- If any of the Oracle server packages `DBMS_OUTPUT`, `DBMS_PIPE` or `UTL_RAW` are missing, 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, the script installs them on the production Oracle server.

Removing the PL/SQL Packages

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

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

   ```
   > cd ORACLE_HOME\pg4mq\admin\deploy
   ```
2. Run the script by entering:

   ```
   $ sqlplus /nolog @pgmundeploy.sql
   ```
3. At the script prompt: `Enter the connect string for the Oracle server... [LOCAL]`, press Enter to use the default of `LOCAL`.
4. At the script prompt, `Enter the required Oracle server passwords`, enter the password of the `SYS` account.

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

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

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