Oracle® Warehouse Builder

Installation and Administration Guide

11*g* Release 1 (11.1) for Windows and UNIX

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Oracle Warehouse Builder Installation and Administration Guide, 11*g* Release 1 (11.1) for Windows and UNIX

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Primary Author: Cathy Shea

Contributor: David Allan, Michelle Bird, Srinivasa Ganti, Roza Leyderman, Padmaja Potineni, John Potter, Vishwanath Sreeraman, Geoff Watters

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Preface

This preface includes the following topics:

Audience

This manual is written for those responsible for installing Oracle Warehouse Builder, including:

- Data warehouse administrators
- System administrators
- Data warehouse and ETL developers
- Other MIS professionals

To install Oracle Warehouse Builder, you must be familiar with installing Oracle Database.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Publications

The Warehouse Builder documentation set includes these manuals:

- *Oracle Warehouse Builder Sources and Targets Guide*
- *Oracle Warehouse Builder API and Scripting Reference*

To access to documentation set, including the latest version of the release notes, refer to the following Web site:

http://www.oracle.com/technetwork/developer-tools/warehouse/documentation/index.html

In addition to the Warehouse Builder documentation, you can reference *Oracle Database Data Warehousing 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.

Part I

Installing Oracle Warehouse Builder

This part contains the following chapters:

1

Installation Overview and Requirements

This chapter outlines the installation process, discusses the hardware and software requirements, and introduces the Oracle Warehouse Builder architecture and its components. This chapter includes the following topics:

1.1 What's New in Installing Warehouse Builder

This section includes important tips for users who are familiar with installing previous version of Warehouse Builder. If you are new to Warehouse Builder, please skip to "Warehouse Builder Architecture and Components" on page 1-2.

Oracle Warehouse Builder Embedded in Oracle Database 11*g*

Beginning in this release, Warehouse Builder is automatically installed when you install the Oracle Database 11*g* Release 1 (11.1).

To install Warehouse Builder on client computers, download and install the standalone Warehouse Builder software. The standalone software is also required for certain cases such as installing Warehouse Builder 11*g* onto Oracle Database 10*g*. For more information, see "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

SYSDBA Privileges No Longer Required for Installation

Previously, installing a Warehouse Builder repository on an Oracle Database required a user with `SYSDBA` privileges. Beginning in this release, this is no longer required. A schema `OWBSYS` is created while installing Oracle Database 11*g* Release 1. `OWBSYS` holds

the metadata which is divided into workspaces. To start using Warehouse Builder, you create a new workspace. You do not need `SYSDBA` privileges.

Unified Warehouse Builder Repository with Multiple Workspaces

Previously, users accessed the repository as a whole. Beginning with this release, users are assigned to workspaces within the repository. Thus, instead of granting access to a repository, you grant access to a workspace.

Starting and Stopping the Browser Listener

In previous releases, Windows users could start and stop the Browser Listener from the program group. You could go to Start, Programs, OWB_ORACLE_HOME, Warehouse Builder and click **Start Browser Listener** and **Stop Browser Listener.** Beginning in this release, you can only stop and start the Browser Listener from a command line. This change improves usability and facilitates new password requirements.

Oracle Workflow Embedded within Warehouse Builder

Previously, if you wanted to utilize Oracle Workflow to manage job dependencies or if you wanted to deploy process flows, it was necessary to install Oracle Workflow. Beginning in this release, these additional installation steps are no longer required as Oracle Workflow components are embedded within Warehouse Builder.

Security Based on PL/SQL Package No Longer Supported

Beginning with Warehouse Builder11*g* Release 1 (11.1), the preferred method of implementing metadata security is through the user interface available in the Design Center and described in the *Oracle Warehouse Builder Sources and Targets Guide*. If, in a previous release, you implemented security using a PL/SQL package, Warehouse Builder 11*g* Release 1 (11.1) does support that implementation.

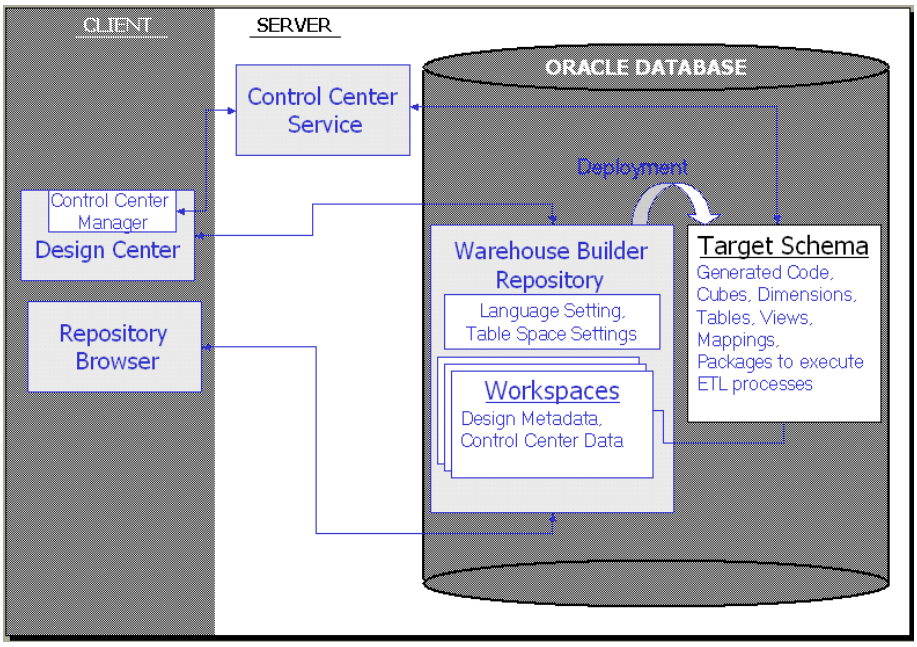
1.2 Warehouse Builder Architecture and Components

Oracle Warehouse Builder is an information integration tool that leverages the Oracle Database to transform data into high-quality information. The Oracle Database is a central component in the Warehouse Builder architecture because the Database hosts the Warehouse Builder repository and the code generated by Warehouse Builder.

Figure 1–1 illustrates the interaction of the major components of the Warehouse Builder software.

The Design Center is the user interface for designing, managing, scheduling, and deploying ETL processes for moving and transforming data. All metadata associated with the work done in the Design Center is stored in the Warehouse Builder Repository. The repository is hosted on an Oracle Database and you can use the Repository Browser to report on the metadata in the repository. Also hosted on an Oracle Database is the Target Schema to which Warehouse Builder loads data resulting from the ETL processes that you run through the Control Center Service.

Figure 1–1 Warehouse Builder Components



1.2.1 Design Center

The Design Center provides the graphical interface for defining sources, designing targets, and designing ETL and other data transformation processes. As you create a design in the Design Center, you are working with logical designs only, not physical implementations.

1.2.2 Control Center Manager

The Control Center Manager is the console for managing deployment and job execution. Previously, in the Design Center, you created a logical design for transforming data. Your logical design may have introduced objects that do not yet exist, such as staging tables. Now in the Control Center Manager, you deploy the design. That is, you instruct Warehouse Builder to create the necessary physical objects such as the staging tables, for example. Subsequently, you execute the design. During execution, Warehouse Builder runs the code associated with extracting, transforming, and loading the data.

1.2.3 Target Schema

The target schema is the target to which you load your data and the data objects that you designed in the Design Center such as cubes, dimensions, views, and mappings. The target schema contains Warehouse Builder components such as synonyms that enable the ETL mappings to access the audit/service packages in the repository. The repository stores all information pertaining to the target schema such as execution and deployment information.

Notice that the target schema is not a Warehouse Builder software component but rather an existing component of the Oracle Database. As such, you can associate multiple target schemas with a single Warehouse Builder repository. You can have a 1 to 1 relationship or many target schemas to a single repository.

1.2.4 Warehouse Builder Repository

The repository schema stores metadata definitions for all the sources, targets, and ETL processes that constitute your design metadata. In addition to containing design metadata, a repository can also contains the runtime data generated by the Control Center Manager and Control Center Service.

As part of the initial installation of Warehouse Builder, you use the Repository Assistant to define the repository in an Oracle Database. You can host a Warehouse Builder 11*g* repository either on Oracle Database 10*g* Release 2 (10.2) or 11*g*.

About Workspaces

In defining the repository, you create one or more workspaces with each workspace corresponding to a set of users working on related projects. A common practice is to create separate workspaces for development, testing, and production. Using this practice, you can allow users such as your developers access to the development and testing workspaces but restrict them from the production workspace.

Later in the implementation cycle, you also use the Repository Assistant to manage existing workspaces or create new ones.

For examples of the options for implementing repositories, see "Implementation Strategies" on page 1-4.

1.2.5 Repository Browser

The Repository Browser is a web browser interface for reporting on the repository. You can view the metadata, create reports, audit runtime operations and perform lineage and impact analysis. The Repository Browser is organized such that you can browse design-specific and control center-specific information.

1.2.6 Control Center Service

The Control Center Service is the component that enables you to register locations. It also enables deployment and execution of the ETL logic you design in the Design Center such as mappings and process flows.

1.2.7 Implementation Strategies

This section provides an overview of the various choices and considerations for implementing Warehouse Builder. Detailed instructions on how to implement each option are provided in subsequent sections.

The choices for implementing Warehouse Builder include the following:

- Basic Implementation
- Traditional Client/ Server Implementation
- Repository on Oracle Database 10g Release 2
- Separate Design and Runtime Environments Implementation
- Development, Test, and Production Environments
- Remote Runtime Environment Implementation

1.2.7.1 Basic Implementation

The simplest option is to host the client and server components on a single local computer, which is suitable if you are performing a proof of concept or launching a pilot program.

If you install Oracle Database 11*g*, the most commonly used Warehouse Builder components are also installed for you. The next step is to start the Warehouse Builder Repository Assistant to define a workspace and workspace user.

Two Warehouse Builder components not included in the Oracle Database 11*g* installation are deployment to Discoverer and execution of runtime scripting commands. To access these components, see "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

To implement a basic implementation with a pre-existing Oracle Database 10*g* Release 2 installation, see "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

1.2.7.2 Traditional Client/ Server Implementation

This is the most commonly implemented strategy with client components residing on multiple client computers and server components residing on a single server.

When you install the Oracle Database 11*g*, the Database installation includes all the Warehouse Builder components necessary for the server. You need only start the Warehouse Builder Repository Assistant to define workspaces and workspace users. Subsequently, you download and install the Warehouse Builder software on the client computers.

1.2.7.3 Repository on Oracle Database 10*g* Release 2

When you install Oracle Database 11*g*, the Warehouse Builder server components are also installed.

However, you may choose to host the repository on Oracle Database 10*g* Release 2. There are no known limitations or restrictions for hosting a Warehouse Builder 11*g* repository on Oracle Database 10*g* Release 2, other than the fact that you will not have access to functionality new in Oracle Database 11*g*.

For instructions, see "Hosting the Repository on Oracle Database 10g Release 2" on page 1-20.

1.2.7.4 Separate Design and Runtime Environments Implementation

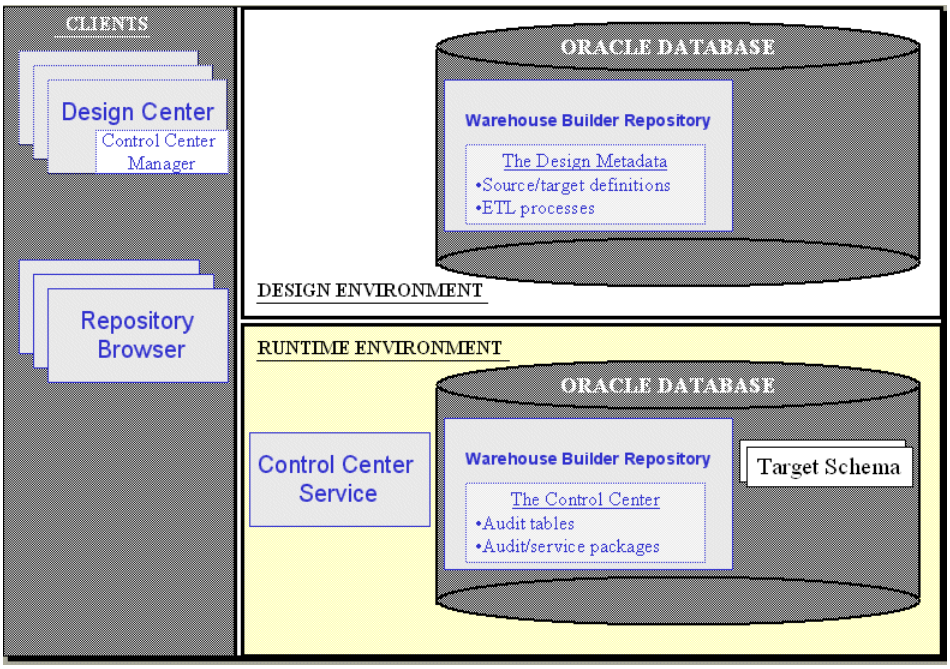
In an implementation such as shown in Figure 1–2, one repository stores the metadata necessary for designing in Warehouse Builder. This includes the metadata for sources, targets, and ETL processes that users access through the Design Center.

You can define a separate environment dedicated to job execution. Refer to this environment as the *runtime environment*. Notice that each runtime environment requires a single Control Center Service to manage the control center and its deployment and execution activities.

Runtime data is stored in audit tables. You can access the audit tables through the control center specific reports in the Repository Browser.

The only communication between the design repository and the control center repository occurs when you deploy objects to the target schema.

Figure 1–2 Split Repositories Implementation



1.2.7.5 Development, Test, and Production Environments

Organizations typically maintain separate environments for developing and testing prior to releasing a project into a production environment. You can have multiple physical environments based on a common logical design in a single Warehouse Builder repository. Or, you can associate each physical environment with its own Warehouse Builder repository.

To implement either strategy, refer to Chapter 11, "Managing Multiple Environments from Development to Production".

1.2.7.6 Remote Runtime Environment Implementation

The Control Center Service is the Warehouse Builder server component that governs the deployment of objects to target schemas. Most commonly, the Control Center Service is installed on the computers hosting the target schemas.

In some cases, though, it may be desirable to run the Control Center on a computer that does not host an Oracle Database. You may want to implement a remote runtime for purposes of load balancing. Also consider remote runtime if your company security policies restrict you from installing additional software on the computer hosting the target schema.

To implement any of these scenarios, refer to "Implementing a Remote Runtime (Optional)" on page 2-6.

1.3 General Steps for Installing Warehouse Builder

If you want to upgrade an existing installation, then refer to Chapter 3, "Upgrading to Oracle Warehouse Builder 11g Release 1 (11.1)".

If you want to begin a new installation, then use the following instructions to determine which topics to reference.

To begin a new installation:

1. Determine your implementation strategy.

   To accommodate a variety of environments and customer needs, Warehouse Builder offers you flexibility in where you install server and client components.

   Review "Warehouse Builder Architecture and Components" on page 1-2 and "Understanding the Installation Requirements" on page 1-8 to develop an implementation strategy.

2. Review the Oracle Warehouse Builder Release Notes, part number B40098, available at `http://www.oracle.com/technetwork/index.html`.

3. Preparing the Server on page 1-10

4. For Oracle RAC environments only, proceed to "Steps for Installing Warehouse Builder in Oracle RAC Environments" on page 1-22. Otherwise, continue with the next step in these instructions.

5. Preparing the Oracle Database on page 1-12

6. If necessary, install the Warehouse Builder standalone software.

   Skip this step if the Warehouse Builder repository is hosted on Oracle Database 11*g* and you do not intend to integrate with Oracle Discoverer or utilize runtime scripting commands.

   Otherwise, refer to the instructions in "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

7. To utilize the default Warehouse Builder schema installed in Oracle Database 11*g*, first unlock the schema.

   Connect to SQL*Plus as the SYS or SYSDBA user. Run the following commands:

   ```
   SQL> ALTER USER OWBSYS ACCOUNT UNLOCK;

   SQL> ALTER USER OWBSYS IDENTIFIED BY owbsyspasswd;
   ```

8. Define Warehouse Builder workspaces and workspace users on the Oracle Database.

   Start the Warehouse Builder Repository Assistant on the computer hosting the Oracle Database.

   To start the Repository Assistant on Windows, from the Windows **Start** menu, select **Programs** and navigate to the Oracle product group you installed in the previous step. Select **Warehouse Builder, Administration,** and then **Repository Assistant.**

   To start the Repository Assistant on UNIX, run

   ```
   OWB_ORACLE_HOME/owb/bin/unix/reposinst.sh
   ```

   Follow the prompts in the Repository Assistant. Or, for detailed instructions, see Chapter 2, "Managing Workspaces and Workspace Users".

9. Setting the Security Policy for the Repository on page 2-10

   When you install a repository, Warehouse Builder enforces a default metadata security policy. The default policy is a minimal security policy appropriate for proof-of-concept or pilot projects.

   You can override the default by selecting a maximum security policy. Alternatively, you can use the security interface in Warehouse Builder to design your own security policy. In either of these two cases, ensure that repository database has the Advanced Security Option (ASO) enabled.

10. See Chapter 5, "Installing and Enabling Optional Components" for instructions on enabling optional components such as browsers, third party tools, and related Oracle products.
11. Install the Warehouse Builder software on the client computers.

    Repeat the steps in "Installing the Warehouse Builder Software" on page 1-18 on each computer to be used as a client.
12. When you complete the installation process, verify that the Warehouse Builder components can be successfully launched as described in "Launching Warehouse Builder Components" on page 1-19.

1.4 Understanding the Installation Requirements

Refer to this section as you develop your implementation strategy.

Table 1–1 lists the components required in an Oracle Warehouse Builder environment. Optionally, you can also integrate with the components listed in Table 1–2.

Required Components

Table 1–1 lists the components required in an Oracle Warehouse Builder environment. The table summarizes important considerations for installing each component and identifies where to look for further details.

Table 1–1 Required Components

Components	Important Considerations
Server The operating system can be any Windows or UNIX platform supported by Oracle Database. For the most up-to-date list of certified hardware platforms and operating system versions, review the certification matrix on My Oracle Support (formerly Oracle *MetaLink)* at `https://support.oracle.com`	For Windows, both 32-bit and 64-bit architectures are supported. Ensure a minimum of 850 MB disk space, 768 MB available memory, and 768 MB of page file size, TMP, or swap space. All UNIX platforms require 768 MB available memory and 1100 MB of page file size, TMP, or swap space. For Linux, ensure a minimum of 1100 MB disk space. More disk space is required for all other UNIX platforms. See "Preparing the Server" on page 1-10.
Oracle Database The database can be any of the following versions: ▪ Oracle Database 11*g* R1 Standard Edition ▪ Oracle Database 11*g*R1 Enterprise Edition ▪ Oracle Database 10*g* R2 Standard Edition ▪ Oracle Database 10*g* R2 Enterprise Edition	Ensure that DB_BLOCK_SIZE is set to the most optimal value of 16384 or the largest block size the server allows. Optionally, you may need to change additional configuration settings as described in: ▪ Setting the Security Policy for the Repository on page 2-10 ▪ Steps for Installing Warehouse Builder in Oracle RAC Environments on page 1-22 ▪ Configuring the Target Data File Path for Flat File Targets on page 1-13 See "Preparing the Oracle Database" on page 1-12.
Client computer Client computers must have either a Windows or a Linux operating system.	For Windows, ensure that the computer has a minimum of 850 MB disk space, 768 MB available memory, and 1GB of page file size, TMP, or swap space. For Linux 32-bit, ensure that the computer has a minimum of 1100 MB disk space, 768 MB available memory, and 1GB of page file size, TMP, or swap space. See "Preparing Client Computers" on page 1-16.

Table 1–1 (Cont.) Required Components

Components	Important Considerations
Oracle Universal Installer	Start the Universal Installer as described in "Installing the Warehouse Builder Software" on page 1-18. Be sure to specify a separate home directory for Warehouse Builder. For Windows, ensure that you log onto the Windows system as an Administrator and then start the Universal Installer.
Oracle Warehouse Builder Components ■ Warehouse Builder Design Center for designing ETL processes ■ OMB Plus, the scripting language and interface ■ Warehouse Builder repository ■ Repository Assistant, for defining repositories ■ Control Center Service ■ Repository Browser for viewing and reporting on metadata and audit data in the repository.	For an overview, see "Warehouse Builder Architecture and Components" on page 1-2.

Compatible Components

Table 1–2 lists some of the optional components that are compatible with an Oracle Warehouse Builder environment. The table does not list all compatible components, but does list those components that either effect how you install Warehouse Builder or require intervention by an Oracle Database Administrator.

The table summarizes important considerations for each optional component and identifies where to look for further details.

Table 1–2 Compatible Components

Components	Important Considerations
Oracle Discoverer	See "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.
Oracle E-Business Suite You have the option of making data and metadata from E-Business Suite available to Warehouse Builder users.	See "Enabling Integration with Oracle E-Business Suite" on page 5-1. You can also integrate with other applications such as PeopleSoft, SAP, and Siebel. Integrating with these products is discussed in Oracle Warehouse Builder User's Guide.
Oracle Workflow You can use Oracle Workflow to manage job dependencies. If you plan to use Warehouse Builder process flows, then enable Oracle Workflow to facilitate deployment.	Beginning with Oracle 11*g* Release 1, Oracle Workflow is shipped with the Warehouse Builder software and licensed for using Warehouse Builder with the Oracle 11*g* Database. If the Warehouse Builder repository is hosted on Oracle 10*g* Release 2, you must install an appropriate version of Oracle Workflow 2.6.4 and follow "Enabling Integration with Oracle Workflow" on page 5-3
Third Party Name and Address Data You can cleanse name and address data based on third party name and address data.	Requires the following from one of the certified vendors listed on Oracle Technology Network: ■ Regional data libraries ■ Name and Address adapter software See "Enabling Integration with Third-Party Name and Address Data Libraries" on page 5-2.

1.5 Preparing the Server

If you have yet to install an Oracle Database on the server, then consult the Oracle Database *Installation Guide* for your operating system. Be sure to install the required operating system patches before installing the Oracle Database.

Review the certification matrix on the My Oracle Support (formerly Oracle *MetaLink)* at `https://support.oracle.com`, for the most up-to-date list of certified hardware platforms and operating system versions. This Web site also provides compatible client and database versions, patches, and workaround information for bugs. My Oracle Support (formerly Oracle *MetaLink)* is available at the following URL:

`https://support.oracle.com`

If you intend to host the Warehouse Builder repository on Oracle Database 11*g*, no additional steps are required. Proceed with the next topic, "Preparing the Oracle Database" on page 1-12.

If you intend to host the Warehouse Builder repository on Oracle Database 10*g* Release 2, proceed with either "UNIX Servers Hosting a Warehouse Builder Repository on Oracle 10g Release 2" or "Windows Servers Hosting a Warehouse Builder Repository on Oracle 10g Release 2".

1.5.1 UNIX Servers Hosting a Warehouse Builder Repository on Oracle 10*g* Release 2

On all UNIX platforms other than Linux, only the Warehouse Builder server components are supported. For Linux 32-bit platforms, however, you can install both server and client components. That is, you can install the Repository and Control Center Service on a UNIX server but the Design Center and Repository Browser require either a Windows or Linux 32-bit platform.

If you are installing only the server components, then ensure that the UNIX operating system meets the requirements listed in Table 1–3. If you are also installing the client components to be accessed by Linux, then see the additional hardware requirements listed in "Preparing Client Computers" on page 1-16.

Table 1–3 UNIX Operating Environment Software Requirements

Requirement	Value
Disk Space	1100 MB for Linux. All other UNIX platforms require more disk space.
Available Memory	768 MB for Linux. Memory requirements increase depending on the functions being performed and the number of users connected.
Page File Size, TMP, or Swap Space	1 GB for Linux.

Setting Environmental Variables on a UNIX Server

When installing on UNIX, you must specify the environmental variable for the Oracle home, that is, the directory in which Warehouse Builder is to be installed.

Use the UNIX commands listed in Table 1–4 where *`full_path`* is the path into which you install Warehouse Builder.

Table 1–4 Setting Oracle home on a UNIX server

Variable	C Shell Command	Korn Shell Command	Bourne Shell Command
ORACLE_HOME	`setenv ORACLE_HOME full_path`	`export ORACLE_HOME=full_path`	`ORACLE_HOME=full_path; export ORACLE_HOME`

1.5.2 Windows Servers Hosting a Warehouse Builder Repository on Oracle 10*g* Release 2

On Windows platforms, you can install either the Warehouse Builder server or client components or both components on the same computer. Table 1–5 contains the Windows operating system requirements. These requirements are in addition to the requirements of any other Oracle products you are installing on the same computer. Refer to the documentation for each Oracle product you are installing to determine complete system requirements.

Table 1–5 Windows Operating Environment Software Requirements

Requirement	Value
Disk Space	850 MB
Available Memory	768 MB Memory requirements increase depending on the functions being performed and the number of users connected.
Page File Size, TMP, or Swap Space	1 GB
System Architecture	32-bit and 64-bit Note that while the OWB Design Center client is installed with the DB, only the 32-bit Windows and 32-bit Linux Design Center clients are certified and supported by Oracle. For Windows, Design Center is only supported on 32-bit client operating systems, not on Windows Server 2003. Note also that Oracle provides both 32-bit and 64-bit versions of Warehouse Builder server components. The 32-bit version of Warehouse Builder must run on the 32-bit version of the operating system. The 64-bit version of Warehouse Builder must run on the 64-bit version of the operating system.
Operating System	Warehouse Builder server components are supported on the following operating systems: ■ Windows XP Professional ■ Windows 2000 with Service Pack 1 or higher. All editions, including Terminal Services and Windows 2000 MultiLanguage Edition (MLE), are supported. ■ Windows Server 2003. Note that the Design Center client is not supported in Windows Server 2003. Oracle Warehouse Builder Design Center client is only supported on Linux x86 32-bit and the following Windows 32-bit platforms: ■ Windows XP Professional ■ Windows 2000 with Service Pack 1 or higher. All editions, including Terminal Services and Windows 2000 MultiLanguage Edition (MLE), are supported.

1.6 Preparing the Oracle Database

Warehouse Builder 11*g* Release 1 (11.1) is supported and certified for use with the following releases of the Oracle Database:

- Oracle Database 11*g* Standard Edition Release 1 (11.1.x)
- Oracle Database 11*g* Enterprise Edition Release 1 (11.1.x)
- Oracle Database 10*g* Standard Edition Release 2 (10.2.x)
- Oracle Database 10*g* Enterprise Edition Release 2 (10.2.x)

Note: Warehouse Builder has not been tested or certified and therefore is not supported for use with the Personal or Express Editions of the Oracle Database.

When you install Enterprise or Standard Editions of Oracle Database 11*g*, the installation provides you with an unpopulated schema, `OWB_SYS`, for use in Oracle Warehouse Builder 11*g*.

You must install the Oracle Database on any computer that you intend to create a Warehouse Builder design repository or a target schema as described in subsequent chapters.

The size requirements for the repository varies according to the character set. The tablespace usage of an empty repository with an AL32UTF8 character set, for example, is approximately 90 MB. To accommodate an average usage of the Warehouse Builder repository with a single-byte character set, Oracle recommends an additional 1330 MB for a total of 1420 MB recommended. For multibyte character sets, extrapolate a larger tablespace requirement.

To successfully create a Warehouse Builder repository, the following Oracle Database components are required:

- JServer JAVA Virtual Machine 10.2.0.1
- Oracle XDK 10.2.0.1
- Oracle Database Java Packages 10.2.0.1

If you intend to implement one of the metadata security options available in Warehouse Builder, then enable the Oracle Advanced Security option in the database. See "Setting the Security Policy for the Repository" on page 2-10 for an overview of the metadata security options.

1.6.1 Database Configuration Settings for the Warehouse Builder Repository

Oracle 11*g* Database Configuration Settings

The Oracle 11*g* Database self tunes its configuration settings to optimize server resources for hosting both the design and runtime components. The only additional step you may need is "Configuring the Target Data File Path for Flat File Targets" on page 1-13.

Oracle 10*g* Database Configuration Settings

As with Oracle 11*g* Database, the Oracle 10*g* Database also self tunes with the possible exception of "Configuring the Target Data File Path for Flat File Targets" on page 1-13.

Additionally, you have the option of maintaining the Warehouse Builder design and runtime components in separate repositories. If so, then refer to "Configuring Oracle 10g Databases for Design and Runtime Repositories (Optional)" on page 1-13.

1.6.2 Configuring the Target Data File Path for Flat File Targets

To configure the Target Data File Path for Flat file Targets, you set this path in the `init.ora` file of the warehouse instance. Set the `UTL_FILE_DIR` parameter to the directory for the flat file targets so that the database has access to it.

For example, for the output file location `D:\Data\FlatFiles\File1.dat`, set the `UTL_FILE_DIR` parameter in your `init.ora` file to:

```
UTL_FILE_DIR = D:\Data\FlatFiles
```

For multiple valid file locations, such as both `D:\Data\FlatFiles` and `E:\OtherData`, set the parameter in `init.ora` to:

```
UTL_FILE_DIR = D:\Data\FlatFiles
UTL_FILE_DIR = E:\OtherData
```

These lines must be consecutive in the `init.ora` file.

You can bypass this checking of directories by using the following command:

```
UTL_FILE_DIR = *
```

1.6.3 Configuring Oracle 10*g* Databases for Design and Runtime Repositories (Optional)

This section lists the configuration parameters that ensure performance when using Oracle 10*g* databases to separately host a design repository and a runtime repository for Warehouse Builder.

1.6.3.1 Parameters for the Design Repository Database Instance

The Oracle Database self tunes its configuration settings to optimize server resources. To ensure that Warehouse Builder performs effectively, verify that DB_BLOCK_SIZE is set to its optimal value.

Table 1–6 lists the initialization parameters for a Warehouse Builder design repository.

Table 1–6 Initialization Parameters for the Design Repository Instance

Initialization Parameter	Set to Value	Comments
`COMPATIBLE`	*db value*	Set this to value to equal the release number of the Oracle Database. For example, specify 10 for 10*g*. If this parameter is not in the initialization file, then add it to the end of the file.
`DB_BLOCK_SIZE`	`8192`	This parameter is set when the database is created. It cannot be changed. Warehouse Builder does not recommend a value higher than `8192` for a design repository.
`DB_CACHE_SIZE`	`104877600`	This is 100 MB.
`LOCK_SGA`	`TRUE`	Oracle recommends locking the design SGA in physical memory.
`O7_DICTIONARY_ACCESSIBILITY`	`TRUE`	Set this to `TRUE` as an alternative to setting `REMOTE_LOGIN_PASSWORDFILE` parameter to `EXCLUSIVE`.
`OPEN_CURSORS`	`300`	You may specify a higher value.

Table 1–6 (Cont.) Initialization Parameters for the Design Repository Instance

Initialization Parameter	Set to Value	Comments
REMOTE_LOGIN_ PASSWORDFILE	EXCLUSIVE	To enable the user sys to connect as sysdba, set this parameter to EXCLUSIVE. If, however, this parameter must be set to NONE, then set O7_DICTIONARY_ACCESSIBILITY to TRUE.

1.6.3.2 Parameters for the Runtime Repository Database Instance

To support the Warehouse Builder runtime component, you may need to modify the Oracle Database instance. Table 1–7 lists the database configuration parameters.

Table 1–7 Initialization Parameters for the Runtime Instance

Initialization Parameter	Set to Value	Comments
AQ_TM_PROCESSES	1	This parameter is required for the Warehouse Builder and Oracle Workflow advanced queuing system.
COMPATIBLE	*db value*	Set this to value to equal the release number of the Oracle Database. If this parameter is not in the initialization file, then add it to the end of the file.
DB_BLOCK_SIZE	16384	This parameter is set when the database is created. Do not change it. The recommended value is 16384. If your server does not allow a block size this large, then use the largest size available. If your computer has less than 512 MB of RAM, then a value of 9600 is recommended.
DB_CACHE_SIZE	314632800	Set this value to 300 MB or as high as the system permits. You may need to adjust operating system parameters to allow larger shared memory segments. Do not set any value for the DB_CACHE_SIZE parameter if you set a value for the SGA_TARGET parameter.
DB_FILE_MULTIPLE_ BLOCK_READ_COUNT	16	A value of 16 is recommended, but 32 is preferred.
DB_WRITER_PROCESSES	see comments	If you have fewer than 8 CPUs, then set DB_WRITER_ PROCESSES to 1. Increase this parameter value by 2 for every additional 8 CPUs.
DBWR_IO_SLAVES	*n*	*n* is the number of CPUs. Disable this parameter by setting it to 0 if: ■ DB_WRITER_PROCESSES has a value greater than 1. In this case, tuning the DBWR_IO_SLAVES parameter has no effect. ■ there is only 1 CPU, and the platform does not support asynchronous I/O.
DISK_ASYNCH_IO	TRUE	If the platform does not support asynchronous I/O, then set DBWR_IO_SLAVES to a positive number, such as 4, to simulate asynchronous I/O.

Table 1–7 (Cont.) Initialization Parameters for the Runtime Instance

Initialization Parameter	Set to Value	Comments
ENQUEUE_RESOURCES	3000 or higher if you are importing large MDL files.	A minimum setting of '1' is required for the install to complete without error.
JAVA_POOL_SIZE	20 MB	The minimum recommended value is 20 MB. Do not set any value for the JAVA_POOL_SIZE parameter if you set a value other than 0 for the SGA_TARGET parameter.
JOB_QUEUE_PROCESSES	greater than 10	Optimal setting is 10. If JOB_QUEUE_PROCESSES is set to 0, then the Control Center Service does not run and produces error messages.
LARGE_POOL_SIZE	0	Do not set any value for this parameter if you set a value for the SGA_TARGET parameter. This parameter enables the server to set the LARGE_POOL_SIZE automatically. Prerequisite: PARALLEL_AUTOMATIC_TUNING must be set to TRUE.
LOG_BUFFER	*See comments*	Set the value to larger than 512K and must be 128K times the number of CPUs.
LOG_CHECKPOINT_TIMEOUT	3000	This setting increases the timeout for performing checkpoints from the default 3 minutes to 5 minutes.
MAX_COMMIT_PROPAGATION_DELAY	0	This is only required when installing on Oracle RAC systems. If it is not set to 0, then data propagation delays may cause NO_DATA_FOUND errors in the Control Center Service.
OPEN_CURSORS	500	You may specify a higher value if you start multiple sessions or if you run multiple or complicated mappings in one session.
OPTIMIZER_MODE	all_rows	For other possible optimizer modes, see *Oracle Designing and Tuning for Performance*, *Oracle Database Performance Tuning Guide and Reference*, and *Oracle Data Warehousing Guide*.
PARALLEL_ADAPTIVE_MULTI_USER	TRUE	Set PARALLEL_AUTOMATIC_TUNING to TRUE as a prerequisite for this parameter.
PARALLEL_AUTOMATIC_TUNING	TRUE	This setting delegates the task of tuning parallel processing to the server. Set this parameter for Oracle9*i* or Oracle8*i* databases only. For Oracle 10*g* and later, this parameter is not available and setting SGA_TARGET to a nonzero value is recommended.
PGA_AGGREGATE_TARGET	314572800	This is 300 MB. If you perform frequent sorting and aggregation, then you can increase this value. However, PGA_AGGREGATE_TARGET must be smaller than the available physical memory size.
PLSQL_OPTIMIZE_LEVEL	2	The PL/SQL compiler in Oracle Database can perform more elaborate optimization on PL/SQL code.
QUERY_REWRITE_ENABLED	TRUE	Set this parameter to TRUE if you plan to generate materialized views with the QUERY REWRITE option.

Table 1–7 (Cont.) Initialization Parameters for the Runtime Instance

Initialization Parameter	Set to Value	Comments
REMOTE_LOGIN_ PASSWORDFILE	EXCLUSIVE	You must use the SYS account with SYSDBA privileges to access or create a runtime schema. The workspace user requires access to certain v_$ tables. These grants are made by the SYSDBA account when you create the workspace. This setting ensures that the SYSDBA privilege is granted to SYS.
RESOURCE_MANAGER_PLAN	*plan_name*	Oracle strongly recommends creating a resource plan for managing resource usages for Warehouse Builder runtime. Refer to the *Oracle Database Administration Guide* for information on resource plans.
SGA_TARGET	500 MB to 1 GB	The larger value, or as close to it as possible, is recommended if computer memory allows it. If you set the SGA_TARGET parameter, do not set these following parameters which the server automatically adjusts: ■ JAVA_POOL_SIZE ■ DB_CACHE_SIZE ■ LARGE_POOL_SIZE ■ SHARED_POOL_SIZE Alternatively, you can set the SGA_TARGET parameter to 0, which turns off the automatic sizing feature. In that case, follow the recommendations on sizing the preceding four parameters. **Note:** For Oracle 10*g* and later, setting SGA_TARGET is recommended.
SHARED_POOL_SIZE	419430400	The recommended minimum value is 400 MB. Do not set any value for the SHARED_POOL_SIZE parameter if you set a value for the SGA_TARGET parameter.
STATISTICS_LEVEL	TYPICAL	
UNDO_MANAGEMENT	AUTO	With this setting, you do not have to create rollback segments.
UTL_FILE_DIR	*	Specifies the directories that PL/SQL can use for file input and output. UTL_FILE_DIR = * specifies that all directories can be used for file input and output. If you want to specify individual directories, then repeat this parameter on contiguous lines for each directory. If you use flat file targets in Warehouse Builder, then set this parameter to the directory where you want to create the flat file target so that your database engine has access to it. Refer to "Configuring the Target Data File Path for Flat File Targets".
WORKAREA_SIZE_POLICY	AUTO	.

1.7 Preparing Client Computers

For Windows, ensure that the computer has a minimum of 850 MB disk space, 768 MB available memory, and 1GB of page file size, TMP, or swap space.

For Linux, ensure that the computer has a minimum of 1100 MB disk space, 768 MB available memory, and 1GB of page file size, TMP, or swap space. Ensure that you set the ORACLE_HOME variable.

If you previously deinstalled Warehouse Builder and the path OWB_ORACLE_HOME\owb\j2ee\owbb remains, then delete the owbb directory before installing Warehouse Builder again.

Setting Environmental Variables on the Linux Client

When installing client components on Linux, you must specify the environmental variable for the Oracle home.

Use the UNIX commands listed in Table 1–8 where *full_path* is the path into which you install Warehouse Builder.

Table 1–8 Setting Oracle home path on the Linux client

Environmental Variable	C Shell Command	Korn Shell Command	Bourne Shell Command
ORACLE_HOME	`setenv ORACLE_HOME full_path`	`export ORACLE_HOME=full_path`	`ORACLE_HOME=full_path; export ORACLE_HOME`

1.8 Downloading and Installing the Standalone Warehouse Builder Software

Download the Warehouse Builder standalone software to complete any of the following tasks:

- Installing the software on a client computer
- "Hosting the Repository on Oracle Database 10g Release 2" on page 1-20
- Enabling integration with Oracle Discoverer
- Enabling the use of runtime scripting commands

To download the standalone software, locate the software from the following link:

http://www.oracle.com/products/index.html

1.8.1 About the Oracle Universal Installer

When installing the standalone software, Oracle Warehouse Builder utilizes the Oracle Universal Installer to install components and to configure environment variables. The installer guides you through each step of the installation process.

About Oracle Home and Warehouse Builder

Oracle home is the top-level directory into which you install Oracle software. Some Oracle products enable you to share the same Oracle home. Or you can create separate homes and assign names to each home as you install each product.

Warehouse Builder, however, cannot share its home directory with any other Oracle product. When the Oracle Universal Installer prompts you to specify a home directory for Oracle Warehouse Builder, specify a directory different from the Oracle Database or any other Oracle product.

This separate directory is designated by the term OWB_ORACLE_HOME in the Warehouse Builder documentation.

For Linux, in addition to specifying the OWB_ORACLE_HOME, you also must set the ORACLE_HOME variable.

1.8.2 Installing the Warehouse Builder Software

Use the Oracle Universal Installer to install Warehouse Builder components.

To install the software, complete the following:

1. Review and complete the Checklist: Before You Start the Universal Installer.
2. Run the installer following either the instructions Running the Oracle Universal Installer for Warehouse Builder on Windows or Running the Oracle Universal Installer for Warehouse Builder on UNIX.
3. If the Warehouse Builder repository is hosted on an Oracle 10*g* Database, complete the instructions "Hosting the Repository on Oracle Database 10g Release 2" on page 1-20.

Next

When the software installation completes successfully, you can continue with the next step in General Steps for Installing Warehouse Builder on page 1-6.

1.8.2.1 Checklist: Before You Start the Universal Installer

This section contains additional points to address before launching the Universal Installer:

- If you have not already done so, review the Oracle Warehouse Builder Release Notes either on the Oracle Warehouse Builder CD-ROM or, for the latest version, go to the Oracle Technology Network at `http://www.oracle.com/technetwork/index.html`.
- Close all other open applications.

1.8.2.2 Running the Oracle Universal Installer for Warehouse Builder on Windows

To run the Oracle Universal Installer on Windows:

1. Ensure that you are logged on to your system as a member of the Administrators group.
2. Insert the Oracle Warehouse Builder CD-ROM.
3. If your computer supports the autorun feature, then the autorun window launches the Oracle Warehouse Builder installation.

   If your computer does not support the autorun feature, then locate the executable `setup.exe` in the root directory of the CD-ROM or downloaded software. Start the installer by launching the `setup.exe` program.
4. When prompted, specify a home directory to be used only for the Warehouse Builder installation.

   For example, you could specify a directory such as `C:\oracle\owb11_1`.

   For the sake of brevity, the directory you specify in this step is referred to as the OWB_ORACLE_HOME throughout this guide.
5. Follow the on screen instructions.

When the software installation completes successfully, you can continue with the next step in General Steps for Installing Warehouse Builder on page 1-6.

1.8.2.3 Running the Oracle Universal Installer for Warehouse Builder on UNIX

To run the Oracle Universal Installer on UNIX:

You can run Oracle Universal Installer from the CD-ROM. Do not run the Installer while the CD-ROM directory is the current directory or you will be unable to unmount the next CD-ROM when prompted to do so.

1. If you have not already done so, you must set the ORACLE_HOME environmental variable as described in "Setting Environmental Variables on a UNIX Server" on page 1-10 and "Setting Environmental Variables on the Linux Client" on page 1-17.
2. Log in as the operating system user of the Oracle Database.

   For example, log in as the `oracle` user. If you choose to log in as the `oracle` user, you must configure the user environment by setting the default file mode creation mask (umask) to 022 in the shell startup file.

   Be sure you are not logged in as the root user when you start the Oracle Universal Installer. If you are, then only the root user would have permissions to manage Oracle Warehouse Builder.
3. Start the installer by entering the following at the prompt:

   ```
   cd mount_point

   ./runInstaller
   ```
4. As the installation proceeds, the Oracle Universal Installer prompts you to run several scripts. You must switch users and run the script as root.

1.8.3 Launching Warehouse Builder Components

The Oracle Warehouse Builder CD installs the client and server-side software at the same time. After you complete the installation, you can start the Warehouse Builder components listed in Table 1–8.

The components in Table 1–8 are listed in the order that you are likely to use the components directly after installation:

Table 1–9 Launching Oracle Warehouse Builder Components from Windows or Linux Clients

Warehouse Builder Component	Windows: Select Start, Programs, Oracle, Warehouse Builder and then...	Linux: Locate OWB_ORACLE_HOME/owb/bin/unix and then...
Repository Assistant Enables you to manage the repository and its workspaces and workspace users.	Select Administration, and then Repository Assistant.	Run reposinst.sh
Design Center Is the primary design interface.	Select Design Center.	Run owbclient.sh

Table 1–9 (Cont.) Launching Oracle Warehouse Builder Components from Windows or Linux Clients

Warehouse Builder Component	Windows: Select Start, Programs, Oracle, Warehouse Builder and then...	Linux: Locate OWB_ORACLE_HOME/owb/bin/unix and then...
Start Control Center Service This command is only necessary when working in a remote runtime environment.	Select Administration then Start Control Center Service.	Run local_service_login.sh as follows: `local_service_login.sh -startup OWB_ORACLE_HOME` If the service fails to start, you can run OWB_ORACLE_HOME/owb/rtp/sql/service_doctor.sql.
Control Center Manager Use this command to deploy and run in a remote runtime environment.	Start the Design Center. From the Tools menu, select Control Center Manager.	Run local_service_login.sh as follows: `local_service_login.sh -startup OWB_ORACLE_HOME`
Stop Control Center Service This command is only necessary when working in a remote runtime environment.	Select Administration then Stop Control Center Service.	Run local_service_login.sh as follows: `local_service_login.sh -closedown OWB_ORACLE_HOME`
Start OWB Browser Listener	Run startOwbbInst.bat The first time you invoke this listener, select and re-confirm a password for an oc4jadmin account.	Run startOwbbInst.sh The first time you invoke this listener, select and re-confirm a password for an oc4jadmin account.
Repository Browser	Select Repository Browser.	Start the OWB Browser Listener and then run openRAB.sh.
Stop OWB Browser Listener	Type the command: `stopOwbbInst.bat` *`oc4jadmin pwd`*	Type the command: `stopOwbbInst.bat` *`oc4jadmin pwd`*
OMB Plus Is the scripting utility that enables to perform all operations available in the graphical user interfaces.	Select OMB Plus.	Run OMBPlus.sh.

1.9 Hosting the Repository on Oracle Database 10*g* Release 2

To host a Warehouse Builder 11*g* repository on Oracle Database 10*g* Release 2, complete the following steps:

1. Install Warehouse Builder 11*g* on to the computer hosting Oracle Database 10*g* Release 2 as described in "Installing the Warehouse Builder Software" on page 1-18.

   You can locate the software from the following link:

http://www.oracle.com/products/index.html

2. For additional considerations for hosting the repository on Oracle 10*g* Database, refer to "Preparing the Oracle Database" on page 1-12.
3. Complete the steps in "Running Scripts to Create a Warehouse Builder Repository Schema" on page 1-21.
4. Start and complete the Repository Assistant.

   Use the Repository Assistant to create a Warehouse Builder 11*g* repository and workspace in the Oracle Database 10*g*.
5. Complete the steps in "Enabling Access to Workspaces Hosted on Oracle 10g Databases" on page 1-22.

1.9.1 Running Scripts to Create a Warehouse Builder Repository Schema

To create a Warehouse Builder repository on an Oracle 10*g* Release 2 Database, complete the following steps:

1. Change the current directory to the `OWB_ORACLE_HOME\owb\UnifiedRepos` directory. For example:

   ```
   C:\> cd OWB_ORACLE_HOME\owb\UnifiedRepos\
   ```
2. Run the version of SQL*Plus provided with Warehouse Builder, with SYSDBA privilege. This executable is located in the `OWB_ORACLE_HOME/bin` directory. For example, type the following:

   ```
   C:\OWB_ORACLE_HOME\owb\UnifiedRepos> OWB_ORACLE_HOME\bin\sqlplus
   sys/sys_password as sysdba;
   ```
3. Run the `cat_owb.sql` script stored in the `OWB_ORACLE_HOME/owb/UnifiedRepos` directory.

   The script creates the repository and sets up the required roles and privileges on the 10*g* Release 2 Database.

   The script prompts you for the name of the default tablespace in which to create `OWBSYS` schema. For example, to install the `OWBSYS` schema into the `USERS` tablespace in a 10*g* Release 2 Database hosted on Windows, type the following:

   ```
   SQL> @cat_owb.sql

   Enter Tablespace Name for OWBSYS user:

   USERS
   ```
4. Unlock the `OWBSYS` user and assign it a password. For example:

   ```
   SQL> alter user OWBSYS account unlock identified by owbsys_password;
   ```
5. Run the script `OWB_ORACLE_HOME/owb/UnifiedRepos/reset_owbcc_home.sql`

   Use this script to ensure that the Control Center runs correctly from the Warehouse Builder 11.1 home. When prompted for the OWB_ORACLE_HOME, type the directory carefully. The entry is case-sensitive, does not accept a trailing slash, and requires forwards slashes only, regardless of the operating system. For example, for Windows, if the OWB_ORACLE_HOME is

   ```
   C:\Oracle\My_OWB_Home\>
   ```

   then type the following:

   ```
   C:/Oracle/My_OWB_Home
   ```

1.9.2 Enabling Access to Workspaces Hosted on Oracle 10*g* Databases

Warehouse Builder 11*g* clients connect to workspaces on an Oracle 11*g* Database by default. To access workspaces on an Oracle 10*g*Release 2 Database, you must take additional steps.

To enable access to workspaces on a 10*g* Release 2 Database:

1. On each client computer, locate the file `OWB_ORACLE_HOME/owb/bin/admin/Preference.properties`.

   If the file does not exist, you can create it based on the example file `Preference.properties.tmp` in the same directory.

2. Edit `Preference.properties`, add a property REPOS_DB_VERSION_ALLOWED and set its value to one of the following:

   - Oracle 10*g*
   - Oracle 10*g*, Oracle 11*g*

   For example:

   ```
   REPOS_DB_VERSION_ALLOWED=Oracle 10g,Oracle 11g
   ```

   After you save the file, the client can access repositories stored in Oracle Database 10*g*Release 2.

1.10 Steps for Installing Warehouse Builder in Oracle RAC Environments

The overall process for installing on an Oracle RAC environment is similar to the "General Steps for Installing Warehouse Builder". However, there are a few specific details to observe as noted in the following instructions:

To install in an Oracle RAC environment:

1. Create the Oracle RAC environment as described in the Oracle Clusterware and Oracle Real Application Clusters Installation Guide specific to your platform.
2. If you have not already done so, review the most recent Oracle Warehouse Builder Release Notes available at `http://www.oracle.com/technetwork/index.html`.
3. Preparing host computers

   For each computer to host Warehouse Builder components, configure the *tnsnames.ora* file located in the `OWB_ORACLE_HOME\owb\network\admin` directory.

4. Preparing the Oracle Database on page 1-12

   For Oracle RAC 10*g* environments, be sure to set the initialization parameter `MAX_COMMIT_PROPAGATION_DELAY` to a value of zero.

   Also configure tnsnames.ora for each Oracle Database server that will be a Warehouse Builder data source or target. If you fail to configure tnsnames.ora for any host or database server, you may encounter a repository connection error.

5. If necessary, install the Warehouse Builder standalone software.

   If the Warehouse Builder repository is hosted on Oracle Database 11*g* and you do not intend to integrate with Oracle Discoverer, skip to the next step.

   Otherwise, complete the steps in "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

6. Chapter 2, "Managing Workspaces and Workspace Users"

The Repository Assistant prompts you to define users and an owner for the repository.

To start the Repository Assistant on Windows, from the Windows **Start** menu, select **Programs** and navigate to the Oracle product group you installed in the previous step. Select **Warehouse Builder, Administration,** and then **Repository Assistant.**

To start the Repository Assistant on UNIX, locate `OWB_ORACLE_HOME/owb/bin/unix` and run reposinst.sh.

7. Register each Oracle RAC node.

   For each node, start the Repository Assistant and select the Advanced Set up option. Connect to the node using `Host:Port:Sid`, where `Host` is the physical node name. Select the option for registering the Oracle RAC instance.

8. If the software is installed on separate disks, copy `rtrepos.properties` to each node in the cluster.

   If you did not install to a shared disk, then you must manually copy the file `OWB_ORACLE_HOME/owb/bin/admin/rtrepos.properties` from the primary node to each node in the cluster.

9. Setting the Security Policy for the Repository on page 2-10.

10. Chapter 5, "Installing and Enabling Optional Components" (Optional).

    Consider performing the optional step "Configuring Repository Browser Environments" on page 5-2. The Repository Browser lets you nominate a node and register other nodes.

11. Install the Warehouse Builder software on the client computers.

    Repeat "Installing the Warehouse Builder Software" on page 1-18 for each computer to be used as a client.

12. When complete the installation process, you can start all the Warehouse Builder components.

    When "Launching Warehouse Builder Components" on page 1-19 such as the Design Center, Control Center Manager, and Repository Assistant, select the log on option Oracle Net Services connection and specify the net service name you assigned in the *tnsnames.ora* file.

    Because you can connect to Warehouse Builder repositories using a net service name, you can embed Oracle RAC properties into the connect string to utilize Oracle RAC capabilities such as connect time failover, load balancing on server and load balancing of connections.

13. "Ensuring the Availability of Service Names for Oracle RAC Nodes" on page 1-25

    The Control Center Service requires that service names for the individual nodes in the cluster be available. If these are not present after the Oracle RAC installation, you must manually ensure the availability.

1.10.1 Installing Warehouse Builder on Each Node of a Cluster

Whether you are installing Warehouse Builder components onto a server or a client computer, you use the Oracle Universal Installer to install Warehouse Builder components.

For Oracle RAC, it is recommended that you install the Warehouse Builder components on each node of the cluster. The Control Center Service is required on to

each node of the Oracle RAC cluster.You can achieve this in a single installation of the Warehouse Builder software if you install on a shared disk such as an OCFS or NTS shared disk.

Before launching the Universal Installer, review and complete the Checklist: Before You Start the Universal Installer.

1.10.1.1 Checklist: Before Using the Universal Installer in an Oracle RAC Environment

This section contains additional points to address before launching the Universal Installer:

- If you have not already done so, review the latest version Oracle Warehouse Builder Release Notes at `http://www.oracle.com/technetwork/index.html`.
- The installed location must be the same directory path if using separate OWB_ORACLE_HOME installed disks, that is, local physical disks on each server.
- Close all other open applications.

1.10.1.2 For Windows Users Installing in an Oracle RAC Environment

To run the Oracle Universal Installer in an Oracle RAC environment:

1. Ensure that you are logged on to your system as a member of the Administrators group.
2. Insert the Oracle Warehouse Builder CD-ROM.
3. If your computer supports the autorun feature, the autorun window will automatically start the Oracle Warehouse Builder installation.

   If your computer does not support the autorun feature, locate the executable `setup.exe` in the root directory of the CD-ROM or downloaded software. Start the installer by launching the `setup.exe` program.
4. When prompted to specify the cluster node, you can select all hosts or the local node.

   If you select local node, then you must install Warehouse Builder separately for each system unless installing to a shared disk.
5. When prompted, specify a home directory to be used only for the Warehouse Builder installation.

   For example, specify a path such as `C:\oracle\owb11_1`.

   For the sake of brevity, the path you specify in this step is referred to as OWB_ORACLE_HOME throughout this guide.
6. Follow the on screen instructions.

When the software installation completes successfully, you can continue with the next step in "Steps for Installing Warehouse Builder in Oracle RAC Environments" on page 1-22.

1.10.1.3 For UNIX Users Installing in an Oracle RAC Environment

To run the Oracle Universal Installer in an Oracle RAC environment:

You can run Oracle Universal Installer from the CD-ROM. Do not run the Installer while the CD-ROM directory is the current directory or you will be unable to unmount the next CD-ROM when prompted to do so.

1. If you have not already done so, you must set the ORACLE_HOME environmental variable as described in "Setting Environmental Variables on a UNIX Server" on page 1-10 and "Setting Environmental Variables on the Linux Client" on page 1-17.
2. To enable clusterware installation, ensure that you run an interactive secure shell such as `/bin/ssh` and have host user equivalency to all nodes.
3. Log in as the operating system user of the Oracle Database.

   For example, log in as the `oracle` user.

   Be sure you are not logged in as the root user when you start the Oracle Universal Installer. If you are, then only the root user will have permissions to manage Oracle Warehouse Builder.
4. Start the installer by entering the following at the prompt:

   ```
   cd mount_point
   ./runInstaller
   ```
5. When prompted to specify the cluster node, you can select all hosts or the local node.

   If you select local node, then you must install Warehouse Builder separately for each system unless installing to a shared disk.
6. As the installation proceeds, the Oracle Universal Installer prompts you to run several scripts. You must switch users and run the script as root.

When the software installation completes successfully, you can continue with the next step in General Steps for Installing Warehouse Builder on page 1-6.

1.10.2 Ensuring the Availability of Service Names for Oracle RAC Nodes

1. List all of the instance or node names in the cluster. Issue the following command:

   ```
   srvctl config database -d dbname
   ```

   where dbname is the unique database name as specified by the init parameter db_name.
2. For a given instance, `instn`, add a service with the following command:

   ```
   srvctl add service -d dbname -s instn -r instn
   ```

   The resulting service name is `instn.clusterdomainname`. For example, if the instance name is owbrac1,then the service name could be `owbrac1.us.oracle.com`.
3. For a given instance, `instn`,start the service with the following command:

   ```
   srvctl start service -d dbname -s instn
   ```
4. For a given instance, `instn`, verify the service is running with the following command:

   ```
   srvctl status service -d dbname -s instn
   ```
5. Complete steps 2 through 4 for each node.

2

Managing Workspaces and Workspace Users

This chapter includes the following topics:

2.1 Using the Repository Assistant

Use the Repository Assistant to define the repository on an Oracle Database.

Note: Before proceeding with this wizard, first complete steps 1 through 6 in "General Steps for Installing Warehouse Builder" on page 1-6.

As an alternative to using the wizard, you can install a repository using the OMB Plus scripting language. The default settings for creating a repository are the same whether you use the OMB Plus or the Repository Assistant. For example both methods assign USERS as the default tablespace for indexes.

For more information installing through the scripting language, read about the OMBINSTALL command in Oracle Warehouse Builder API and Scripting Reference.

2.2 Connecting to the Oracle Database

The assistant prompts you for connection information to the Oracle Database.

In an Oracle RAC environment, in addition to typing the host name, port number, and Oracle service name, also select the Oracle Net Services Connection option. Type the net service name, defined in OWB_ORACLE_HOME\network\admin\tnsnames.ora.

To proceed with the next step, Defining Workspace Users, note that the Database must be running and you must enter a database user with SYSDBA privileges.

2.2.1 Defining Workspace Users

Specify a workspace user name and password based on the "Guidelines for User Names and Passwords". The Repository Assistant assigns the user as a deployment target. In other words, that user can access both the Design Center for designing ETL processes and the Control Center Manager for deploying and auditing.

2.2.1.1 Guidelines for User Names and Passwords

The Repository Assistant prompts you to create user names and confirm passwords.

To specify a valid user name and password, adhere to the security standard implemented on the Oracle Database. The default minimum requirement is that both the user name and password be a VARCHAR(30). Also, do not include any special characters. Your database may have more requirements if a password complexity verification routine was applied. For more information about user names, passwords, and password complexity verification routines, refer to Oracle® Database Security Guide.

2.3 Choosing Workspace Operations

Choose one of the following options:

- **Managing Workspaces:** Select this option if you want to create, delete, or alter a workspace owner.
- **Managing Workspace Users**: Select this option to create or remove the registration for one or more workspace users.
- **Registering a Real Application Cluster (Oracle RAC) instance:** This option is only available for local installations. To register an Oracle RAC instance, select this option, click **Next** and then **Finish** on the Summary page.

  For additional information, see "Steps for Installing Warehouse Builder in Oracle RAC Environments" on page 1-22.

2.3.1 Managing Workspaces

Managing a workspace includes:

- **Creating a new workspace**
- Dropping Workspaces

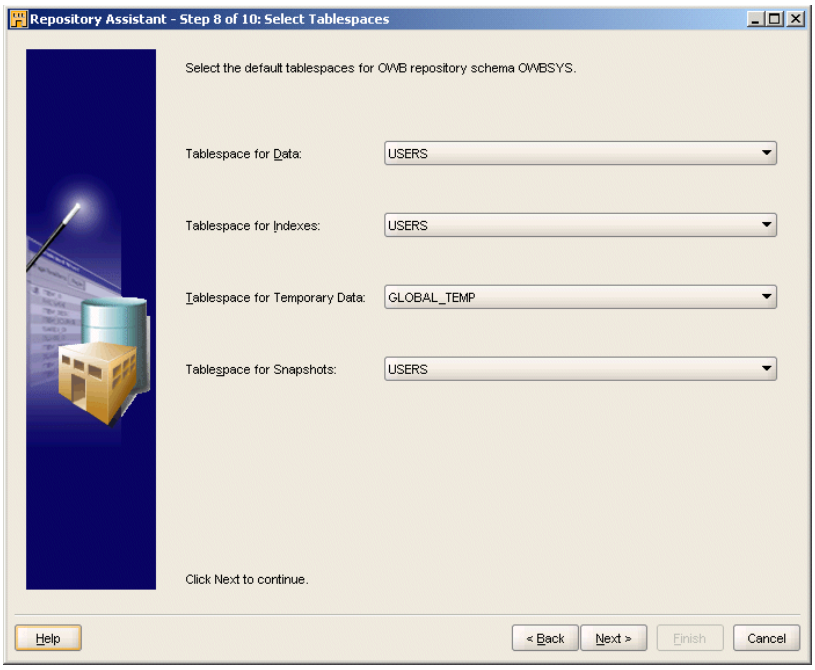
2.3.1.1 Dropping Workspaces

When you drop a workspace owner, be aware that each workspace owner can be associated with multiple workspace users. After you drop a workspace owner, any remaining users become orphans and you cannot use the Repository Assistant to delete them. Therefore, use the Repository Assistant to delete associated users prior to dropping a workspace owner. Alternatively, you can delete orphan users through the SQL Plus.

2.3.1.2 Selecting the Default Tablespaces

The assistant recommends a set of default tablespaces. You can accept the recommendations or specify new tablespaces.

Figure 2–1 Dialog: Selecting Default Tablespaces



2.3.2 Selecting the Base Language for the Repository

The repository has a single base language. That is, the physical name for each repository object is assumed to be written in the base language.

The Repository Assistant assumes a default base language contingent upon the locale of the computer from which you launched the Repository Assistant. For example, when you run the assistant from a computer with its locale set to British English, the default base language for the repository is *en_GB* for British English.

You can accept the default or select from a list of base languages. Note, however, that you can define the base language only once. That is, after you create the repository, you cannot change the base language and you cannot add another base language. This means that when creating a new repository object, the business name can be in any language, but the physical name should always be written in the base language.

However, to enable users to use different languages for the physical names of objects, you have the option to support multiple display languages .

2.3.2.1 Adding Display Languages

Unlike the base language, you can have multiple display languages and you can add display languages after initially defining the repository.

Display languages are associated with business names only. For a given object, its physical name corresponds to the base language. However, for each display language you enable, users can create a corresponding business name.

Table 2–1 lists the International Organization for Standardization (ISO) IDs for each display language supported in Warehouse Builder.

Table 2–1 ISO IDs for Supported Languages

ISOID	Language
sq_AL	Albanian

Table 2–1 (Cont.) ISO IDs for Supported Languages

ISOID	Language
en_US	American English
ar_AE	Arabic
ar_EG	Arabic Egypt
as_IN	Assamese
bn_IN	Bangla
pt_BR	Brazilian Portuguese
bg_BG	Bulgarian
fr_CA	Canadian French
ca_ES	Catalan
hr_HR	Croatian
cs_CZ	Czech
da_DK	Danish
nl_NL	Dutch
en_GB	English
et_EE	Estonian
fi_FI	Finnish
fr_FR	French
de_DE	German
el_GR	Greek
gu_IN	Gujarati
he_IL	Hebrew
hi_IN	Hindi
hu_HU	Hungarian
is_IS	Icelandic
in_ID	Indonesian
it_IT	Italian
ja_JP	Japanese
kn_IN	Kannada
ko_KR	Korean
es_US	Latin American Spanish
lv_LV	Latvian
lt_LT	Lithuanian
ms_MY	Malay
ml_IN	Malayalam
mr_IN	Marathi
es_MX	Mexican Spanish
no_NO	Norwegian

Table 2–1 (Cont.) ISO IDs for Supported Languages

ISOID	Language
or_IN	Oriya
pl_PL	Polish
pt_PT	Portuguese
pa_IN	Punjabi
ro_RO	Romanian
ru_RU	Russian
zh_CN	Simplified Chinese
sk_SK	Slovak
sl_SI	Slovenian
es_ES	Spanish
sv_SE	Swedish
ta_IN	Tamil
te_IN	Telugu
th_TH	Thai
zh_TW	Traditional Chinese
tr_TR	Turkish
uk_UA	Ukrainian
vi_VN	Vietnamese

2.3.3 Managing Workspace Users

All users and the workspace owner must first be defined as Oracle Database users.

As a workspace owner, the actions you can take include adding workspace users or "Deleting Workspace Users" on page 2-6.

You cannot change user passwords from within the product. Change passwords directly in the Oracle Database as described in *Oracle® Database Security Guide.*

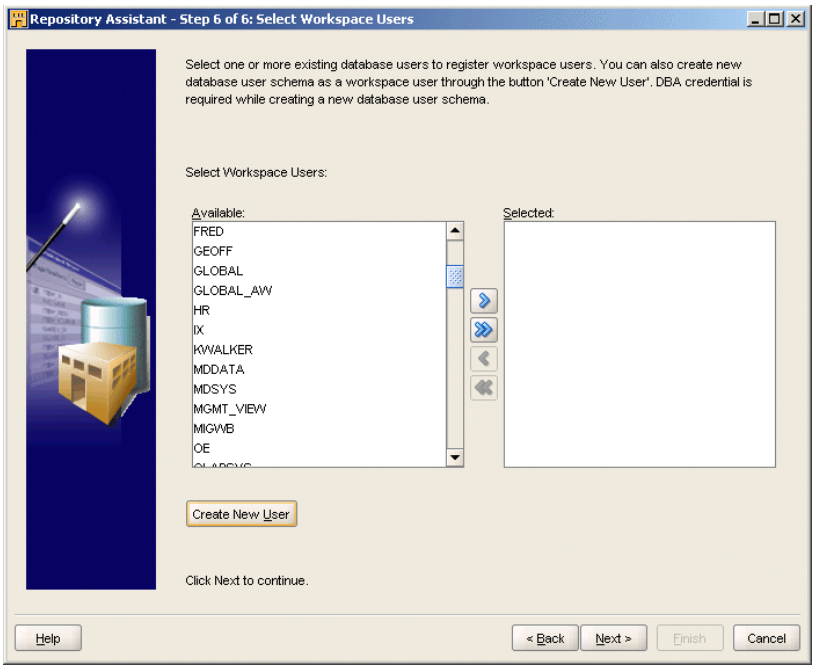
2.3.3.1 Selecting Workspace Users

The left panel in Figure 2–2 lists the existing Oracle Database users and schemas. Select existing database users from the list. Or, if adding new users, you can define and register a new user by clicking on **Create New User** located in the lower left corner.

If you select an existing user, you are prompted for the password before allowing you to proceed.

When selecting from the list, you can select one or more database users. Notice that, for security reasons, database administrator users such as SYSDBA are not available for registering as Warehouse Builder users.

Figure 2–2 Adding Workspace Users



2.3.3.2 Deleting Workspace Users

When you delete a workspace user, you unregister and remove the user from the workspace. Deleting the user from the workspace does not delete or alter the user account on the Oracle Database.

2.4 Implementing a Remote Runtime (Optional)

Recall that the Control Center Service is the Warehouse Builder server component that governs the deployment of objects to target schemas. Most commonly, the Control Center Service is installed on the computers hosting the target schemas. In limited cases, though, it may be necessary to run the Control Center on a computer that does not host an Oracle Database.

To achieve this, implement a remote runtime environment. That is, the target schemas are remote with respect to the Control Center Service running on another server.

2.4.1 Remote Runtime Scenarios

There are several scenarios for implementing a remote runtime. However, to deploy and run ETL processes in any of the scenarios, keep in mind that Control Center Service must be running. Remote runtime environments include the following scenarios:

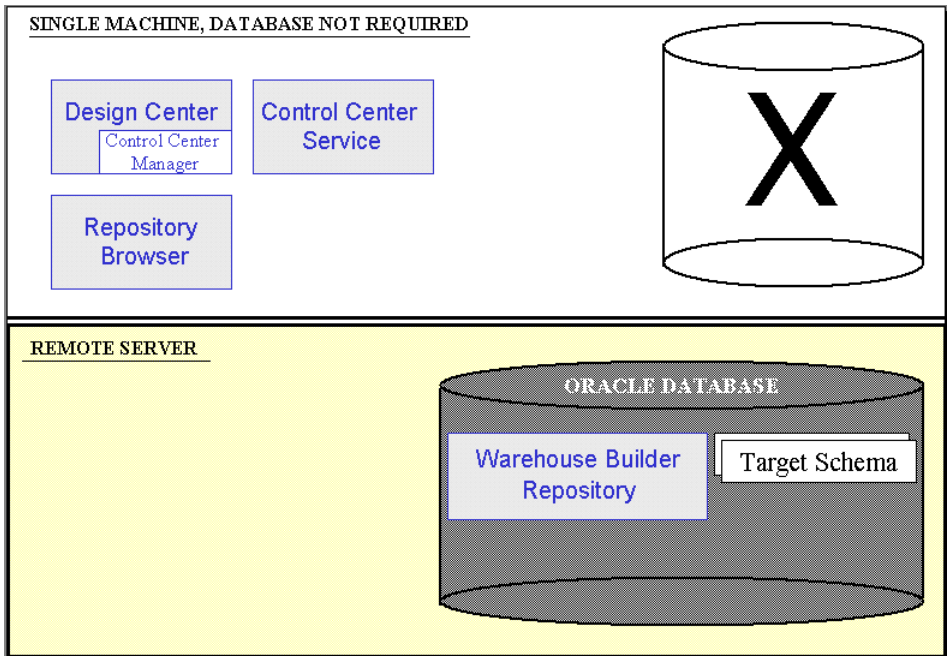
- Control Center Service Installed on a Dedicated Computer
- Control Center Service Installed on a Local Server
- A Standalone Target Schema

Regardless of the specifice scenario that you choose, follow the instructions "Steps for Installing and Testing a Remote Runtime" on page 2-9.

2.4.1.1 Control Center Service Installed on a Dedicated Computer

Oracle Database is not required to be installed on the computer hosting the Control Center Service. You can deploy all types of mappings to the remote target without restriction.

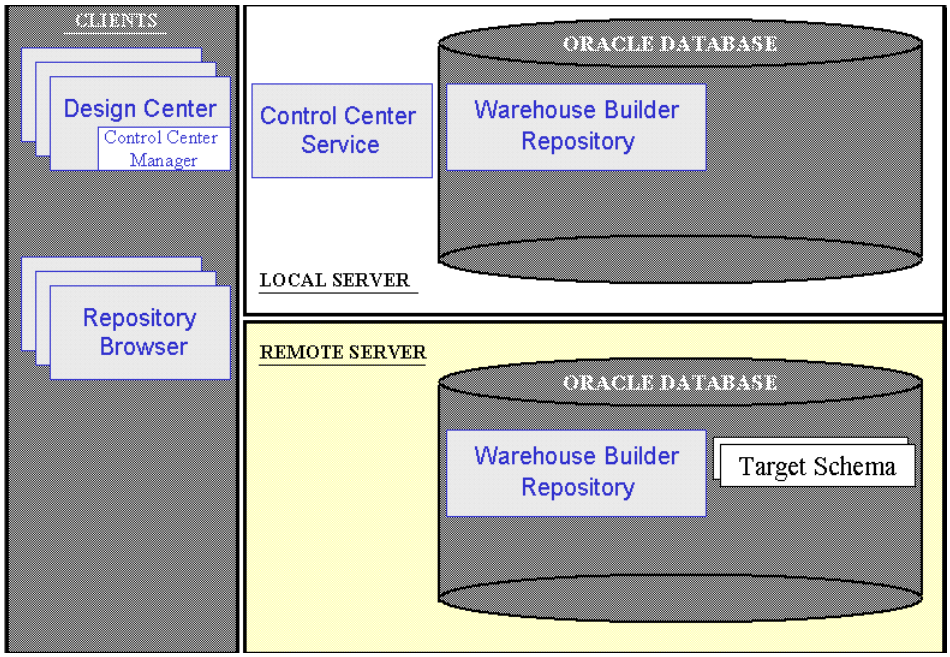
Figure 2–3 Control Center Service Installed on a Dedicated Computer



2.4.1.2 Control Center Service Installed on a Local Server

You can deploy all types of mappings to the remote target. However, if the mapping calls external programs such as SQL Loader, then these programs run on the local server.

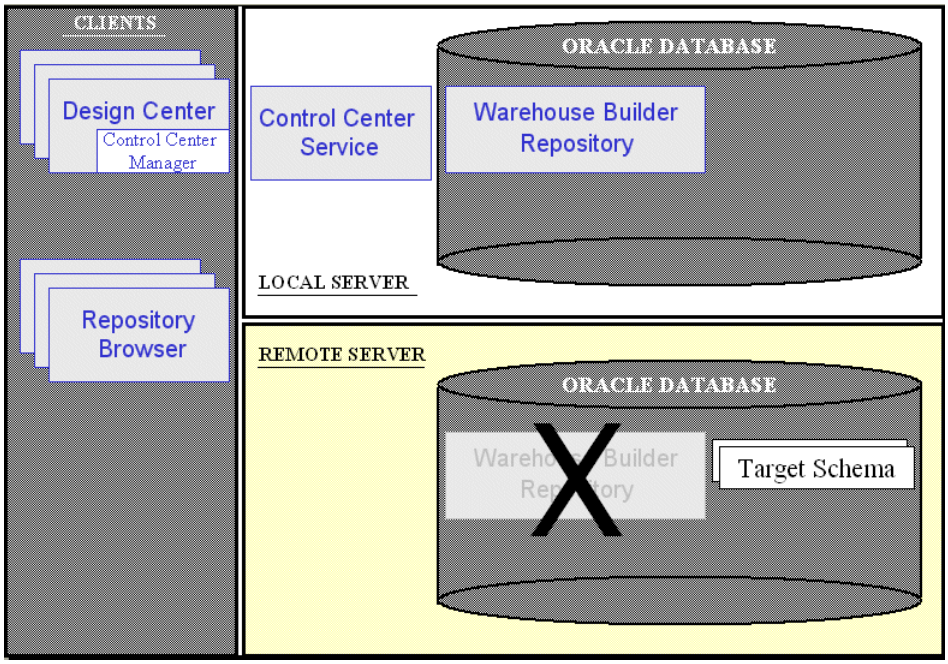
Figure 2–4 Control Center Service Installed on a Local Server



2.4.1.3 A Standalone Target Schema

Although it is not a preferred scenario, it is possible to implement a remote target without any Warehouse Builder components installed on the target computer. This scenario has a significant restriction. Because the remote target schema and the repository are in two different databases, you cannot deploy PL/SQL mappings to the standalone target schema.

Figure 2–5 A Standalone Target Schema



2.4.1.4 Steps for Installing and Testing a Remote Runtime

To implement a remote runtime environment, complete the following steps:

1. If necessary, install the client components including the Design Center and Control Center Service as depicted in "Remote Runtime Scenarios" on page 2-6.

   For Oracle Database 11*g* Release 1, the necessary components are already installed. Skip to the next step.

   For Oracle Database 10*g* Release 2, see "Downloading and Installing the Standalone Warehouse Builder Software" on page 1-17.

2. From the client computer, start the Repository Assistant.

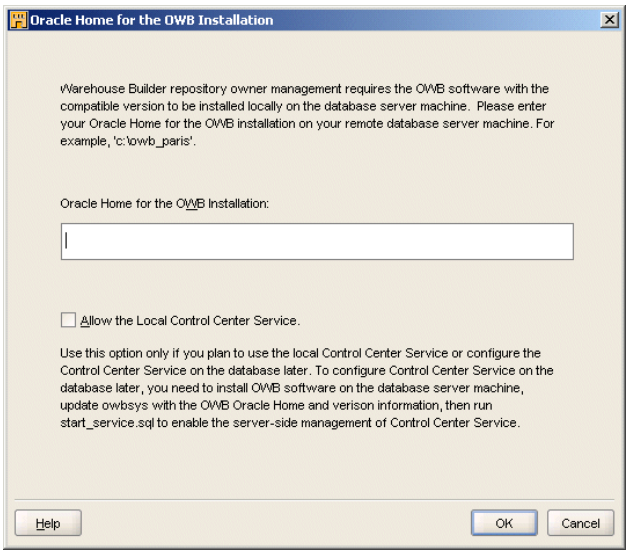
   Select **Start, Programs, OWB_ORACLE_HOME, Warehouse Builder, Administration**, then **Repository Assistant.**

3. Select the Advanced Setup option.

4. Connect to the server that will host the standalone target schema.

   The Repository Assistant displays a dialog as shown in Figure 2–6. Enable **Allow the Local Control Center Service** and click **OK**.

Figure 2–6 Dialog: Oracle Home for the OWB Installation



5. Follow the prompts in the Repository Assistant.

6. From the client computer, start the Control Center Service.

   Select **Start, Programs, OWB_ORACLE_HOME, Oracle Warehouse Builder, Administration** then **Start Control Center Service.** When prompted, connect to the workspace you previously created. Use the workspace owner user name and password.

7. Start the Control Center Manager to deploy and then run ETL processes on the target schema.

   To start the Control Center Manager, navigate to the **Tools** menu in the Design Center and select **Control Center Manager.**

8. Start the Repository Assistant again to create additional target users. (Optional)

Note: Only the Repository Assistant can create users for the target schemas. The security interface in the Design Center can only create users that are local to the workspace. Therefore, it cannot be used to create users for the target schemas.

2.5 Setting the Security Policy for the Repository

When you install a repository, Warehouse Builder enforces a default metadata security policy. The default policy is a minimal security policy appropriate for proof-of-concept or pilot projects. With minimal security, Oracle Database security policies keep data in the design repository secure, and metadata is available to anyone who knows the workspace owner log-on information.

You can change the default by selecting a maximum security policy. Alternatively, you can use the security interface in Warehouse Builder to design your own security policy as described in *Oracle Warehouse Builder User's Guide*. In either of these two cases, ensure that the repository database has the Oracle Advanced Security option enabled.

To change the default metadata security policy:

1. Start the Warehouse Builder Design Center.

   In Windows, from the **Start** menu select **Programs** and navigate to the Oracle product group you installed in the previous step. Select **Warehouse Builder** and then **Design Center.**

2. Log in as the workspace owner.
3. From the main menu, select **Tools** and then **Preferences.**
4. Select **Security Parameters.**
5. For the parameter **Default Metadata Security Policy,** specify the security policy to be applied.

   Minimum security enables all users to have full control over objects that any newly registered user creates. However, maximum security restricts access so that only the registered user that created an object and the Warehouse Builder repository administrators have access to an object.

For a description of the additional security parameters, refer to the online help.

For instructions on designing your own security policy or for more information about the maximum and minimum security policies, see Chapter 7, "Implementing Security in Warehouse Builder".

3

Upgrading to Oracle Warehouse Builder 11*g* Release 1 (11.1)

This chapter includes the following topics about upgrading Warehouse Builder:

3.1 General Steps for Upgrading to Warehouse Builder 11*g* Release 1 (11.1)

As a general rule, you can upgrade directly to the current release of Warehouse Builder from subsequent releases, beginning with Warehouse Builder 9.2.0.4 and onwards. You may encounter exceptions to this rule if you decide to migrate runtime audit data from early releases, as described in "Using the Control Center Upgrade Assistant" on page 3-12.

To upgrade to Warehouse Builder 11*g* Release 1 (11.1), refer to the following sections:

1. "Understanding the Installation Requirements" on page 1-8

   Verify that your environment meets the new minimum requirements for computers hosting client and server components.

2. Understand changes to the product architecture described in "Warehouse Builder Architecture and Components" on page 1-2.

3. Identify and complete any changes necessary to the database environment.

   If you determine that you must upgrade to a new Oracle Database version, then complete the steps in "Migrating An Oracle Database Environment" on page 3-2.

   If you determine that the new control center is to be hosted on a database or server that is different from the existing one, then do not continue with these instructions. Instead, refer to "Selectively Migrating a Warehouse Builder Environment to a New Database" on page 3-4.

4. Review the *Oracle Warehouse Builder Release Notes*.

   Any instructions in the Release Notes supersede the instructions in this guide.

5. If you want to continue to host the repository on Oracle Database 10*g*, see "Repository on Oracle Database 10g Release 2" on page 1-5.

   Otherwise, proceed to the next step.

6. Install a new repository.

   From the Windows **Start** menu, select **Programs** and navigate to the Oracle product group. Select **Warehouse Builder, Administration,** and then **Repository Assistant.**

   On UNIX, locate OWB_ORACLE_HOME/owb/bin/unix and run reposinst.sh.

   Follow the instructions Chapter 2, "Managing Workspaces and Workspace Users".

   If in the pre-existing repository you created multiple users through the optional PL/SQL package, then take note of the instructions for "Selecting Workspace Users" on page 2-5.

7. Upgrading a Design Repository on page 3-8
8. Upgrading Existing Control Centers or Runtime Repositories on page 3-12
9. Reusing and Redeploying Specific Objects on page 3-17

   To reuse most objects designed in a previous release, you need to take additional steps.

10. Chapter 5, "Installing and Enabling Optional Components" (Optional)
11. "Installing the Warehouse Builder Software" on page 1-18.

    Repeat the instructions "Installing the Warehouse Builder Software" on page 1-18 for each computer to be used as a client.

12. When complete the installation process, you can start all the components as described in "Launching Warehouse Builder Components" on page 1-19.
13. Chapter 4, "Deinstalling Oracle Warehouse Builder" (Optional)

    You have the option of deinstalling the existing components from the previous release. Or, you can deinstall pre-existing components at a later date.

3.2 Migrating An Oracle Database Environment

If your current version of Oracle Database is compatible with Warehouse Builder, then you can keep the current version or optionally choose to upgrade to a higher compatible version of the database. You can migrate your Oracle environment to a different instance of Oracle Database, or you can continue on the same instance.

Before You Begin

Before you upgrade the Oracle Database, stop the Control Center Service if it is running.

Log on to the host as the repository owner. Run the *`OWB_ORACLE_HOME\rtp\sql\stop_service.sql`* script.

Note: In Oracle Warehouse Builder 10.1 and earlier versions, the Control Center Service was known as the Runtime Platform Service. The stop_service.sql is located in the same directory.

Upgrading to Oracle Database 10*g* (11.x)

If you intend to upgrade to Oracle Database 10*g* while maintaining the same database instance, then all relevant instructions are detailed in the Oracle Database 10*g* Upgrade Guide. Continue with step 4 in "General Steps for Upgrading to Warehouse Builder 11g Release 1 (11.1)" on page 3-1.

If you intend to create a new database instance, then you must take the additional steps of either

"Migrating a Complete Database" (Recommended)

or

"Selectively Migrating a Warehouse Builder Environment to a New Database" on page 3-4

3.2.1 Migrating a Complete Database

If you are upgrading from Warehouse Builder 10*g* Release 2 (10.2), you can migrate a complete Oracle Database as described in the upgrade documentation for Oracle Database 11*g*.

If you want to migrate an Oracle Workflow Schema, then see "Migrating an Oracle Workflow Schema" on page 3-3.

3.2.2 Migrating an Oracle Workflow Schema

Oracle Workflow Schemas Used in Warehouse Builder 10*g* Release 2

Take the following precautions now, that is, prior to upgrading runtime metadata.

To upgrade Oracle Workflow on a new Oracle Database instance:

1. In the new Database instance, locate and run the Oracle Workflow installation software.

   For Oracle Database 11*g*, the installation software is located at owb home/wf/install. Use wfinstall.csh for UNIX or wfinstall.bat for Windows platforms.

2. Use Oracle Database export and import utilities to move an Oracle Workflow schema from one database to another.

   This may result in invalid PL/SQL packages due to missing privileges. To resolve this, use the scripts owf_grants.sql and tsupgrade_compile_pkg.sql. Both scripts are at available at OWB_ORACLE_HOME/owb/rtasst/upgrade.

   Logon as SYS and use owf_grants.sql to grant the privileges.

3. Continue with steps 4 through 6 in "General Steps for Upgrading to Warehouse Builder 11g Release 1 (11.1)" on page 3-1.

   Following the general steps, you install the Warehouse Builder software, install a repository, and register users for Warehouse Builder. When prompted to register user, ensure that the OWF_MGR user is registered as a user of your workspace.

4. Continue with "Upgrading a Design Repository" on page 3-8 followed by "Upgrading Existing Control Centers or Runtime Repositories" on page 3-12.

5. The final step is "Reusing Process Flows and Schedules" on page 3-18.

   Manually re-register the workflow locations and redeploy the process flow packages from within the new version of Warehouse Builder.

Oracle Workflow Schemas Used in Warehouse Builder 10*g* Release 1 and Prior

After you move an Oracle Database instance, Warehouse Builder process flows remain registered to the Oracle Workflow installed on the pre-existing Oracle Database instance. This condition occurs only when the Warehouse Builder installation from which you are upgrading is Warehouse Builder 10*g* Release 1 (10.1) or prior.

Take the following precautions now, that is, prior to upgrading runtime metadata.

To upgrade Oracle Workflow on a new Oracle Database instance:

1. In the new Database instance, locate the Oracle Workflow installation software.

   For Oracle Database 11*g*, the installation software is located at *OWB_ORACLE_HOME/wf/install*. Use `wfinstall.csh` for UNIX and `wfinstall.bat` for Windows platforms.

2. Run the Oracle Workflow assistant in **Upgrade** mode on the new database instance.

   The Oracle Workflow schema is now upgraded. However, in Warehouse Builder, the associated locations remain registered to the pre-existing instance of Oracle Workflow.

3. Continue with steps 4 through 6 in "General Steps for Upgrading to Warehouse Builder 11g Release 1 (11.1)" on page 3-1.

   Following the general steps, you install the Warehouse Builder software, install a repository, and register users for Warehouse Builder.

4. Register the Workflow user in the new repository.

   Start the new Design Client and navigate to the security interface. In the **Global Explorer** on the lower right window, expand the **Security** node and right-click the **Users** node to create a new user. Add a new user with the same name as your workflow user in the pre-existing database from which you are migrating. Deselect the user as target.

5. Continue with "Upgrading a Design Repository" on page 3-8 followed by "Upgrading Existing Control Centers or Runtime Repositories" on page 3-12.

6. The final step is "Reusing Process Flows and Schedules" on page 3-18.

   Manually re-register the workflow locations and redeploy the process flow packages from within the new version of Warehouse Builder.

3.2.3 Selectively Migrating a Warehouse Builder Environment to a New Database

Use this option to selectively move a Warehouse Builder environment from one Oracle Database to another. You must use this option if the new control center is to be hosted on a database or server different from the existing runtime repository or control center.

As this is the most challenging migration and upgrade scenario, avoid this scenario if possible. Do not use this option if you intend to either keep the same database instance or migrate the full database.

Steps for Migrating Warehouse Builder to an Oracle Database 11*g*

1. Review the *Oracle Warehouse Builder Release Notes*.

   Any instructions in the Release Notes supersede the instructions in this guide.

2. Install a new repository on Oracle Database 11*g*.

From the Windows **Start** menu, select **Programs** and navigate to the Oracle product group. Select **Warehouse Builder, Administration,** and then **Repository Assistant.**

On UNIX, locate OWB_ORACLE_HOME/owb/bin/unix and run reposinst.sh.

3. Upgrading a Design Repository on page 3-8
4. Exporting Target Schemas from the Existing Runtime Environment
5. Creating the Target Schemas and Users in the New Database
6. Copying External Directory References to the New Database Instance (Optional)
7. Importing Target Schemas to the New Database
8. Upgrading Existing Control Centers or Runtime Repositories on page 3-12
9. Take manual steps to reuse specific types of objects.

   If the existing Warehouse Builder environment included flat files and external tables, then "Reusing Flat Files and External Directories from a Different Database Instance" on page 3-18.

   See Reusing and Redeploying Specific Objects on page 3-17 for additional steps to reuse certain objects such as Advanced Queues that you designed in a previous release.

10. Chapter 5, "Installing and Enabling Optional Components" (Optional)

    See Chapter 5 for instructions on installing and configuring optional components.

11. "Installing the Warehouse Builder Software" on page 1-18

    Repeat the instructions "Installing the Warehouse Builder Software" on page 1-18 for each computer to be used as a client.

12. When complete the installation process, you can start all the Warehouse Builder components as described in "Launching Warehouse Builder Components" on page 1-19.
13. Chapter 4, "Deinstalling Oracle Warehouse Builder" (Optional)

    You have the option of deinstalling the existing components from the previous release. Or, you can deinstall pre-existing components at a later date.

3.2.3.1 Exporting Target Schemas from the Existing Runtime Environment

Pre-create the tablespaces in the new Database environment to exactly match the tablespaces in the existing version of Oracle Database.

1. Use Oracle Export in the existing version of the Oracle Database to export the existing target schemas into a `DMP` file with the following command for each schema:

   ```
   exp OldOWBTargetUserName/OldOWBTargetUserPassword@
   Old_DBTNSConnection Owner=OldOWBTargetUserName    FILE=OldOWBTarget.dmp
   LOG=OldOWBTarget.log
   ```

   OldOWBTargetUser stands for the Warehouse Builder target schema user from the existing version of Warehouse Builder.

   For example, type:

   ```
   exp owb_target/owb_target owner=owb_target FILE=owb_target.dmp LOG=owb_
   target.log
   ```

2. Identify all the tablespaces for each of the existing Warehouse Builder target schema users.

   Connect to SQL*Plus in the existing version of the Oracle Database as the Warehouse Builder target schema user, and then enter the following command:

   ```
   select distinct TABLESPACE_NAME from user_segments;
   ```

   Enter the following to check the default and temporary tablespaces for existing Warehouse Builder target schema users:

   ```
   select DEFAULT_TABLESPACE, TEMPORARY_TABLESPACE from
   user_users;
   ```

3.2.3.2 Creating the Target Schemas and Users in the New Database

The steps you take here depend on the version from which you are upgrading.

When migrating from Warehouse Builder 9.2 or 10.1, complete the following instructions:

1. In the new Database instance, create the tablespaces you listed from the existing instance in "Exporting Target Schemas from the Existing Runtime Environment".
2. In the new Database, connect as a `SYS` user to SQL*Plus to create each target schema and grant privileges to it.

   For each target schema you create, enter the following commands in SQL*PLus:

   ```
   connect SYS/SYS as sysdba;
   ```

   ```
   create user OldOWBTargetSchemaUser identified by
   OldOWBTargetSchemaPassword default tablespace users temporary
   tablespace temp;
   ```

   ```
   SET DEFINE %
   ```

   ```
   define user=OldOWBTargetSchemaUser
   ```

   ```
   @new OWB_ORACLE_HOME\owb\rtasst\upgrade\preowb10_2\warehouse_system_
   rights.sql
   ```

   @new owb home\owb\rtasst\upgrade\preowb10_2\xmltk_grant.sql

When migrating from Warehouse Builder 10.2, complete the following instructions:

1. In the new Database instance, create the tablespaces you listed from the existing instance in "Exporting Target Schemas from the Existing Runtime Environment".
2. In the new Database, connect as a `SYS` user to SQL*Plus to create each target schema and grant privileges to it.

   For each target schema you create, enter the following commands in SQL*PLus:

   ```
   connect SYS/SYS as sysdba;
   ```

   ```
   create user OldOWBTargetSchemaUser identified by
   OldOWBTargetSchemaPassword default tablespace users temporary
   tablespace temp;
   ```

   ```
   SET DEFINE %
   ```

   ```
   define user=OldOWBTargetSchemaUser
   ```

   ```
   @new OWB_ORACLE_HOME\owb\rtasst\upgrade\owb10_2\warehouse_system_
   rights.sql
   ```

3.2.3.3 Copying External Directory References to the New Database Instance

Complete this section if in the pre-existing Warehouse Builder environment includes external directories which are used by external tables and flat files.

External directories have two elements: the logical and the physical. The logical element is the reference residing in the database to a directory located outside the database. These instructions migrate the logical elements. You migrate the physical elements in a later step subsequent to upgrading the runtime environment.

To migrate the external directories for each target schema users:

1. Create a copy of the script gen_ext_dirs.sql.

   Locate *OWB_ORACLE_HOME*\owb\mig\gen_ext_dirs.sql on the *new host*, that is, the computer hosting the new Warehouse Builder installation.

   Copy the file to a temporary directory on the *original host*, that is, the computer hosting the pre-existing version of Warehouse Builder from which you are migrating.

2. In SQL*Plus, connect as a Warehouse Builder target schema user and run TEMP\gen_ext_dirs.sql on the original host computer.

3. Locate the ext_dirs.sql file generated in the SQL*Plus default directory.

   Typically, this default directory is *OWB_ORACLE_HOME*\bin.

4. Rename the generated script.

   As you complete these instructions, you generate a separate script for each Warehouse Builder target schema use. Consider renaming the file to indicate the target schema.

5. Transfer the generated and renamed ext_dirs_TargetUserName.sql file to a temporary location on the new host.

6. On the new host, use SQL*Plus to connect as the Warehouse Builder 11*g* Release 1 (11.1) target schema user and run ext_dirs.sql.

7. Repeat steps 2 through 6 for each target schema user you intend to migrate.

3.2.3.4 Importing Target Schemas to the New Database

Use Oracle Import to import the target schema files into the new user you created.

To import a target schema:

1. To import the target schema DMP file you created in "Exporting Target Schemas from the Existing Runtime Environment" on page 3-5, enter the following command:

   imp *OldOWBTargetUserName*/*OldOWBTargetUserPassword*@*New_DBTNSConnection* FILE=*OldOWBTarget*.dmp LOG=*NewOWBTarget*.log

   OldOWBTargetUser stands for the Warehouse Builder target schema user from the existing version of Warehouse Builder.

   For example, enter:

   ```
   imp owb_target/owb_target@New10gConnection FILE=owb_target.dmp
   LOG=c:\temp\owb_target_import.log
   ```

2. Examine the import log file, whose name and location you specified in the import command.

Proceed to the next step only if the last line of the log file indicates a successful completion.

If the last line of the log file indicates an unsuccessful completion, you must fix all import errors before proceeding.

3. Repeat these instructions for each target schema you want to migrate.

3.3 Upgrading a Design Repository

You have the following options when upgrading the design metadata in a repository:

- Migrating All Design Metadata from Warehouse Builder 10g Release 2 (10.2)
- Selectively Migrating Design Metadata

3.3.1 Migrating All Design Metadata from Warehouse Builder 10*g* Release 2 (10.2)

Follow these instructions if you want to export the entire design metadata from repository in Warehouse Builder 10*g* Release 2 and import the entire design metadata into the current release.

3.3.1.1 Exporting All Design Metadata from Warehouse Builder 10g Release 2 (10.2)

In these instructions, you modify and run a tcl script using Warehouse Builder 10*g* Release 2 (10.2). The script exports the entire design metadata from a Warehouse Builder 10.2 repository.

All the design metadata is exported as a single unit.

To export all design metadata:

1. Copy the tcl script from the home directory of the current release into a temporary directory.

   Locate `ExportEntireRepos.tcl` in *`owb 11.1 home`*`/owb/bin/upgrade/.`

2. Use a text editor to update the copy of `ExportEntireRepos.tcl` that you saved in a temporary directory.

   Specify the Warehouse Builder 10*g* Release 2 repository owner for the connection information. This includes the repository owner user name, password, host, port and service.

   Specify the export and import directory. These directories must specify the same directory location. The export and import directory will contain the MDL data files, log files and generated scripts.

3. Make sure no one is logged into the Oracle Warehouse Builder 10*g* Release 2 repository. The export script requires exclusive access to the repository for the upgrade process.

4. Run OMB Plus using the tcl script.

   For Unix, type the following command on the same line:

   ```
   owb 10.2 home/owb/bin/unix/OMBPlus.sh                                temp
   directory/ExportEntireRepos.tcl
   ```

   For Windows, type the following command on the same line:

   ```
   owb 10.2 home\owb\bin\win32\OMBPlus.bat                              temp
   directory\ExportEntireRepos.tcl
   ```

5. Verify that the export completed successfully by reviewing `ExportEntireRepos.log` located in the export directory.

3.3.1.2 Importing All Design Metadata into the Current Release

In these instructions, you modify and run a tcl script. The script imports the entire design metadata as a single unit from Warehouse Builder 10.2 into a Warehouse Builder 11.1 repository.

To import all design metadata:

1. If you have not already done so, create a workspace and a workspace owner in the new release.

   Refer to Chapter 2, "Managing Workspaces and Workspace Users" for additional information.

2. If the new repository resides on the same Database as the previous repository, skip to the next step.

   If the new repository resides on a different Database from the previous repository, then create the same Warehouse Builder users from the previous repository in the new database, e.g., use SQL*Plus.

   ```
   SQL> CREATE USER owb User Name IDENTIFIED BY password DEFAULT
   TABLESPACE debasing...
   ```

   Refer to Oracle SQL Language Reference documentation for details for CREATE USER command.

   Note: This step is important if you want to migrate security information into Oracle Warehouse Builder 11*g* Release 1. The upgrade process creates the Oracle Warehouse Builder users if the database users exist. So there is no need to create the Oracle Warehouse Builder users explicitly.

3. Use a text editor to update the script in *owb 11.1 home*`/owb/bin/upgrade/ImportEntireRepos.tcl`.

   Specify the Warehouse Builder 11*g* Release 1 workspace owner and workspace. For the connection information, include the workspace owner user name, password, host, port and service.

   Specify the export and import directory. The export and import directory must be the same directory specified in ExportEntireRepos.tcl. The import directory will contain the log files of the import.

4. Run OMB Plus using the tcl script. Enter the commands on the same line.

   For UNIX, type the following command on the same line:

   owb 11.1 home`/owb/bin/unix/OMBPlus.sh` *owb 11.1 home*`/owb/bin/upgrade/ImportEntireRepos.tcl`

   For Windows, type the following command on the same line:

   owb 11.1 home`\owb\bin\win32\OMBPlus.bat` *owb 11.1 home*`\owb\bin\upgrade\ImportEntireRepos.tcl`

5. Verify that the Import completed successfully by reviewing `ImportEntireRepos.log` located in the import directory.

3.3.2 Selectively Migrating Design Metadata

Follow these instructions if you want to migrate only a portion of an existing repository. For example, use these instructions to export and import selected projects or collections.

Create a full database backup before you begin. Additionally, create metadata export (MDL) files for all Warehouse Builder projects. Keep these backups until you have completed and tested the entire upgrade process.

These instructions apply whether you upgraded your Oracle Database.

1. Export design metadata from the existing version of Warehouse Builder into an MDL file using the Metadata Loader.
2. Use the new version of Warehouse Builder to create a new repository.
3. Import design metadata into the new repository.

3.3.2.1 Exporting Design Metadata from a Prior Release of Warehouse Builder

Export each project, collection, or public transformation you want to migrate to Metadata Loader (MDL) files using the Metadata Loader. If you have created any user-defined definitions, then export these objects too. For more information on exporting metadata, see *Oracle Warehouse Builder User's Guide*.

Note: You must export and import metadata using the Metadata Loader. Warehouse Builder upgrade does not support files that were exported or imported using back end database commands.

To export existing metadata into an MDL file:

1. Use the prior version of the Warehouse Builder client to select the project, collection, or public transformation you want to export.

   For information about exporting user-defined definitions, refer to *Oracle Warehouse Builder User's Guide*.

2. From the **Project** menu, choose **Export Metadata**, then **File**.

   The Metadata Loader assigns a path and file name to the exported MDL file. Make a note of the path and filename for all data you export. For more information on exporting metadata, refer to *Oracle Warehouse Builder User's Guide*.

3.3.2.2 Importing Design Metadata to Warehouse Builder

After having installed the new software, you must import and upgrade design metadata into the new version of Warehouse Builder. Ensure that you first import custom public transformations, if any. Use the Metadata Import utility to import design metadata. For more information on importing metadata, see *Oracle Warehouse Builder User's Guide*.

Note: Warehouse Builder upgrade does not support files that were exported or imported using back end database commands.

To import and upgrade metadata into the new Warehouse Builder repository:

1. From the new Warehouse Builder Design Center, select the **Design** menu, **Import,** and **Warehouse Builder Metadata**.

   The Metadata Import dialog is displayed.

2. In the **File Name** field, specify the path and file name of the exported data from the former repository.

3. In the **Log File** field, specify the path and file name of the log file or click **Browse** to locate a directory and file name. Warehouse Builder records information about the import in this log file.
4. In the Import Option section, select the import option used while importing metadata. The options available are:
   - **Create new metadata only:** Adds new metadata to a repository.
   - **Update metadata (replace existing objects and create new metadata):** Adds new objects and replaces existing objects with those in the MDL file.
   - **Merge metadata (merge existing objects and create new metadata):** Adds new objects and overwrites existing objects only if they are different from those in the MDL file. Existing objects are not deleted.
   - **Replace existing objects only:** Replaces existing objects in the repository.
5. In the Match By section, select **Universal Identifier**.
6. (Optional) If the MDL file contains additional languages or user-defined definitions, click the **Advanced** button to select the options that include them in the import.

   Because the MDL file being imported was created using an earlier version of Warehouse Builder, the Metadata Upgrade dialog is displayed. Click **Upgrade** to upgrade the MDL file to the current version. Click **Cancel** if you do not want to upgrade the MDL file.

   If the MDL file is upgraded, then the Import Advanced Options dialog displays. Use this dialog to import the following:

   - Additional language metadata
   - User-defined definitions

   Click **OK** to save your selections and close the Import Advanced dialog. For more information about the advanced import options, refer Oracle Warehouse Builder User's Guide.
7. (Optional) To view a detailed summary of the contents of the export MDL file, click **Show Summary**.

   Because the MDL file being imported was created using an earlier version of Warehouse Builder, the Metadata Upgrade dialog is displayed. Click **Upgrade** to upgrade the export MDL file to the current version. Click **Cancel** if you do not want to upgrade the MDL file.

   If the MDL file is upgraded, the Show Summary dialog is displayed. This dialog provides a brief summary of the contents of the export MDL file.
8. Click **Import** to import the MDL file.

   If the MDL file was not previously upgraded in step 6 or step 7, the Metadata Upgrade dialog is displayed. Click **Upgrade** to upgrade the export MDL file to the current version. Click **Cancel** if you do not want to upgrade the MDL file.

   If you click Upgrade, then the Metadata Progress dialog displays the progress of the upgrade and import operation. After the upgrade completes, click **Close** to return to the Design Center.

In prior versions of Oracle Warehouse Builder, locations and runtime repository connections were owned by individual projects. Beginning in Oracle Warehouse Builder 10*g* Release 2, locations and connections are owned by a project called PUBLIC_PROJECT. If locations or runtime repository connections with the same

names as the ones being upgraded exist in the repository, then Warehouse Builder generates unique names when they are imported for the upgrade. You may need to manually clean up location associations after the upgrade is complete.

For more information about the changes made to repository objects after an upgrade and import operation, see Oracle Warehouse Builder User's Guide.

3.4 Upgrading Existing Control Centers or Runtime Repositories

In previous releases, runtime repositories were managed by the interface known as the Deployment Manager. Beginning in Oracle Warehouse Builder 10.2 release, the Control Center Manager replaced the Deployment Manager. The term *runtime repository* from previous releases is replaced by the term *control center.*

In previous releases, you could have multiple runtime repositories or control centers associated with a single Oracle Warehouse Builder installation. Beginning with Oracle Warehouse Builder 11*g* Release 1 (11.1), a repository is owned by a database user called OWBSYS. This repository can contain one or more workspaces. Each Workspace is equivalent to a repository from any previous release. That is, it can contain design metadata, runtime audit data or both. Therefore, when upgrading to this release, the upgrade assistant re-creates each runtime repository or control center as a workspace within the new, unified repository.

To upgrade existing control centers or runtime repositories, start the Control Center Upgrade Assistant.

For Windows, start `OWB_ORACLE_HOME\owb\bin\win32\cc_migrate.bat`.

For UNIX, start `OWB_ORACLE_HOME\owb\bin\UNIX\cc_migrate.sh`.

3.4.1 Using the Control Center Upgrade Assistant

Use the Control Center Upgrade Assistant to move audit data from a runtime repository or control center that you created in a previous release. After you use the Control Center Upgrade Assistant, use the Control Center Manager to manage runtime repositories, now referred to as control centers.

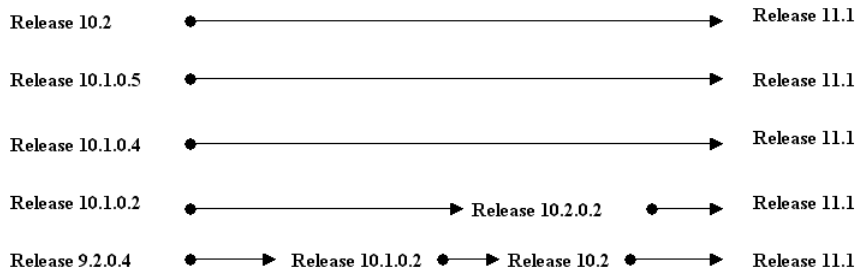
The Control Center Upgrade Assistant directs you through the steps needed to migrate an existing Warehouse Builder environment into one that can be further designed and managed from the current release of Warehouse Builder. These steps involve migrating audit-data into a workspace and upgrading target schemas to fulfill requirements in the current release.

If you want upgrade your Oracle Database, do so before running this assistant. Also, ensure that target schemas that contain PL/SQL mappings are in the same database instance as their owning Control Center.

Supported Upgrade Scenarios

Use this assistant to complete any of the scenarios illustrated in Figure 3–1. You can migrate audit data directly to Oracle Warehouse Builder release 11.1 from Oracle Warehouse Builder releases 10.2, 10.1.0.5, and 10.1.0.4.

Figure 3–1 Valid Paths for Migrating and Upgrading Runtime Audit Data



3.4.2 Connecting to a New Control Center

Connect to the repository created in the Oracle Database when you recently installed the latest version of this product.

Connect to the repository as the repository owner.

3.4.2.1 Choose a Workspace

From the newly created repository, select the workspace you created during the installation process.

3.4.3 Connecting to an Existing Runtime Repository Or Control Center

As you use the Control Center Upgrade Assistant, the assistant prompts you for the connection details to the previous runtime repository or control center.

By default, the assistant assumes that the new control center and existing one share the same host name, port number, and Oracle service name. This is the case for the most common upgrade scenarios including the following scenarios:

- Since the time you created the runtime repository or control center, you did not upgrade the Oracle Database to a new version.
- You did upgrade the Oracle Database but performed a full database migration such as described in "Migrating a Complete Database" on page 3-3.

If you want to upgrade to a control center on a different host or database other than the existing one, then complete the steps in "Selectively Migrating a Warehouse Builder Environment to a New Database" on page 3-4, start the Control Center Upgrade Assistant again, and then enter the correct connection information.

3.4.4 Choosing An Upgrade Operation

Use the upgrade operations in the following order:

1. Select Move to transfer location registration information and audit data from the pre-existing runtime repository or control center to the new control center.

   After you successfully move location registration information, you access the other options for Upgrade and Generate.

2. Select Upgrade to upgrade the locations details that you previously moved for use in the new control center.

3. Select Generate to create a Tcl script that you can later apply to update a design repository.

4. Proceed with Upgrading Locations in the Design Repository on page 3-16.

3.4.4.1 Move

When you select the Move operation, the assistant prompts you to connect to the original runtime repository or control center as a repository owner.

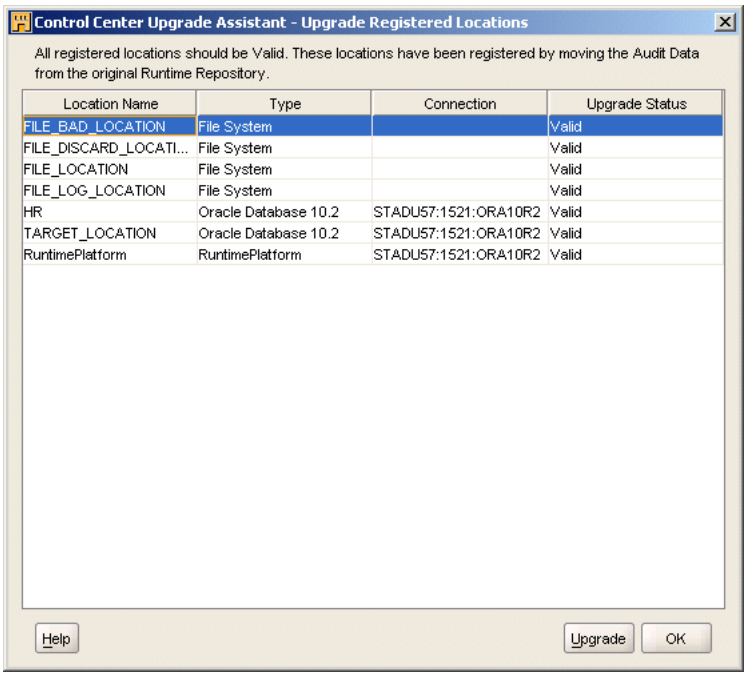
In this step, you upgrade runtime audit data so that the new control center displays the correct status, history, location details, and version numbers for objects you deployed and ran in the runtime repository or control center from the previous release.

This option is only available if the new control center does not contain any registered locations or audit data.

3.4.4.2 Upgrade

The assistant lists the locations registered in the new control center and displays whether they are valid or not. Figure 3–2 displays the Upgrade Registered Locations dialog.

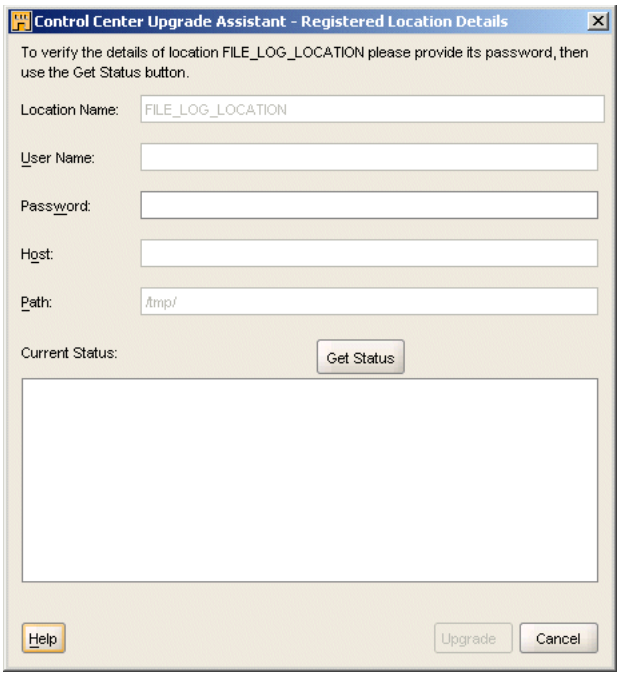
Figure 3–2 Upgrade Registered Locations Dialog



3.4.4.3 Upgrade Operation: Location Details

Select a location and use this button to check and fix locations for possible errors. Ensure that all locations are valid before proceeding. Figure 3–3 displays the Registered Locations Details dialog.

Figure 3–3 Registered Locations Details Dialog



This dialog box displays the registration details of the currently selected location. Select **Get Status** to evaluate its status and view the results of various tests.

For each location, the assistant checks that the password is valid and that it is the same as the registered password. The assistant verifies that the version registered for the location is the same as the actual version. If the assistant detects any errors, then you can select **Upgrade** to correct the errors.

3.4.4.4 Generate

Use this operation to generate a TCL script of OMB Plus commands that you can use to alter the location information stored against locations in the design repository. Such information was not stored against locations in Warehouse Builder 10.1.x. Also, depending on your migration path, it may have been altered as part of migration.

To generate a Tcl script that updates location information:

1. Ensure that you previously imported MDL from the previous design repository to the new Warehouse Builder 11.1 repository as described in "Upgrading a Design Repository" on page 3-8.
2. Click **Generate.**
3. Edit the script to change the value of the variable `CC_NAME`.

   Either edit the script in the user interface and select save again. Or edit the script in Notepad.

   Set `CC_NAME` to the name of the control center object in the new design repository. For example, assume that you migrated a runtime repository called `MY_DEV_RUNTIME` from a previous of Warehouse Builder. Therefore, in the Tcl script, change the line

   ```
   CC_NAME cc_name
   ```

   to

```
CC_NAME MY_DEV_RUNTIME
```

4. Save the edited script in a temporary directory.
5. Click OK in the Generate dialog and complete the Control Center Upgrade Assistant.
6. Proceed with "Upgrading Locations in the Design Repository" on page 3-16.

3.4.5 Reviewing Selections in the Upgrade Assistant

Verify your selections in the assistant before clicking **Finish.**

On the summary page, control center refers to the new control center to which you are upgrading. Runtime repository refers to the repository from which you are upgrading.

3.4.6 Upgrading Locations in the Design Repository

1. After you generate a Tcl script using the "Generate" on page 3-15, use an OMB Plus session to connect to the new design repository using the OMBCONNECT command.

   For example, enter:

   OMBCONNECT <repos>/<password>@<host>:<port>:<service_name> USE WORKSPACE <wokspace_name>

   For more information on OMB Plus commands, see the Oracle Warehouse Builder API and Scripting Reference.

2. Run the Tcl script against the new design repository.

   For example, enter at the OMB Plus prompt:

   ```
   source/temp_path/my_generated_script.tcl
   ```

   When you run the script, the details for the control center and the location address are seeded into the design repository. Each location is associated with the control center. The registration details are also added to the logical location because, beginning in Warehouse Builder 11.1, these details can be stored in the Design Center.

3. For each project that you migrated, ensure that a configuration object uses the control center object you specified for the `CC_NAME` variable previously in these instructions.

   In the Design Center, expand the project node, and expand the **Configurations** node. Right-click DEFAULT_CONFIGURATIONS and select **Open Editor.**

   On the Name page, enable the Set and Save option.

   On the Details tab, select the incoming control center which is the same control center you set for `CC_NAME`.

4. Save the changes you made in the Design Center by selecting **Save All** from the Design menu.
5. To view and re-deploy the migrated objects, start the Control Center Manager from the Tools menu.
6. Register all of the locations and provide any passwords.

   For security purposes, the location passwords are not saved. In the Control Center Manager, right click each location and select **Register**. Enter the password and optionally test the connection.

3.5 Reusing and Redeploying Specific Objects

As a general rule, when migrating from the previous release to Warehouse Builder 11*g*, you can run migrated mappings immediately without redeploying them in the new environment. For all other jobs, however, you must take further action before running jobs for the first time. The objects that require further action include, but are not limited to the following: dimensions and cubes, Discoverer integration, process flows, schedules, and data profiles.

This section includes the following additional instructions for reusing objects you created in a previous release:

- Redeploying Dimensions and Cubes
- Reusing Advanced Queues
- Reusing Oracle Workflow Locations
- Reusing Process Flows and Schedules
- Reusing Flat Files and External Directories from a Different Database Instance
- Reusing Data Profiles

3.5.1 Redeploying Dimensions and Cubes

Migrating Type 2 Slowly Changing Dimensions

Beginning in Warehouse Builder 11*g*, hierarchy versioning is available and enabled as a default for type 2 slowly changing dimensions. If you migrate a type 2 slowly changing dimension, verify that the settings are set correctly after migration. For these dimensions to behave in the same way as originally designed in a previous release, you must first deselect hierarchy versioning and then deploy the dimension.

To disable hierarchy versioning, go to the Type 2 Slowly Changing Dimension Settings tab. Each level is listed together with its level attributes. With this new version of Warehouse Builder, each level except the highest has an attribute representing the parent ID. The name of this attribute is similar to the parent level name and has the suffix "_ID".

If Record History for this ID is set to Trigger History, then hierarchy versioning is turned on for this level. To turn off hierarchy versioning, remove the entry from Record History and leave it blank.

Migrating Dimensions from Warehouse Builder 10*g* Release 2

When you migrate a target schema from Oracle Warehouse Builder 10*g* Release 2 (10.2), you must redeploy any dimensions that used a ROLAP implementation to the OLAP catalog. To do this, you set the configuration property called **Deployment Options** to **Deploy to Catalog Only** and deploy the dimensions.

Migrating Dimensions and Cubes from Warehouse Builder 10*g* Release 1

Oracle Warehouse Builder 10*g* Release 2 (10.2) introduced significant changes to the logical model for dimensions and cubes. After upgrading from Oracle Warehouse Builder 10*g* Release 1 or prior, dimensions and cubes appear as new objects in the Control Center Manager.

New validation rules may cause errors or warnings that did not exist in your previous installation. This is expected and does not indicate problems with the migrated data. Validate the cubes and dimensions and fix errors that may prevent you from redeploying the objects.

Redeploy the objects as this is necessary for updating the audit history.

3.5.2 Reusing Advanced Queues

In a previous release you may have created a mapping with Advanced Queues. Only if you intend to redeploy such a mapping in this release, you must first create a separate table for each AQ with the following structure:

```
PAYLOAD SRC_TYPE107,

MSG_ID RAW(16),

CONSUMER_NAME VARCHAR2(30),

MSG_ORDER NUMBER,

CORR_ID VARCHAR2(128),

MSG_PRIORITY NUMBER
```

3.5.3 Reusing Oracle Workflow Locations

Re-register any Oracle Workflow locations created in a previous release.

3.5.4 Reusing Process Flows and Schedules

Process Flows and Schedules from Warehouse Builder 10*g* Release 2

Re-register the workflow locations and then select one process flow package to redeploy in the new environment. Preferably, redeploy a small process flow package with a single, simple process flow. Subsequently, other process flows created in this release can run without redeployment.

For schedules, redeploy all schedules from previous releases.

Process Flows and Schedules from Warehouse Builder 10*g* Release 1 and Prior

For process flows and schedules from release Warehouse Builder 10*g* Release 1 and earlier, you need redeploy each object separately in the new environment.

3.5.5 Reusing Flat Files and External Directories from a Different Database Instance

Complete the instructions in this section *only if both of the following are true*:

- If you migrated the Oracle Database by "Selectively Migrating a Warehouse Builder Environment to a New Database" on page 3-4.

  AND

- If you had flat files or external tables in the existing Warehouse Builder environment

If both of these points are true, you must copy the following objects from the computer hosting the existing instance of Oracle Database to the computer hosting the new instance:

- **Flat Files:** Copy any flat files used by SQL*Loader from the computer hosting the existing instance of Oracle Database to the computer hosting the new instance.
- **External Directories:** You must also copy all external directories from the computer hosting the existing instance of Oracle Database to the computer on which the new Database resides. Make sure to re-create identical file system directories.

3.5.6 Reusing Data Profiles

Migrating data profiles that you created in a previous release is not supported in Warehouse Builder 11*g* Release 1. You must manually recreate any data profile metadata you created in a previous release.

4

Deinstalling Oracle Warehouse Builder

This chapter contains the following topics for deinstalling Oracle Warehouse Builder components:

4.1 General Steps for Deinstalling Oracle Warehouse Builder

The steps you take to deinstall Warehouse Builder depends on if you want to remove only the client components from a computer or remove all server and client components from your environment.

To remove a client installation, follow the instructions in "Deinstalling the Oracle Warehouse Builder Software" on page 4-3. If you want to deinstall all Warehouse Builder components including the repository, then you must have `SYSDBA` privileges to the repository database. Follow the order of steps presented in this chapter to avoid the necessity of deleting components manually through a utility such as SQL Plus.

If you are deinstalling multiple or all components, then follow the order presented in this chapter.

To deinstall all components, complete the following steps:

1. Deleting the Workspace Users on page 4-2

   Use the Advanced Setup option in the Repository Assistant to delete one or more users.

2. Deleting the Workspace Owner on page 4-2

   Use the Advanced Setup option in the Repository Assistant to delete the workspace owner.

3. Deinstalling the Oracle Warehouse Builder Software on page 4-3

   Start the Oracle Universal Installer to deinstall the software components.

4. Deleting the Schema Objects (Optional) on page 4-3

5. Deleting a Repository from an Oracle 10g Database

4.2 Deleting the Workspace Users

Before you can deinstall a workspace owner, you must first delete the associated workspace users. When you delete a workspace user, you unregister and remove the user from the repository. Deleting the user from the Warehouse Builder repository does not delete or alter the user account in the Oracle Database.

To delete workspace users:

1. Start the Oracle Warehouse Builder Repository Assistant.

   For Windows, select **Start**, **Programs**, **OWB_ORACLE_HOME**, **Warehouse Builder**, **Administration**, and then click **Repository Assistant**.

   For UNIX, locate `OWB_ORACLE_HOME/owb/bin/unix` and run `reposinst.sh`.

2. On the **Install Type** page, select **Advanced Setup**, and click **Next.**
3. In the **Connection Information** page, provide the following information to connect to the repository:
   - SYSDBA User Name
   - SYSDBA Password
   - Host Name
   - Port Number (The default Port Number is 1521)
   - Oracle Service Name
4. On the **Choose Operation** page, select **Manage Warehouse Builder workspace users** option and click **Next.**
5. In the **Manage Workspace Users** page, select the option **Delete the registration of one or more Warehouse Builder workspace users**.
6. In the **Workspace Owner Information** page, select the workspace owner from which you want to delete the associated user. Then type the password for that workspace owner and click **Next.** The **Select Workspace Users** page is displayed.
7. Select the workspace users to be deleted, then click the left to right shuttle button to move the user to the **Selected:** box.
8. On the **Summary** page, review your selections and click **Finish**.

The **Deinstallation Successful** page appears after the workspace user is deleted.

4.3 Deleting the Workspace Owner

After deleting the workspace users, you can delete the workspace owner. When you delete a workspace owner, you unregister and remove the owner from the repository. Deleting the owner from the repository does not delete or alter the owner account in the Oracle Database.

To delete the workspace owner:

1. Start the Repository Assistant and navigate to the **Choose Operation** page.

   Repeat steps 1 through 3 in "Deleting the Workspace Users" on page 4-2.

2. In the **Choose Operation** page, select **Manage a Warehouse Builder workspace owner** option.
3. Click **Next**.

4. In the **Manage Workspace Owner** page, select **Delete an existing Warehouse Builder Workspace owner** option.
5. Click **Next**. The **Workspace Owner Information** page is displayed.
6. Enter the Workspace Owner Password.
7. On the Summary page, review your selections and click **Finish**.

The **Deinstallation Successful** page appears once the workspace owner is deleted.

4.4 Deinstalling the Oracle Warehouse Builder Software

To deinstall the Oracle Warehouse Builder:

1. Start the Oracle Universal Installer.

   For Windows, select **Start**, **Programs**, **OWB_ORACLE_HOME**, **Oracle Installation Products**, and then click **Universal Installer**.

   For UNIX, locate `OWB_ORACLE_HOME/oui/bin` and run run`Installer.sh`.
2. In the **Oracle Universal Installer: Welcome** page, click **Deinstall Products**.
3. In the **Inventory** page, on the **Contents** tab, in the **You have the following Oracle products installed** box, select the Oracle Warehouse Builder home.
4. Click **Remove**.
5. In the **Confirmation** page, click **Yes** to deinstall the Oracle Warehouse Builder. The deinstallation process begins.
6. After the deinstallation completes, click **Close** in the **Inventory** page.
7. In the **Oracle Universal Installer: Welcome** page, click **Cancel** to close the **Oracle Universal Installer** page.

4.5 Deleting the Schema Objects (Optional)

When you delete a workspace user or the workspace owner, you unregister and remove the owner from the repository. Deleting the user or owner from the Warehouse Builder repository does not delete or alter the owner account in the Oracle Database.

If you determine that it is necessary, then you can use Oracle Enterprise Manager to drop the workspace users, workspace owners, and the Warehouse Builder-related roles and synonyms permanently from Oracle Database.

Note: To grant permission to an OWB repository user to use Enterprise Manager for performing tasks, enter the following command in SQL*Plus:

```
GRANT SELECT any dictionary to "&OWB repository user";
```

4.6 Deleting a Repository from an Oracle 10*g* Database

You can delete an Oracle Warehouse Builder 11*g* repository and associated objects from a 10*g*Release 2 database using the SQL script `clean_owbsys.sql`. The script is stored in the `OWB_ORACLE_HOME/owb/UnifiedRepos` directory.

To delete an 11g Warehouse Builder repository from a10gRelease 2 database:

1. Change your working directory to `OWB_ORACLE_HOME/owb/UnifiedRepos`. For example:

   ```
   C:> cd OWB_ORACLE_HOME
   ```

2. Start SQL*Plus with SYSDBA privileges.

   Use the version of the SQL*Plus executable provided with Warehouse Builder 11*g* Release 1 (11.1). This executable is located in the `OWB_ORACLE_HOME/bin` directory.

   For example, enter the following command:

   ```
   C:>OWB_ORACLE_HOME\bin\sqlplus sys/sys_password as sysdba;
   ```

3. Run the `clean_owbsys.sql` script. For example:

   ```
   SQL> @clean_owbsys.sql
   ```

The `OWBSYS` user and Warehouse Builder-related roles are dropped from the 10*g*Release 2 Database.

If you used Repository Assistant to create a workspace, a workspace owner DB user, and workspace user DB users, these objects will still exist in the database after you run `clean_owbsys.sql`.

5

Installing and Enabling Optional Components

This chapter includes the following topics:

5.1 Enabling Integration with Oracle E-Business Suite

Warehouse Builder employs a design-deploy-run model as an ETL solution. To integrate with Oracle E-Business Suite (EBS), Warehouse Builder users must import metadata from EBS before designing mappings to move and transform data. Specifically, during the design phase, Warehouse Builder users require access to metadata in the APPS schema. Later, in the execution phase, Warehouse Builder users must access the data in that schema.

Because direct access to the APPS production schema is most likely limited and restricted, you may define a user on the EBS database through which Warehouse Builder users can access only the relevant metadata and data.

To enable access to EBS data and metadata:

1. Create a user on the database hosting EBS. This user needs at least CONNECT and RESOURCE roles.
2. Grant access to the relevant metadata by running the script OWB_ORACLE_HOME\owb\cmi\ebs\owbebs.sql.

   This script grants access to the following tables in the APPS schema that contain metadata for EBS tables, views, sequences, and keys: FND_APPLICATION, FND_APPLICATION_VL, FND_TABLES,FND_VIEWS, FND_SEQUENCES, FND_COLUMNS, FND_PRIMARY_KEYS, FND_FOREIGN_KEYS,FND_PRIMARY_KEY_COLUMNS, FND_FOREIGN_KEY_COLUMNS.

   The script also creates a synonym in the user schema for each of the preceding objects.
3. Enable a user to extract data from the EBS database.

You can create a new user or enable the same user you created in the previous steps. For each object to enable data extraction, grant this user at least SELECT access to each object.

Warehouse Builder users can now import the E-Business Suite metadata as described in the importing section of Oracle Warehouse Builder User's Guide.

5.2 Configuring Repository Browser Environments

The Repository Browser connects to Warehouse Builder repositories and enables you to view metadata, run Web reports, perform lineage and impact analysis on your metadata, and audit runtime executions.

When you install Warehouse Builder from the Oracle Universal Installer, the Repository Browser is also installed and available in the languages you selected in the for Product Languages in the Oracle Universal Installer.

To verify the installation, start the Repository Browser listener and then the Repository Browser. For information on how to use the Repository Browser, refer to Oracle Warehouse Builder User's Guide.

Making Additional Language Fonts Available

If end users need to view the Repository Browser in a language that you did not select when initially installing Warehouse Builder, then copy the additional language fonts from the Warehouse Builder CD. From the fonts directory, copy the following fonts to the JDK directory under the OWB_ORACLE_HOME:

- ALBANWTJ.TTF
- ALBANWTK.TTF
- ALBANWTS.TTF
- ALBANWTT.TTF
- ALBANYWT.TTF

Changing the Session Timeout

By default, Repository Browser sessions time out after 180 minutes, that is, 3 hours of inactivity.

To change this setting, update the session-config tag in `web.xml` located at `OWB_ORACLE_HOME\owb\j2ee\owbb\WEB-INF\.`

By default, the tag displays as follows:

```
<session-config>

<session-timeout>180</session-timeout>

</session-config>
```

5.3 Enabling Integration with Third-Party Name and Address Data Libraries

Warehouse Builder gives you the option to perform name and address cleansing on your data with the Name and Address operator. The Name and Address operator identifies and corrects errors and inconsistencies in name and address source data. The operator identifies inconsistencies by comparing input data to data libraries supplied

by the third-party name and address cleansing software vendors. Purchase the data libraries directly from these vendors.

To install data libraries, refer to the installation instructions of the name and address cleansing software vendor of your choice. For the list of certified name and address cleansing software providers, refer to Oracle Technology Network at http://www.oracle.com/technetwork/index.html.

To integrate with third-pary name and address data libraries:

1. Install Warehouse Builder as instructed in this guide.
2. Purchase data libraries from one of the certified vendors listed on My Oracle Support (formerly Oracle*MetaLink)* at https://support.oracle.com.
3. Install and access a certified vendor's data libraries and Name and Address adapter following the vendor's instructions.

   If you are installing in a Real Application Cluster environment, then you may be able to install the name and address adapter on many nodes to benefit from the parallelism and failover enabled by the Oracle RAC architecture. Check with your vendor to see if your purchase license allows a multiple-node installation.

   You do not need to install the data libraries on multiple nodes. However, if you install all data libraries on one node, then performance may suffer due to file access time latency. Follow the recommendations of your name and address cleansing software vendor.
4. Design a mapping using the Name and Address operator to cleanse name or address data. Refer to *Oracle Warehouse Builder User's Guide* for information on designing mappings using the Name and Address operator.

5.4 Enabling Integration with Oracle Workflow

If you plan to use Warehouse Builder process flows, then use Oracle Workflow to enable deployment. You can also deploy Warehouse Builder schedules to Oracle Workflow. For more information, read about schedules in Oracle Warehouse Builder User's Guide.

To enable integration with Oracle Workflow:

1. Locate the Oracle Workflow installation program.

   For a Warehouse Builder 11*g* repository on an Oracle Database 11*g* , the installation script is provided with the Warehouse Builder 11*g* software at OWB_ORACLE_HOME/owb/wf/install.

   For a Warehouse Builder 11*g* repository on an Oracle 10*g* Release 2 Database, you must download the Oracle Workflow 2.6.4 software.
2. Start the Oracle Workflow installation program.

   For Windows, type the following at the command prompt:

   C:\> cd owb_home\owb\wf\install

   C:\owb_home\owb\wf\install> wfinstall.bat

   For UNIX, type the following in a UNIX shell:

   $ cd owb_home/owb/wf/install

   $ wfinstall.csh
3. Complete the Workflow Configuration Assistant as follows:

Oracle Workflow Setting	Value
Install Option	Server Only
Workflow Account	owf_mgr
Workflow Password	Specify a password for the account.
SYS Password	Type the SYS password for the database where you are installing Oracle Workflow.
TNS Connect Descriptor	Type hostname:port:service_name, where the values of hostname, port and service_name correspond to your database. **Note:** Do not use a net service name as the assistant does not reference the tnsnames.ora file.
LDAP Parameters	Depending upon your situation, you may need to specify LDAP parameters. See the Oracle Workflow documentation for details.
Mailer Parameters	Depending upon your situation, you may need to specify mailer parameters. See the Oracle Workflow documentation for details.
Tablespace	You can optionally change the tablespace.

4. Click **Submit** to start the Workflow configuration process.

   The configuration process can take several minutes. Check owb_home/owb/wf/install/wf.log for messages to follow the progress of the configuration process.

   When the process is complete, the Workflow Configuration Assistant displays a message of completion.

5. Install the Workflow Client. (Optional)

   The installation of Oracle Workflow client is optional because the Process Flow Editor in Warehouse Builder replaces its functionality. However, install Oracle Workflow client if you want to view the deployed Oracle Warehouse Builder processes in Oracle Workflow.

   On the computer where you installed Oracle Warehouse Builder client, install the Oracle Workflow client from the CD for Oracle Workflow client.

6. Create a Workflow Proxy User.

   When the Workflow instance is remote from the database hosting the Warehouse Builder repository, you need to create a proxy-user.

   Within the database hosting the repository, use SQL Plus to create a user and grant it the OWB_USER role as a default. This enables the remote OWF instance to connect to the services provided by the Control Center.

6

Troubleshooting a Warehouse Builder Installation

Refer to this chapter in the event that you encounter errors or problems with an installation. This chapter includes the following topics:

6.1 General Steps for Troubleshooting Warehouse Builder

Take the following steps to troubleshoot errors in Warehouse Builder:

1. Review this chapter for a possible solution to the problem.

   If Warehouse Builder displays an error message during the installation process, then refer to "Error Messages Related to Installation" on page 6-6. If you did not note the error number, you can review the "Log Files for Installation Errors" on page 6-2.

   In the absence of an error message, refer to "Troubleshooting Installation Problems That Do Not Display Error Messages" on page 6-14.

2. Check for additional information about the problem by "Inspecting Logs Files in Warehouse Builder" on page 6-2.

3. If the problem remains unresolved, search for a possible solution at `https://support.oracle.com`

4. Review the Oracle Warehouse Builder Release Notes for installation notes or known issues.

5. If you are unable to resolve the problem in the previous steps, contact Oracle Support.

   Oracle Support may ask you to complete the steps in "Generating Log Files for a Specific Warehouse Builder Component" on page 6-15.

6.2 Inspecting Logs Files in Warehouse Builder

This section outlines all the different types of error messages that are logged by Warehouse Builder and how to access them.

Warehouse Builder logs the following types of errors:

Log Files for Installation Errors

When you run the Oracle Universal Installer to install Warehouse Builder, the installation error logs are automatically stored in:

C:\ProgramFiles\Oracle\Inventory\logs\installActions<timestamp>.log

When you run the Warehouse Builder Repository Assistant, the workspace installation error logs are stored in:

OWB_ORACLE_HOME\UnifiedRepos\log_timestamp.log

See "Error Messages Related to Installation" on page 6-6 for suggested actions for commonly encountered errors during installation.

Log Files for Metadata Import and Export Errors

Metadata Import: When you import a project or specific objects into your workspace using the Metadata Import Utility, Warehouse Builder records details of the import process in a log file. You can specify the name and location of this log file from the Metadata Import dialog box.

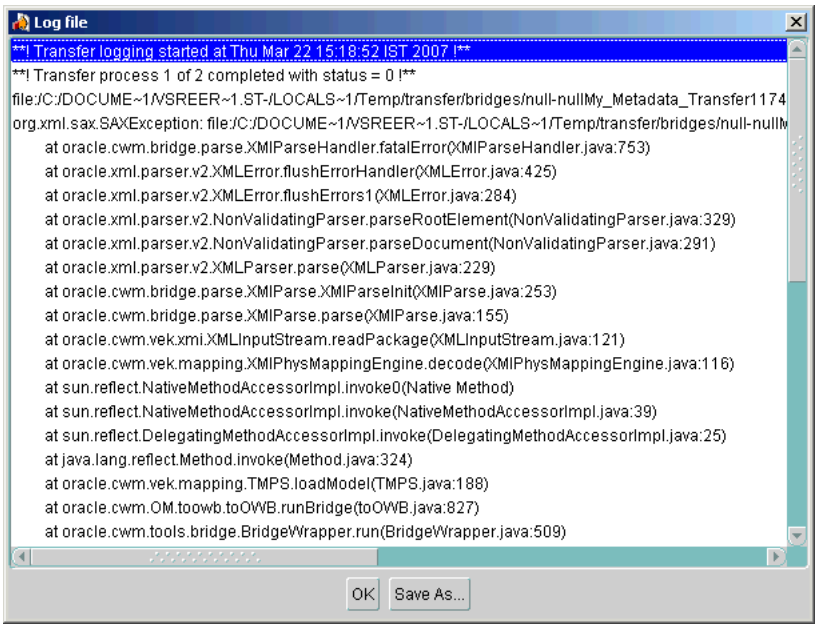
Metadata Export: When you export a Warehouse Builder project or specific objects using the Metadata Export Utility, Warehouse Builder records the details of the export in a log file. You can specify the name and location of this log file from the Metadata Export dialog box.

Metadata Import Using the Transfer Wizard

If you are importing design metadata using the Warehouse Builder Transfer Wizard, then you can view the log file after the import is complete. Warehouse Builder displays the My Metadata Transfer dialog box.

Click **View Log File** to view the log file, as shown in Figure 6–1. Click **Save As** to save the log file to your local system.

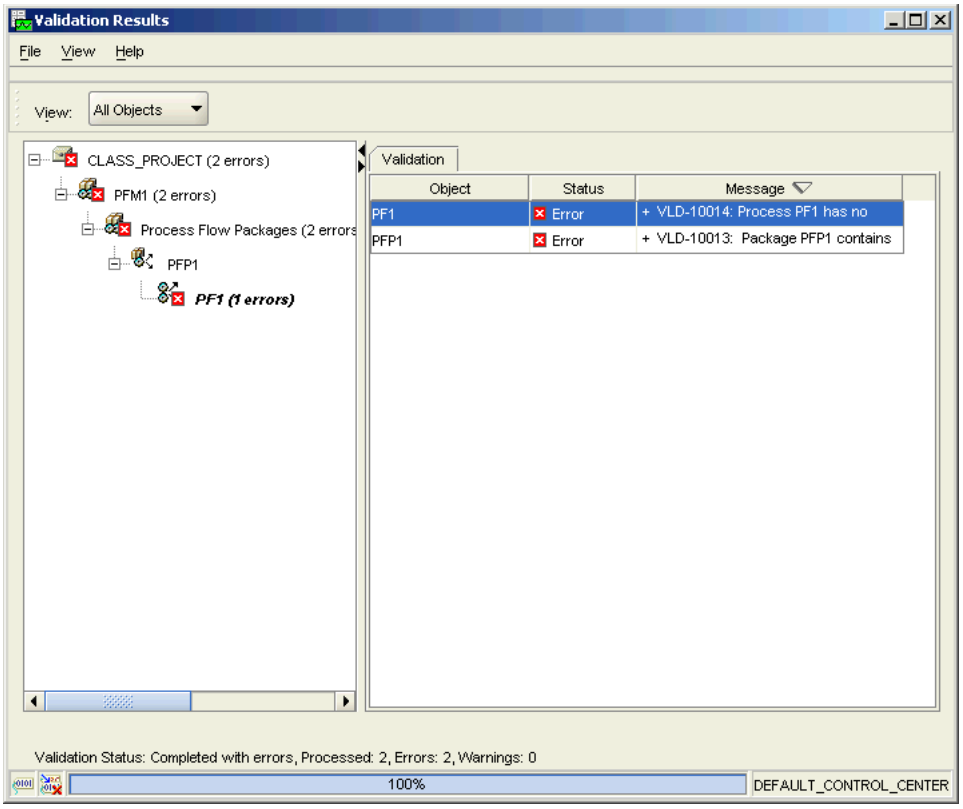
Figure 6–1 Metadata Import Log File



Log File for Validation Errors

In Warehouse Builder, you can validate all objects by selecting the objects from the console tree and then selecting **Validate** from the Object menu. After the validation is complete, the validation messages are displayed in the Validation Results window, as shown in Figure 6–2.

Figure 6–2 Validation Error Messages



You can also validate mappings from the Mapping Editor by selecting **Mapping,** then **Validate.** The validation messages and errors are displayed in the Validation Results window.

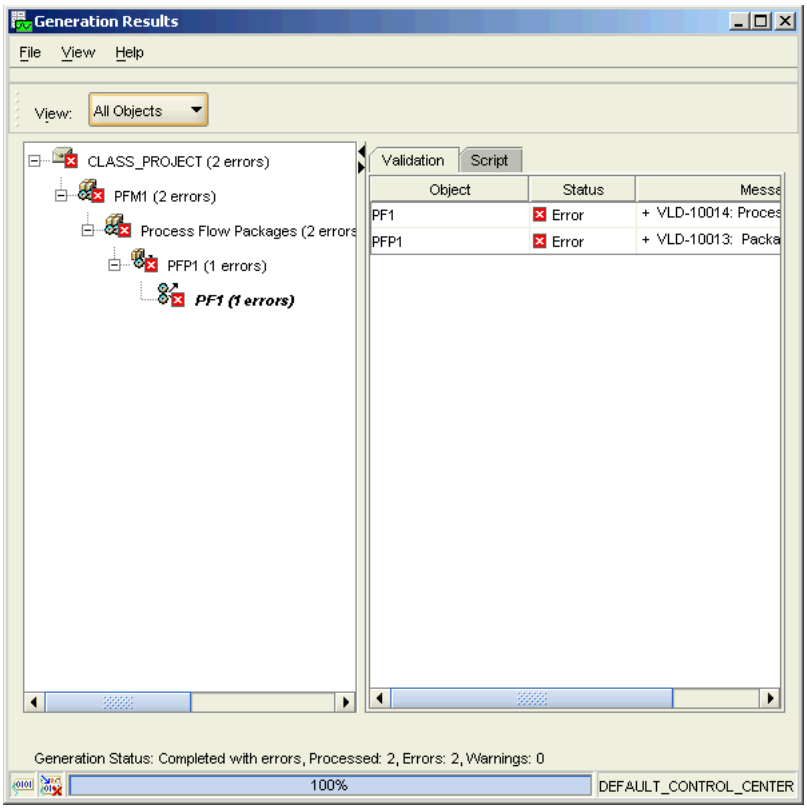
On the Validation tab of the Validation Results window, double-click an object name in the Object column to display the editor for that object. You can fix errors in the editor. Double-click a message in the Message column to display the detailed error message in a message editor window. To save the message to your local system, select **Code** in the menu bar, then select **Save as File**.

Warehouse Builder saves the last validation messages for each previously validated objects. You can access these messages at any time by selecting the object from the console tree in the Project Explorer, select **View** from the menu bar, and then click **Validation Messages.** The messages are displayed in the Validation Results window.

Log File for Generation Errors

After you generate scripts for Warehouse Builder objects, the Generation Results window displays the generation results and errors, as shown in Figure 6–3. Double-click an error under the Messages column on the Validation tab to display a message editor that enables you to save the errors to your local system.

Figure 6–3 Generation Results Window



Log Files for Deployment and Execution Errors

You can store execution or deployment error and warning message logs on your local system by specifying a location for them. In the Project Explorer, select the project. Then from the Tools menu, select **Preferences**. In the Preferences dialog box, click the Logging option in the object tree to the left. In the list box on the right, you can set the log file path, file name and maximum file size. You can also select the types of logs you want to store.

You can view this log of deployment and error messages from the Warehouse Builder console by selecting **View** from the menu bar, and then **Messages Log.** This Message Log dialog box is read-only.

Errors related to the Control Center Service are stored at the following path:

OWB_ORACLE_HOME\log*Repository_Name*\log.*xx* on the Oracle Database server.

Errors related to transforming or loading data are stored the runtime tables. You can access these error reports using the Repository Browser. The Browser provides detailed information about past deployments and executions. Click the Execution tab in the Execution reports to view error messages and audit details.

Log File for Name and Address Server Errors

If you are using the Name and Address cleansing service provided by Warehouse Builder, you can encounter related errors.

Name and address server start up and execution errors can be located at:

OWB_ORACLE_HOME\owb\bin\admin\NASver.log

If your Name and Address server is enabled in:

OWB_ORACLE_HOME\owb\bin\admin\NameAddr.properties:TraceLevel=1,

then it produces the log file `NASvrTrace.log`.

6.3 Error Messages Related to Installation

This section includes the following topics:

Causes and Actions

No fonts were found in '<drive>:\Program Files\ Qarbon\viewlet Builder3jre\lib\fonts'

Cause: After installing Warehouse Builder client components, you installed another software program that relies on Jinitiator and overwrote Java objects necessary of Oracle products. This may prevent you from launching Warehouse Builder or any other Oracle product that depends on Java objects.

Action: Re-install Jinitiator.

OWBSYS is not granted access to OWB_ORACLE_HOME/owb/bin/admin/rtrepos.properties: Please run UnifiedRepos/reset_owbcc_home.sql specifiying the path of the Oracle home from which the Control Center Service is being run.

Cause: When running the script reset_owbcc_home.sql and prompted for the OWB_ORACLE_HOME, you typed an invalid path for OWB_ORACLE_HOME.

Action: Run the script again and enter the correct path.

On all platforms, including both Windows and Unix, the path you enter must use forward slashes, and is case-sensitive. The case of the path entered here must match exactly the case of the path for the Warehouse Builder home as known by the operating system.

On Unix, the correct path to enter is the path for the `OWB_ORACLE_HOME` directory. On Windows, to determine the correct path for the `OWB_ORACLE_HOME` directory, examine the path displayed as part of the default Windows command prompt, and replace the backslashes with Unix-style forward-slashes. Do not supply a trailing slash. For example, if the Windows command prompt is:

```
C:\Oracle\My_OWB_Home\>
```

then the text you would enter is:

```
C:/Oracle/My_OWB_Home
```

SYS user does not have SYSDBA privileges.

Cause: In a standard database installation, the `SYS` user has `SYSDBA` credentials and `REMOTE_LOGIN_PASSWORDFILE=EXCLUSIVE`. You can verify the credentials by issuing the following connect statement:

SQL> `CONNECT sys@tns_name_of_db AS SYSDBA;`

Enter password: sys_password

If your database is configured with `REMOTE_LOGIN_PASSWORDFILE=NONE`, then the statement fails.

Action: If the statement fails, then you have the following options:

- Reconfigure your database with

  `REMOTE_LOGIN_PASSWORDFILE=EXCLUSIVE` and create a password file if none exists.

- If the preceding is not an option, reconfigure your database with

  `O7_DICTIONARY_ACCESSIBILITY=TRUE`.

RTC-5301: The Control Center Service is not currently available.

Cause: A Control Center Service must be running to enable the Control Center to manage deployments and executions. The service connects to the Control Center using JDBC and can be run from any Warehouse Builder home. Normally the service is runs on the server host.

Action: You can start a service on the server host by using the script `start_service.sql`.

If it is not possible to run the service on the server host, then start the Control Center Service on the local computer using the script `local_service_login.sh` or `local_service_login.bat` as appropriate. Use this script as follows:

```
local_service_login.sh [-startup | -closedown] OWB_ORACLE_HOME
```

In this mode, the Control Center Service runs on the local computer and is available only when that computer is available and can connect to the Control Center.

Use the script `show_service.sql` to determine the status of the service.

Control center service log file reports "DBMS_OBFUSCATION" or "No key is found."

Cause: The encryption of the passwords is out of sync with the client.

Action: Reset the repository and restart the control center service. To reset the repository, run *owb/rtp/sql/reset_repository.sql*.

API5022: Cannot Connect to the Specified Repository

This error occurs when you try to connect to the a repository after having performed a database export or import from the Warehouse Builder repository schema.

Cause: The package `NAMESPACESERVICEIMPL` may be invalid. This occurs after a database export or import from the Warehouse Builder repository schema if the repository owner has no `SELECT` privilege on `SYS.V_$SESSION`. You can diagnose the cause as follows:

1. In SQL*Plus, connect to the Warehouse Builder repository schema.
2. Enter the following command at the SQL prompt:

   ```
   ALTER PACKAGE NAMESPACESERVICEIMPL compile body;
   ```

3. If **Warning: Package body altered with compilation errors** appears, enter the following command at the SQL prompt:

   ```
   show errors;
   ```

4. The following errors mean that the Warehouse Builder repository owner has no `SELECT` privilege on `SYS.V_$SESSION`.

   ```
   PL/SQL: SQL statement ignored
   PLS-00201: Identifier 'SYS.V_$SESSION' must be declared
   ```

Action: Complete the following steps:

1. In SQL*Plus, connect as the `SYS` user.
2. At the SQL prompt, enter the following command:

   ```
   grant SELECT on V_$SESSION to Warehouse Builder_Repository_Owner;
   ```

3. Connect to the *`Repository_Owner`*.
4. Enter the following command at the SQL prompt:

   ```
   alter package NAMESPACESERVICEIMPL compile;
   ```

Runtime Assistant fails with LoadJava Error.

Cause: This can occur if the Oracle Database does not have the JServer option installed.

Action: Make sure that the Oracle Database has JServer option installed.

Error when specifying a SYSDBA user.

Oracle Warehouse Builder Assistants require you to provide SYSDBA credentials when installing the Oracle Warehouse Builder Design Repository or Runtime components.

Cause: In a standard database installation, the SYS user has SYSDBA credentials. You can verify this from SQL*Plus by issuing the following connect statement:

```
connect sys/sys_password@TNS_NAME_OF_DB as sysdba;
```

In a standard database installation, the preceding connect statement works because REMOTE_LOGIN_PASSWORDFILE=EXCLUSIVE and the default password file is created by the installation process.

If your database is configured with

REMOTE_LOGIN_PASSWORDFILE=NONE, then the following statement fails:

```
connect sys/sys_password@TNS_NAME_OF_DB as sysdba;
```

In this case, you have two options.

Action: Reconfigure your database with

REMOTE_LOGIN_PASSWORDFILE=EXCLUSIVE and create a password file if none exists.

Action: If the preceding is not an option, then reconfigure your database with

O7_DICTIONARY_ACCESSIBILITY=TRUE. With this setting, the statement

connect sys/*sys_password*@*TNS_NAME_OF_DB* enables the Warehouse Builder Assistants to connect to SYS user.

Regional Name and Address Data Libraries Are Not Available.

Cause: The Name and Address regional data libraries may not have been installed in the correct location.

Action: Ensure that you have successfully extracted regional data to the NAS_DATA directory.

1. From the OWB_ORACLE_HOME, start the Name and Address Server:

   For Windows: Run owb\bin\win32\NAStart.bat.

   For UNIX: Run owb/bin/unix/NASTART.sh.

2. Open the log file: owb\bin\admin\NASvr.log.

   The log contains a list of installed countries.

   If there is no such list, then verify that you have extracted the regional library data to the correct location. If you have extracted the data to the wrong location, then you can either reinstall the data, or modify the owb\bin\admin\NameAddr.properties file to indicate the correct file path. If you modify the NameAddr.properties file, then stop and restart the Name and Address Server as follows:

   For Windows: Start the server by running owb\bin\win32\NAStart.bat. Stop the server by running owb\bin\win32\NAStop.bat.

   For UNIX: Start the server by running owb/bin/unix/NAStart.sh. Stop the server by running owb/bin/unix/NAStop.sh.

3. Once you have verified the installation, you can stop the Name and Address Server if you want, because it is automatically started at the execution of any mapping that employs the Name and Address operator.

Lineage and impact analysis reports: Extensive tablespace requirements for materialized views.

The first time you refresh a materialized view, it is populated from the Oracle Warehouse Builder repository. The materialized view can occupy up to twice the amount of space allocated to the entire Warehouse Builder repository.

Cause: Insufficient space has been allocated to the Warehouse Builder repository schema.

Action: If the Warehouse Builder repository schema is created in a tablespace that is dedicated to its use, these issues are easier to monitor. Ensure that sufficient free space exists on the physical drive for tablespace expansion. Within Oracle Enterprise Manager, ensure that the tablespace is set to `Autoextend On`.

Note: To grant permission to an OWB repository user to use Enterprise Manager for performing tasks, enter the following command in SQL*Plus: `GRANT SELECT any dictionary to "&OWB repository user";`

Java out of memory error occurs during a batch operation.

Operations requiring large amounts of memory can result in a Java out of memory error, if the system resources (such as virtual memory) are constrained.

Cause: There is not enough virtual memory. The Warehouse Builder client runs with a maximum heap size, as defined by the `-mx` parameter in the `owbclient.bat` file. The `-Dlimit` parameter in the `owbclient.bat` file specifies the memory threshold (80% of Dlimit) at which the Warehouse Builder memory manager begins to assist Java garbage collection. If you change the `-mx` parameter value, set the `-Dlimit` parameter to the same value, or at least to 90% of the value. Note that setting the `-Dlimit` to a low value can have a negative impact on the performance of Warehouse Builder.

Action: Increase the `-Dlimit` parameter in Warehouse Builder as follows:

1. Exit Warehouse Builder.
2. Open this file in a text editor:

   For Windows: Open the `$OWBHOME\bin\win32\ombplus.bat`.

   For UNIX: Open the `$OWBHOME\bin\win32\owbclient.sh`.
3. Change the `-Dlimit` parameter to 334.
4. Save and close the file.
5. Restart Warehouse Builder.

ORA-01925: Maximum of 30 enabled roles exceeded

This error occurs when installing a repository or a target schema.

Cause: The maximum number of enabled roles in the database has been exceeded. When you create a repository or a target schema, new roles are created in the database assigned to the schema in question. When the number of roles exceeds the value of the `MAX_ENABLED_ROLES` parameter, this error occurs.

Action: Increase the value of the `MAX_ENABLED_ROLES` parameter in the `init.ora` file. When you deinstall a repository or a target schema, delete the associated roles as well.

INS0009: Unable to connect to the database. Verify the connect information.

This error occurs when you try to connect to a database.

Cause: See the cause for ORA-12514: TNS: listener could not resolve SERVICE_NAME given in connect descriptor.

Action: Follow the instructions for ORA-12514: TNS: listener could not resolve SERVICE_NAME given in connect descriptor.

INS0022: A spawned program error.

Cause: This error message can result from a server issue when installing Warehouse Builder runtime components on an HP-UX operating system.

Action: To identify the server issue, complete the following steps:

1. From SQL*Plus, connect to a `SYS` user.

```
Create user test_lj identified by test_lj;
Grant connect, resource to test_lj;
```

2. Create *`OWB_ORACLE_HOME`*`/owb/bin/unix/test.sh` with the following contents:

```
../unix/loadjava -thin -verbose -order -resolve -user
'test_lj/test_
lj@(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=hpdgpa3)(PORT=1522))(CONNECT_
DATA=(SERVICE_NAME=dgpadw)))'
../../lib/int/rtpserver.jar
```

3. Change directory to *`OWB_ORACLE_HOME`*`/owb/bin/unix/`.
4. Run `test.sh`.

ORA-12154: TNS: Could not resolve service name.

This error occurs when you try to connect to a database.

Cause: You defined a Warehouse Builder location and specified connection information using Oracle Net Services. However, the required TNS name is not accessible.

Action: To set up a TNS name for use during deployment in general and for execution of mappings and process flows, the TNS name needs to be accessible from the OWB_ORACLE_HOME being used to run the control center service. To ensure access, run the Net Configuration Assistant from the OWB_ORACLE_HOME and then restart the control center service.

To set up a TNS name for use by database links, the TNS name needs to be accessible from the database server home. To ensure access, run the Net Configuration Assistant from the database server home.

Cause: See the cause for ORA-12514: TNS: listener could not resolve SERVICE_NAME given in connect descriptor.

Action: Follow the instructions for ORA-12514: TNS: listener could not resolve SERVICE_NAME given in connect descriptor.

ORA-12514: TNS: listener could not resolve SERVICE_NAME given in connect descriptor.

This error occurs when you try to connect to a database.

Cause: If you used Oracle Net Easy Configuration or Oracle Net Assistant to create the Net Service Name entry, and you used the default option (Service Name) on the newly created Net Service Name, then the parameter `SERVICE_NAME` is added to the `TNSNAMES.ORA` as a subclause to the `CONNECT_DATA` section in the Net Service Name entry. This replaces the `(SID=SIDname)` subclause in previous releases of the database, for example, Oracle Database8*i* (8.1.x).

Action: Implement the `TNSNAMES.ORA` file as follows:

1. Use the GLOBAL_DBNAME parameter in the LISTENER.ORA for each SID to identify as a separate service. Use the value of this parameter as the value of the SERVICE_NAME parameter. You need to activate any changes that you make to LISTENER.ORA for this purpose by stopping and restarting the listener process.
2. Use the values of the parameters that exist in the INIT.ORA, namely SERVICE_NAMES and DB_DOMAIN, to determine the value of the SERVICE_NAME that you must use in TNSNAMES.ORA. The valid construction of this value is SERVICE_NAMES.DB_DOMAIN with the period separating the two INIT.ORA values. If your SERVICE_NAMES is BIKES and your DB_DOMAIN is COM, then your SERVICE_NAME is BIKES.COM.
3. If there is no DB_DOMAIN parameter set in your INIT.ORA, or if there is no GLOBAL_DBNAME in the LISTENER.ORA, then you can use the SERVICE_NAMES from the INIT.ORA in your TNSNAMES.ORA for the SERVICE_NAME parameter.

   For example, if INIT.ORA contains SERVICE_NAMES = "TEST817" and db_domain is not set, then the TNSNAMES.ORA entry is: CONNECT_DATA =(SERVICE_NAME = "TEST817")).
4. If you have multiple values specified in the SERVICE_NAMES parameter in the init.ora, then you can use one of them. If SERVICE_NAMES is not set, then you can use DB_NAME.DB_DOMAIN parameters from the INIT.ORA file.
5. If SERVICE_NAMES and DB_DOMAIN is not set in the INIT.ORA and there is no GLOBAL_DBNAME in the LISTENER.ORA, then your SERVICE_NAME in TNSNAMES.ORA file is DB_NAME.

PL/SQL: ORA-04052: Error occurred when looking up remote object

This error occurs when you have upgraded to <Oracle Database version> and are trying to redeploy mappings without first redeploying connectors.

Cause: While upgrading the Oracle Database, you moved your database to a new computer. Your old and new database instances do not have the same domain name. You can verify the cause by logging in to SQL*Plus as a SYS user and entering the following command: SELECT * FROM GLOBAL_NAME; If the Global Name of the old database does not match that of the new database, then a domain mismatch is causing this error.

Action: Either add the domain name to the Global Name in your new database by issuing a command similar to the following statement: ALTER DATABASE RENAME GLOBAL_NAME TO *xxx10G.US.ORACLE.COM*; or redeploy your connectors.

Refer to *Oracle Warehouse Builder User's Guide* for information on deploying connectors.

IMP-00003: ORACLE error 30371 encountered

ORA-30371: column cannot define a level in more than one dimension

This error occurred when you were importing your target schema during migration.

Cause: The Warehouse Builder target schema is created with the select_catalog_role privilege. If you have the same dimension object defined in multiple Warehouse Builder target schemas, then Oracle Export creates duplicates in the export file, and this error occurs when you import.

Action: Connect as a SYS user to the existing version of the Oracle Database from which you exported the target schemas. Enter the following statement in

SQL*Plus: revoke select_catalog_role from *OLD_Target_Schema*;

Export the target schema into an Oracle .DMP file again, and then import the file into the Oracle Database.

Unable to connect to SQL*Plus in <Oracle Database version>

Cause: Your Oracle home or Path is not set correctly, or your Net Service Names are not configured.

Action: Ensure your Oracle home and Path are set correctly, and your Net Service Names are configured in the Oracle Database.

- Ensure that `ORACLE_HOME` and `PATH` are set correctly. Your Oracle home directory must to point to the *`OWB_ORACLE_HOME`*. Set your `PATH` variable to include the `OWB_ORACLE_HOME\bin` directory before any other Oracle products.
- Ensure that the `TNSNames.ora` file is configured correctly:

  For Windows: From the Oracle Database program group, start **Net Configuration Assistant** and select **Local Net Service Name Configuration** to configure `TNSNames.ora`.

  For UNIX: Set `ORACLE_HOME` and `PATH` to the *`OWB_ORACLE_HOME`* for Warehouse Builder 11*g* Release 1 (11.1), then run *`OWB_ORACLE_HOME`*`/bin/netca` to start **Net Configuration Assistant**. Select **Local Net Service Name Configuration** to configure `TNSNames.ora`.

ORA-04020 deadlock detected while trying to lock object or ORA-04021 timeout occurred while waiting to lock object

When creating runtime objects, the Runtime Assistant halts and produces these errors in the error log when trying to lock `sys.dbms_aq`.

Cause: User sessions may be pinning Advanced Queue objects.

Action: First, log in to SQL*Plus as a `SYS` user and run a query to identify which user sessions are pinning the Advanced Queue packages, using the following query as an example:

```
column s.sid format a5;

column s.serial# format a8;

column s.username format a10;

column objectname format a10;

select distinct

 s.sid,

 s.serial#,

  s.username,

  x.kglnaobj as objectname

from

  dba_kgllock l,

  v$session s,

  x$kgllk x

where

  l.kgllktype = 'Pin' and

  s.saddr = l.kgllkuse and

  s.saddr = x.kgllkuse and

x.kglnaobj in ('DBMS_AQ', 'DBMS_AQADM');
```

The following is an example of the output you receive:

```
SID    SERIAL# USERNAME  OBJECTNAME

---    ------- --------  ----------

9      29623  RTU_4942   DBMS_AQ
```

Noting the SID and Serial Number, issue the following command to stop the user sessions:

```
ALTER SYSTEM KILL SESSION 'SIDNoted, SerialNumberNoted';
```

For example, enter the following command to stop the session listed in the sample output for this error:

```
ALTER SYSTEM KILL SESSION '9,29623';
```

ORA-04088: error during execution of trigger 'DVSYS.DV_BEFORE_DDL_TRG'

Cause: When you attempt to create a Warehouse Builder repository on an Oracle Database that includes the Database Vault option, you may encounter an error such as ORA-04088.

Action: Disable the triggers DV_BEFORE_DDL_TRG and DV_AFTER_DDL_TRG.

Import wizard throws error ORA-00997 when importing a table.

Cause: When you import table definitions from an Oracle Database, you may encounter an error such as "Repository Error Message: ORA-00997: illegal use of LONG datatype...". This occurs when the CURSOR_SHARING parameter is set to FORCE or SIMILAR.

Action: Set the database parameter CURSOR_SHARING to EXACT.

DPF-0029: Source <Table_Name> must have less than 165 attributes

Cause: Creating data profiling on a table having more than 165 columns.

Action: Decrease the number of columns on the table. This is a data profiling restriction.

6.4 Troubleshooting Installation Problems That Do Not Display Error Messages

This section includes causes and actions for the following installation problems:

- Oracle Warehouse Builder Clients that Previously Launched Now Momentarily Display the Splash Screen and Fail to Start
- Newly Installed Oracle Warehouse Builder Clients Fail to Start and Previously Launched Oracle Products Fail to Start
- A Oracle Warehouse Builder Client Freezes or Hangs

Causes and Actions

Oracle Warehouse Builder Clients that Previously Launched Now Momentarily Display the Splash Screen and Fail to Start

Cause: If you attempt to start a Warehouse Builder client such as the Design Center and the splash screen displays momentarily but the client fails to start, you

may have overwritten required java objects during the subsequent installation of another software product.

If the client is installed on Windows and you launched the client from the Start menu, you may not see any error messages.

Action: Manually start the client by typing at the DOS prompt `run OWB_ORACLE_HOME\owb\owbclient.bat`. You are likely to encounter an error message such as No fonts were found in '<drive>:\Program Files\ Qarbon\viewlet Builder3jre\lib\fonts' on page 6-6.

Newly Installed Oracle Warehouse Builder Clients Fail to Start and Previously Launched Oracle Products Fail to Start

Cause: After installing Warehouse Builder software, an error in the path variable can prevent you from launching Warehouse Builder clients and other Oracle products that previously launched without problems.

Action: Verify the that the path for OWB_ORACLE_HOME`\bin` is listed correctly in the Environmental Variables.

A Oracle Warehouse Builder Client Freezes or Hangs

Cause: Client software may freeze or hang due to various causes.

Action: If a Warehouse Builder client appears to freeze or hang, perform a stack trace as follows:

1. At the DOS command prompt, enter:

   `cd` *`OWB_ORACLE_HOME`*`\owb\bin\win32\`

2. Run `owbclient.bat`.

3. When the program hangs, press **Ctrl**+**Break**.

   This produces the thread-dump. Contact Oracle Support and provide them with this information to help identify the problem.

6.5 Checking Java Virtual Machine (JVM)

To check, verify, or reinstall the Java Virtual Machine (JVM) server in the database, refer to My Oracle Support (formerly Oracle *MetaLink)*:

1. In your Web browser, go to: `https://support.oracle.com`.

2. Log in to My Oracle Support (formerly Oracle*MetaLink)*, or register as a new user.

3. Enter the following terms into the Search field, separating each term by semicolons):

   `INITJVM.SQL; INSTALL; JAVAVM; JVM; VERIFY; SERVER; INSTALL; CLEANUP`

4. Press **Enter**.

This search returns the cleanup notes for the JVM. The number of available documents frequently changes because Oracle Support creates, merges, and deletes various cleanup notes. This string of search words returns the most current and pertinent documents.

6.6 Generating Log Files for a Specific Warehouse Builder Component

If Warehouse Builder is producing errors or exhibiting other unexpected results, additional error logging can help you and Oracle Support identify the cause.

For additional error logging:

1. At the command prompt, navigate to:

   For Windows: *OWB_ORACLE_HOME*\owb\bin\win32

   For UNIX: *OWB_ORACLE_HOME*/owb/bin/unix

2. Run one of the execution files as listed in Table 1–9 on page 1-19 and pipe the output to a log file.

   For example, enter: `owbclient.bat 1>out.log 2>error.log`

3. Examine the resulting log file.

   Use this log when contacting Oracle Support.

Part II

Administering Oracle Warehouse Builder

This part contains the following chapters:

7

Implementing Security in Warehouse Builder

This chapter includes:

7.1 About Metadata Security

Warehouse Builder enables you to define security on the metadata you store in the design repository. The design repository is an Oracle Database with users, roles, and access privileges already defined. Warehouse Builder metadata security operates in addition to the Oracle Database security. The Oracle Database provides security for data while Warehouse Builder provides security for the metadata.

In addition to being registered in the repository, all users must also be database users in the design repository database. Database users have access to the data in the database by using SQL Plus. However, they do not have access to Warehouse Builder and its metadata unless the users are also registered in Warehouse Builder.

Metadata security is optional and flexible. You can apply no metadata security controls or define a metadata security policy. You can define multiple users and apply full security. Or implement your own security strategy based on the security interface. Also, after you define a security strategy, you can later adapt the strategy to be more or less restrictive.

The following sections describe how to implement metadata security using the Design Center.

You can also implement security through OMB Plus. For more information, refer to the Oracle Warehouse Builder API and Scripting Reference.

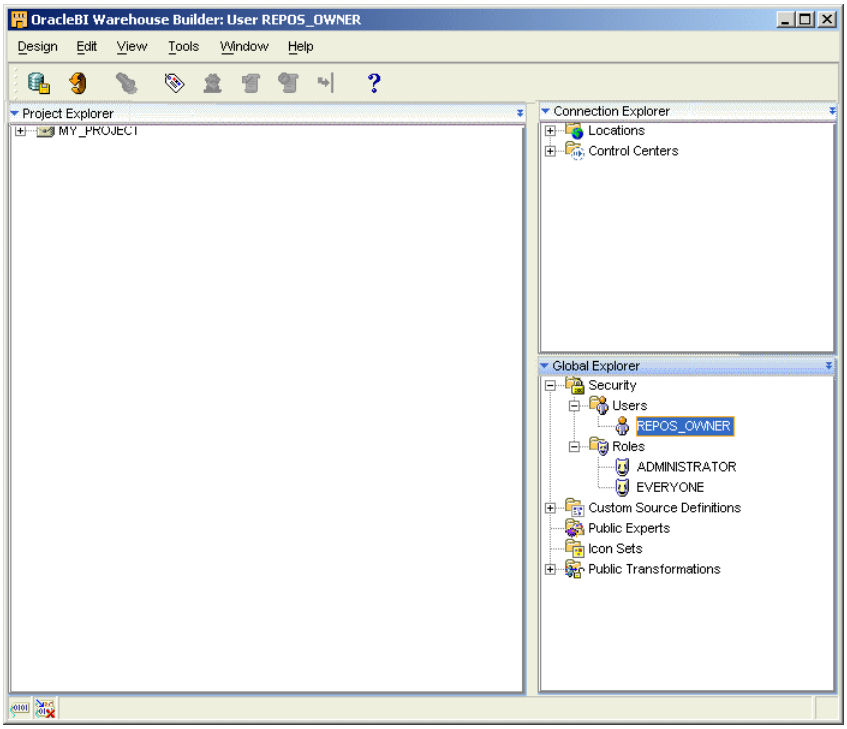
7.1.1 About the Security Interface

Only users with administrative privileges can access the security interface and change security policy in Warehouse Builder.

When you install Warehouse Builder and then use the Repository Assistant to create a design repository, Warehouse Builder assigns the design repository owner you define to be the default administrator. The first time you start the Design Center after installation, you must log in as the design repository owner. You can then define additional administrators or other users as necessary.

Log in to the Warehouse Builder Design Center as the design repository owner and Warehouse Builder displays the Global Explorer as shown in Figure 7–1, "Global Explorer" in the lower right corner of the Design Center.

Figure 7–1 Global Explorer



Under the security node, notice there are two predefined roles, ADMINISTRATOR and EVERYONE. The one predefined user is the design repository owner, *REPOS_OWNER* in this example, which is assigned the ADMINISTRATOR role by default.

To perform actions under the Security node, select an object and right-click to view all of the possible operations. Or select an object and select **Edit** from the menu bar. For a complete list of all the tasks administrators can perform, see "Administrator Role" on page 7-9.

7.2 Metadata Security Strategies

Warehouse Builder enables you to design a metadata security strategy that fits your implementation requirements. As you define your metadata security strategy, recognize that more restrictive policies are more time consuming to implement and maintain.

Consider modeling your strategy based on one of the following security strategies:

- Minimal Metadata Security Strategy (Default)
- Multiuser Security Strategy
- Full Metadata Security Strategy

7.2.1 Minimal Metadata Security Strategy (Default)

Minimal metadata security is the default security policy when you create a new design repository. As your project requirements change, you can apply other metadata security strategies at any time.

You may not want or need to apply extra metadata security if, for instance, you are implementing a pilot project or anticipate only one or a few users accessing Warehouse Builder.

All users log in to Warehouse Builder with the same user name and password— that of the design repository owner. In this case, Oracle Database security policies keep the data in the design repository secure and the metadata is available to anyone who knows the design repository owner logon information. All users can create, edit, and delete all objects and you cannot discern which user performed which operation.

7.2.2 Multiuser Security Strategy

Use this strategy if your implementation has multiple users and you want to track who performs which operations. Also, use this strategy to restrict to a single user the rights and access granted to the design repository owner. Although this strategy does not restrict user access to metadata objects, you can apply restrictions at a later date.

To implement security for multiple users, log on to Warehouse Builder as an administrator and complete the instructions in the following sections:

1. Registering Database Users on page 7-4
2. Editing User Profiles on page 7-6

7.2.3 Full Metadata Security Strategy

This section describes a process for applying all the metadata security options available in Warehouse Builder. You can enable all or some of these options. For instance, you could take steps one through three but ignore the remaining steps.

To implement full metadata security for multiple users, log on to Warehouse Builder as an administrator and complete the instructions in the following sections:

1. Set the parameter **Default Metadata Security Policy** to maximum.

   In the Design Center select **Tools, Preferences,** and then **Security Parameters.**
2. Registering Database Users on page 7-4
3. Editing User Profiles on page 7-6

   The **Default Metadata Security Policy** you set in step one of these instructions is not retroactive. It applies only to users you register after changing the setting. You must manually edit the profiles of preexisting users.
4. Defining Security Roles on page 7-9
5. Editing User Profiles on page 7-6
6. Applying Security Properties on Specific Metadata Objects on page 7-11

Important Note: Be sure to edit the security properties for all projects in the Project Explorer. By default, the EVERYONE role has its object privileges set to full control. Select each project, press `F2`, select the Security tab, and edit the privileges to the EVERYONE role to be more restrictive.

7.3 Registering Database Users

All Warehouse Builder users must also be Oracle Database users.

Use a wizard within Warehouse Builder to either register existing database users or create new database users and then register them in Warehouse Builder.

Note: Although, you are able to create users in SQL Plus, it is not advisable. Creating users through the Warehouse Builder interface ensures that users are assigned the necessary roles and privileges.

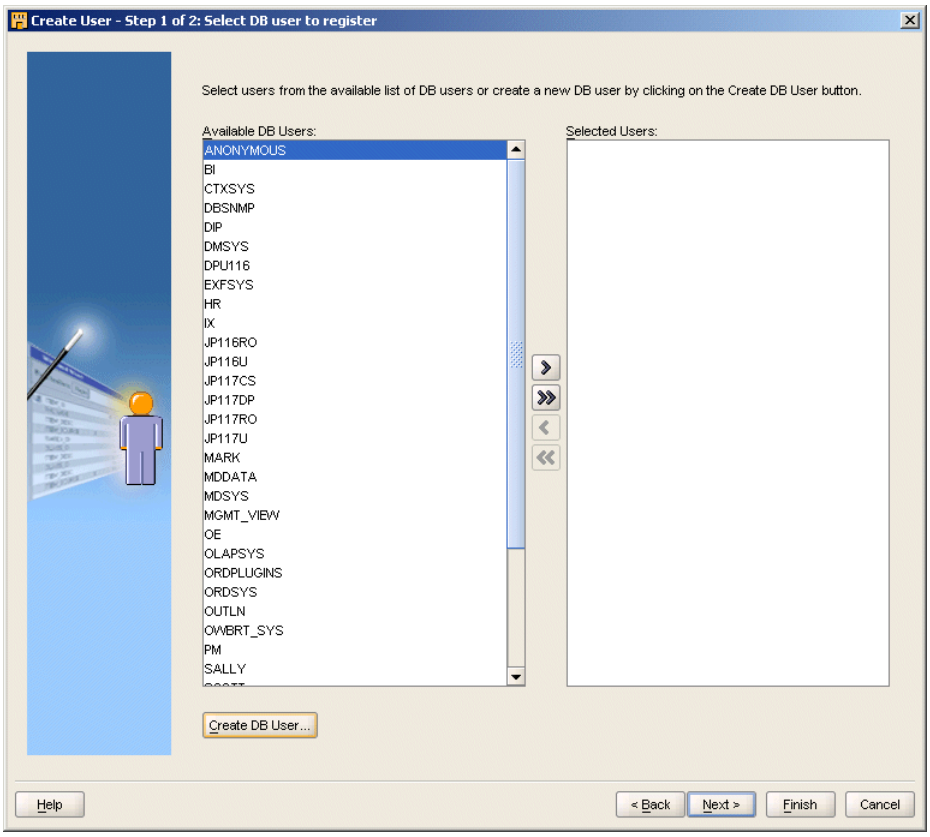
To start the registration wizard, go to the Security node in the Global Explorer, right-click **Users** and select **New.** Follow the prompts in the wizard as described in "Selecting Existing or Creating New Database Users" on page 7-4.

7.3.1 Selecting Existing or Creating New Database Users

The left panel in Figure 7–2 lists the Oracle Database users defined for the design repository. Either select existing database users from the list or define and register a new user by clicking on **Create DB User...** located in the lower left corner.

When selecting from the list, you can select one or more database users. Notice that, for security reasons, you cannot register database administrator users such as SYS. The database default role settings must not be set to ALL. You can change the database default role settings from within the wizard as described in "Changing Database Default Roles" on page 7-5.

Figure 7–2 Creating and Registering Users



7.3.1.1 Creating an Oracle Database User

If you have database system privilege CREATE USER, then you can create new database users. The **Create Database User** dialog prompts you to type a user name and password for the new user and assign the default table space and temporary table space.

To specify a valid user name and password, adhere to the security standard implemented on the Oracle Database. The default minimum requirement is that both the user name and password be a VARCHAR(30). Also, do not include any special characters. Your database may have more requirements if a password complexity verification routine was applied.

For more information about user names, passwords, and password complexity verification routines, refer to *Oracle Database Security Guide*.

7.3.1.2 Changing Database Default Roles

For security reasons, you cannot register database users that have default roles in the database set to ALL. You can, however, change the default setting. Correct the role assignment by selecting Fix Now. Or you can correct the role assignment yourself by selecting Fix Later.

Fix Now

If you select **Fix Now,** type the user name and password with SYSDBA privileges. The product registers the user and issues the necessary commands to the database. For example, when you register new users, the database role `OWB_repository name` is assigned to each user. For security reasons, this role must not be the default role of any

registered user. If you attempt to register a user U1 under these conditions and then select **Fix Now,** then the product registers the new user and issues a command such as the following:

alter user U1 default role all except OWB_*repository_name*

Fix Later

If you select **Fix Later,** then the product does not register the user. You must manually change the default role setting in the database and then return to the product to register the user. To manually change the setting, connect to the database as a user with the ALTER USER system privilege and issue the required commands.

Under the Fix Later option, notice a recommended SQL script for changing the default roles for the selected users. The script also changes the default role setting such that any role subsequently granted to the user cannot be the default role of the user. To change this, you can register the user and then issue a command such as the following:

alter user U1 default role all except OWB_*repository_name*

7.4 Editing User Profiles

For each user, you can enter an optional description, assign the user to existing Roles, specify the Default Object Privilege and the System Privileges.

Because these users are also defined as Oracle Database users, you cannot rename a user from within this product. Rename users through the Oracle Database.

7.4.1 Roles

You can assign a user to one or more roles. If you assign multiple roles with conflicting privileges, then the user is granted the more permissive privilege, which is the union of all the privileges granted to the multiple roles. For example, if you assign to the same user a role that allows creating a snapshot and a role that restricts it, then the user is allowed to create snapshots.

If you want to assign a user to a role that does not display on the Available Roles List, close the editor, create the new role, and then edit the user account. To create a new role, right-click Roles under the Security node in the Global Explorer and select **New.** For information on creating and editing roles, see Defining Security Roles on page 7-9 and Editing Role Profiles on page 7-10.

7.4.2 Default Object Privilege

Default object privileges define the access other users and roles have to objects the selected user creates. These privileges do not impact the privileges the user has for accessing objects that others create.

For example, Figure 7–3, "Default Object Privilege Settings for USER1" shows that for all objects that USER1 creates, USER1 and the ADMINISTRATOR and DEVELOPMENT roles have full access while the EVERYONE, PRODUCTION, and QA roles are restricted to read only.

If you are familiar with UNIX operating system security, then note that the default object privilege behaves similarly to the UMASK command. When you edit the default object privilege, the change only effects objects the user subsequently creates. There is no effect on previously created objects. Therefore, if you set default object privileges at the onset, then little or no additional object-level security setup is necessary.

To define the privileges other users have to objects the selected user creates, check the appropriate box for each role or user. You can grant the following privileges: FULL CONTROL, EDIT, COMPILE, and READ. All the privileges are additive. If you select COMPILE, then you apply both the compile and read privileges.

Figure 7–3 Default Object Privilege Settings for USER1

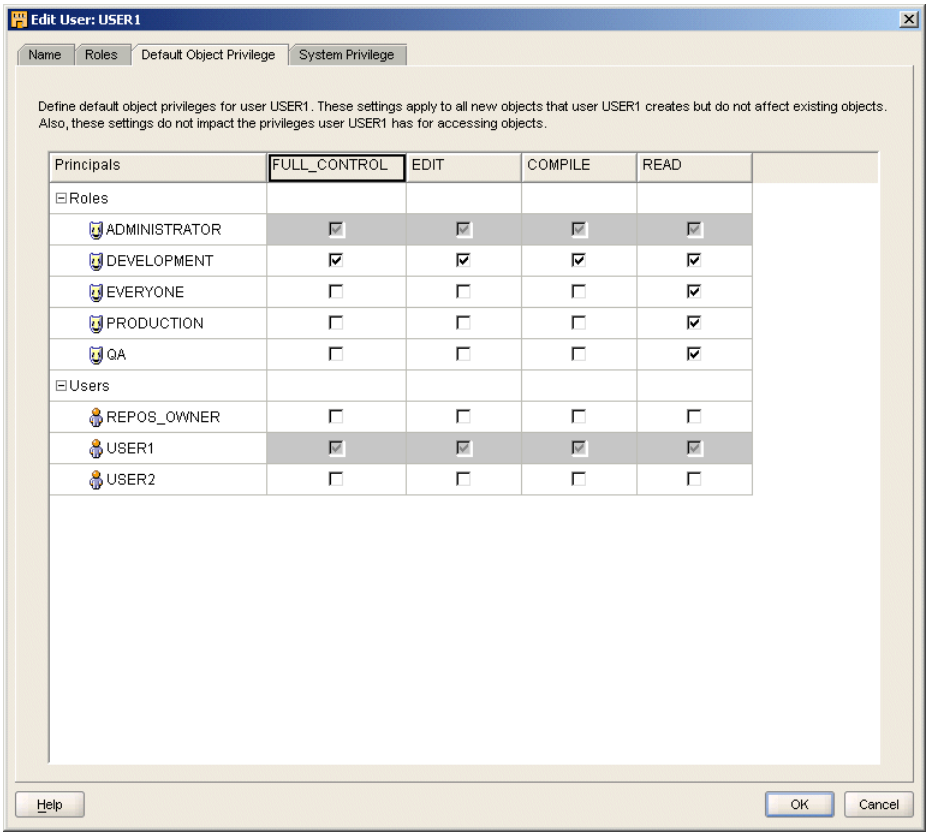


Figure 7–3, "Default Object Privilege Settings for USER1" shows access granted to roles. You can also grant access to individual users. However, when you grant access to a role, the privilege is also extended to all users in that role. Therefore, in Figure 7–3, even though USER2 is not specifically granted access, USER2 has read access through the EVERYONE role. Furthermore, if USER2 is a member of the DEVELOPMENT role, then that user has full control and access.

Important: By default, when you create a new user, the EVERYONE role has full control on all objects. To enable metadata security, be sure to edit all user profiles and restrict the access the EVERYONE role has to objects each user creates.

Securing a Metadata Object Throughout its Lifecycle

Default object privileges work in conjunction with object security properties to provide security options throughout the lifecycle of a given metadata object. Settings you specify on the Default Object Privilege tab persist until a qualified user overrides the restrictions on an object by object basis.

Assume that USER1 creates several mappings. When USER1 designs and develops those objects, the security policy shown in Figure 7–3 may be desirable. However,

assume that USER1 completes the work on mappings and wants to release the objects to the quality assurance team for testing. The default object privilege therefore becomes too restrictive. To extend access to the QA role, USER1 can navigate to the mapping, right click, select Properties, and select the Security tab. For more details on overriding the default security on an object by object basis, see "Applying Security Properties on Specific Metadata Objects" on page 7-11.

7.4.2.1 Object Privileges

Object privileges apply to all metadata objects in the repository including projects, modules, and collections.

FULL CONTROL

Full control includes all the other privileges plus the ability to grant and revoke privileges on an object. Only users with full control over an object can override default security on an object-by-object basis as described in "Applying Security Properties on Specific Metadata Objects" on page 7-11.

EDIT

The edit privilege includes the compile, and read privileges. Additionally, edit allows users to delete, rename, and modify an object.

COMPILE

The compile privilege includes the read privilege and enables you to validate and generate an object.

READ

The read privilege enables you to view an object.

7.4.3 System Privileges

System privileges define user access to workspace-wide services. Use the System Privilege tab to allow or restrict users and roles from performing administrative tasks. You can control access to the following operations:

- **ACCESS_PUBLICVIEW_BROWSER:** Allows users to access the Repository Browser.
- **CREATE_EXTENSIONMODEL:** Allows users to create new object types in the workspace.
- **CREATE_PROJECT:** Allows users to create projects, which administrators create projects as a means of organizing metadata objects.
- **CREATE_SNAPSHOT:** Allows users to create snapshots which administrators use when backing up workspaces.
- **CONTROL_CENTER_DEPLOYMENT:** Allows users to deploy to the Control Center and then run those procedures. For security reasons, you can enable this privilege only on a user by user basis; that is, you cannot extend this privilege to roles.
- **CONTROL_CENTER_EXECUTION:** Allows users to run procedures from the Control Center. For security reasons, you can enable this privilege only on a user by user basis; that is, you cannot extend this privilege to roles.

- **CONTROL_CENTER_VIEW:** Allows users to view procedures from the Control Center. For security reasons, you can enable this privilege only on a user by user basis; that is, you cannot extend this privilege to roles.

7.5 Support for a Multiple-user Environment

Warehouse Builder enables multiple users to access the same Warehouse Builder repository at the same time by managing read/write privileges. Only one user is given write privileges to an object at any given time. All other users can have read-only access. If a user has write access to an object, Warehouse Builder maintains a lock on the object while the object editor is open. If no changes were made to the object, then the lock is released as soon as the object editor is closed. If changes were made, then the lock is maintained until the user closes all editors associated with the object and either saves the changes or reverts to the last saved version. Other users cannot delete an object while it is in use.

7.5.1 Read/Write Mode

Whenever you open an editor, property sheet, or dialog box, you access objects in read/write mode by default. Your changes are available to other users only after you save them to the repository.

7.5.2 Read-Only Mode

If you attempt to open an object locked by another user, then Warehouse Builder displays a message that prompts you either to cancel the request or access the object in read-only mode. If you choose to continue in read-only mode, then the editor displays `Read only` in the title bar.

The user who is editing an object in read/write mode may save his or her changes while you have the object open in read-only mode. To update your view with the repository, click the Refresh button on the toolbar.

7.6 Defining Security Roles

You can use roles to represent groups of users with similar responsibilities and privileges. Unlike users which are also database users, these roles are not database roles. These roles are purely design constructs for implementing security within the product.

Roles enable you to more efficiently manage privileges because it is more efficient to grant or restrict privileges to a single role rather than multiple users.

The Everyone Role and the Administrator Role are predefined roles. You edit the privileges but cannot delete or rename the predefined roles.

7.6.1 Everyone Role

Use this role to easily manage privileges for all users. When you register new users, Warehouse Builder assigns those users to the Everyone role.

7.6.2 Administrator Role

Administrators in Warehouse Builder can perform the security tasks described in Table 7–1.

Table 7–1 Administrator Security Tasks

Task	Instructions
Registering Database Users	From the Global Explorer, right-click **Users** and select **New.**
Editing User Profiles	When you register a user, Warehouse Builder assigns the user to the everyone role and grants access to metadata objects based on that role. To change a user profile, right-click the user and select **Open Editor.**
Changing User Passwords	You cannot change user passwords from within Warehouse Builder. Change passwords directly in the Oracle Database as described in Oracle® Database Security Guide.
Defining Security Roles	Warehouse Builder provides two roles, the administrator role and the everyone role. Define additional roles by right-clicking on **Roles** in the Global Explorer and selecting **New.**
Editing Role Profiles	Right-click a role and select **Open Editor.** You can add and remove users and change the system privileges for the role.
Deleting Users and Roles	From the Global Explorer, right-click a user or a role and select **Delete.** You can delete all Warehouse Builder users expect for the design repository owner. Deleting the user from Warehouse Builder does not delete or alter the user account on the Oracle Database. You can delete all roles expect the predefined ADMINISTRATOR and EVERYONE roles. Warehouse Builder roles and database roles are separate constructs. Therefore deleting a Warehouse Builder has no effect on the database.
Renaming Roles	From the Global Explorer, right-click a role and select **Rename.** You can rename all roles expect the predefined administrator and everyone roles.
Applying Security Properties on Specific Metadata Objects	Right-click any metadata object in any of the three explorers on the Design Center, select **Properties,** and select the Security Tab. Or select any metadata object, press `F2`, and then select the Security tab.

7.7 Editing Role Profiles

For each role that you create, you can edit the name, enter an optional description, assign the role to existing Users, and specify the system privilege. System privileges for roles behave the same as they do for users. For more information on system privilege, see System Privileges on page 7-8.

You cannot rename or edit the descriptions for the predefined roles Everyone and Administrator.

7.7.1 Users

You can assign multiple users to a role. If you want to assign a user that does not display on the Available Users list, then close the editor, create the user from the Security node in the Global Explorer, and then edit the role. To create a new user, right-click **Users** from the Security node and select **New.** For information on creating and editing users, see Registering Database Users on page 7-4 and Editing User Profiles on page 7-6.

7.8 Applying Security Properties on Specific Metadata Objects

You can grant or restrict access to metadata objects on an object-by-object basis.

View the Security Tab by right-clicking on any metadata object and selecting Properties.

7.8.1 Security Tab

Use the Security tab to define metadata security on an object-by-object basis. Only users that have full control privileges on an object can change the metadata access controls on the Security tab. Security properties are important in managing the lifecycle of your projects, as described in "Example: Using Security Properties to Freeze a Project Design" on page 7-11.

While the Default Object Privilege defines metadata security for objects a specific user creates, the Security tab overrides that metadata security policy on an object-by-object basis. Assume that USER1 is a developer that creates mappings and process flows. If you want all objects created by USER1 available to another developer, then use the Default Object Privilege. However, if you want to make only a few objects created by USER1 available to the QA group, then locate each object in the Design Center and use the Security tab.

Important: To enforce a full metadata strategy, edit the security properties for all projects in the Project Explorer. By default, the EVERYONE role has its object privileges set to full control. Change the EVERYONE role privilege to be more restrictive and select **Propagate** to apply the changes to all children.

Propagating Security Properties to Dependent Objects

You can apply security properties to an object and all its children by selecting Propagate on the Security tab. This option is disabled when you select an object that cannot have dependent objects.

7.8.1.1 Example: Using Security Properties to Freeze a Project Design

When users complete the design of a project, you may want to freeze the contents of the project. Once you complete the following steps, only administrators can change the objects in the project.

To freeze a project design:

1. Log on as an administrator.
2. In the Project Explorer, right-click the project node and select **Properties.**
3. On the Security tab, restrict the privileges for all user and roles other than the administrators as appropriate.
4. Click the **Propagate** button.

7.9 Security Enforcement

When any user attempts to perform an operation in Warehouse Builder, Warehouse Builder first verifies that the user has the required privileges to perform the operation. Table 7–2 lists the privileges required to run operations in Warehouse Builder.

Table 7–2 Privileges Required for the Execution of Operations

Warehouse Builder Operation	Security Check
Configure	User must have EDIT privilege on objects to be configured.
Copy	User must have READ privilege on the object to be copied.
Create object	User must have EDIT privilege on parent. For example, to create a mapping you must have Edit privilege on the module.
Cut	User must have EDIT privilege on the object to be cut.
Delete	User must have EDIT privilege on the object to be deleted.
Deploy	No security check is necessary on the Deploy operation because Warehouse Builder checks the previous Generate operation.
Edit	User must have EDIT privilege on the object to be edited.
Export	User must have READ privilege on objects to be exported. Administrative users can export security information such as roles, users, and privileges when Export security information is enabled.
Generate	User must have COMPILE privilege on object to be generated.
Import	User must have EDIT privilege on objects to be exported. Administrative users can import security information such as roles, users, and privileges when Import security information is enabled.
Move	User must have privileges listed for the Cut and Paste operations.
Paste	User must have EDIT privilege on the parent to receive the copied object.
Rename	User must have EDIT privilege on the object to be renamed.
Snapshot: compare snapshots	To compare with another snapshot or other repository object, user must have READ privilege on that snapshot and the snapshot or other repository object.
Snapshot: restore snapshot	To restore an object based on a snapshot, a user must have READ privilege on that object. To restore a folder, a user must have EDIT privilege on the folder and all of its children.
Snapshot: take snapshot	User must have the CREATE_SNAPSHOT system privilege to create snapshots.
Source import	User must have EDIT privilege on objects to be replaced by imported objects.
Synchronize inbound	User must have READ privilege on the object in the repository and EDIT privilege on the object in the editor.
Synchronize outbound	User must have EDIT privilege on the object in the repository.
Validate	User must have COMPILE privilege on object to be validated.

7.10 Managing Passwords in Warehouse Builder

You can manage passwords within Warehouse Builder in the following ways:

- Changing Passwords that Access Control Centers
- Encrypting Passwords to Warehouse Builder Locations

7.10.1 Changing Passwords that Access Warehouse Builder

In keeping with standard security practices, you may want to periodically change the passwords used to access Warehouse Builder repositories.

Changing Passwords that Access Design Repositories

Manage the password to design repositories as you would any other Oracle Database.

Changing Passwords that Access Control Centers

To change the password for a repository that hosts a Control Center and is therefore a deployment environment, you must first stop the Control Center service, run a script to change the password, and restart the Control Center service.

To change the password for a repository that hosts a Control Center:

1. Log on to the Control Center as the repository owner.
2. Stop the Control Center by running the script

   `OWB_ORACLE_HOME/owb/rtp/sql/stop_service.sql`

   The script returns values of Unavailable or Available to indicate the status of Control Center.
3. Change the password by running the script

   `OWB_ORACLE_HOME/owb/rtp/sql/set_repository_password.sql`

   When prompted, specify the new password.
4. Restart the Control Center by running the script

   `OWB_ORACLE_HOME/owb/rtp/sql/start_service.sql.`

7.10.2 Encrypting Passwords to Warehouse Builder Locations

Warehouse Builder users create a location for each database, file server, or application that want to extract or load metadata and data. Locations include the user name and password used to access these various sources and targets. Warehouse Builder can store these passwords in the repository in an encrypted manner. The switch that turns on and off the password storage is Persist Location Password in Metadata, which is located in the Design Center under **Tools, Preferences, Security Parameters.**

The default encryption algorithm utilized is DES56C that is valid for Oracle Database 9i and subsequent versions. If the repository Database is version 10*g* or later, then you can set the encryption algorithm to 3DES168 or any other more powerful encryption by changing OWB_ORACLE_HOME/owb/bin/admin/jdbcdriver.properties file and specifying the following encryption parameters:

encryption_client; default = REQUIRED

encryption_types_client; default = (DES56C)

crypto_checksum_client; default = REQUESTED

crypto_checksum_types_client; default = (MD5)

For the protocol to work, set the server to the default ACCEPTED mode. For more information, see the Oracle® Database JDBC Developer's Guide and Reference.

8

Creating Custom Objects and Properties

This chapter describes how to extend the workspace by creating custom objects and custom properties. This chapter includes the following topics:

8.1 Extending the Workspace With User Defined Objects

As an administrator, you may encounter scenarios that require you to add new types of objects or properties to an existing workspace. Any objects you add to the workspace are known as user defined objects (UDOs) and any properties you add are known as user defined properties (UDPs).

For example, as you use Warehouse Builder in conjunction with other applications, you may want to document how the data and metadata you manage in Warehouse Builder interacts with other applications. To facilitate this documentation, you can introduce new metadata objects and associate those objects with existing workspace objects. These custom objects appear in the Design Center with the icon of your choice. You can edit them with a basic editor and preform lineage and impact analysis.

Administration users can extend the workspace by adding new properties and objects.

- **Adding New Properties to Workspace Objects**: Each workspace object has a pre-defined property set to which you can add UDPs. Consider doing this, if, for example, you want to add a property to contain design notes for metadata objects. Once you define them, UDPs act like native properties.
- **Adding UDOs to the Workspace**: You can introduce new types of objects to the workspace by defining UDOs which follow the general rules for object locking, multiuser access, transactions, security, and snapshots. You can also import and export UDOs and UDPs using the Metadata Loader (MDL).

For the sake of clarity, this chapter refers to the objects native to the workspace as *workspace objects*. Any objects you introduce to the workspace are *UDOs* and any new properties are *UDPs*.

8.1.1 About Oracle Metabase (OMB) Plus

To define custom objects and properties, you must use the scripting utility Oracle Metabase (OMB) Plus. After you specify the UDO and UDP definitions through scripting, you can then create instances of those objects either through scripting or using the graphical user interface.

OMB Plus is the flexible, high-level command-line metadata access tool for Oracle Warehouse Builder. It is an extension of the Tcl programming language and you can use it on UNIX and Windows platforms. The section "Using OMB Plus Scripts to Specify UDOs and UDPs" describes how to write the syntactic constructs such as variable support, conditional and looping control structures, error handling, and standard library procedures. Using OMB Plus, you can navigate through workspaces and manage and manipulate metadata in workspaces.

For more information about using OMB Plus to specify UDOs and UDPs, see *Oracle Warehouse Builder API and Scripting Reference*.

8.1.1.1 Using OMB Plus Scripts to Specify UDOs and UDPs

OMB Plus scripts enable you to define new objects, add and remove properties, as well as view the attributes for existing objects. The syntax is case sensitive and must be in upper case. While creating UDOs and UDPs, follow the guidelines in "Naming Conventions for UDOs and UDPs" on page 8-3.

OMBDEFINE

`OMBDEFINE CLASS_DEFINITION` enables you to create new object definitions in the workspace.

To create a new module definition, use the following command:

```
OMBDEFINE MODULE CLASS_DEFINITION 'UD_TABLEMODULE' SET PROPERTIES (BUSINESS_NAME,
PLURAL_NAME) VALUES ('Table Module', 'Table Modules')
```

This creates a new module definition called `UD_TABLEMODULE`.

OMBREDEFINE

`OMBREDEFINE CLASS_DEFINITION` enables you to redefine workspace objects to include custom properties.

To create a UDP on the Dimension object, use the following command:

```
OMBREDEFINE CLASS_DEFINITION 'DIMENSION'
     ADD PROPERTY_DEFINITION 'UD_DOCID' SET PROPERTIES (TYPE, DEFAULT_VALUE)
     VALUES ('INTEGER', '100')
```

This adds a new property definition called `UD_DOCID` to class definition `DIMENSION`.

The following command adds a new property definition for notes for the `COLUMN` type. Because columns exist in tables, views, materialized view, external tables and sequences, the following command adds the definition of this property to columns for all of those metadata objects:

```
OMBREDEFINE CLASS_DEFINITION 'COLUMN'
     ADD PROPERTY_DEFINITION 'UD_COL_NOTE' SET PROPERTIES (TYPE, DEFAULT_VALUE)
     VALUES ('STRING', 'notes')
```

When you create and save a new property definition, OMB Plus performs the following validations:

- A user access check ensuring that you have single-user access to the current workspace.
- A name space check ensuring that you did not define two identically named property definitions within the same class hierarchy.
- A property value check ensuring that you defined default values consistent with the data types that you specified.

To change the name or the default value of a given property definition, use a command as follows:

```
OMBREDEFINE CLASS_DEFINITION 'TABLE' MODIFY PROPERTY_DEFINITION 'UD_TBL_NOTE'
     SET PROPERTIES (DEFAULT_VALUE, BUSINESS_NAME)
     VALUES ('99', 'Table Note')
```

To delete a UDP, use a command such as

```
OMBREDEFINE CLASS_DEFINITION 'TABLE' DELETE PROPERTY_DEFINITION 'UD_TBL_NOTE'
```

which deletes the UD_TBL_NOTE property definition from the Table class. Deleting a UDP is a destructive action and should generally be done with caution because it cannot be undone. It renders irretrievable all custom property values made for this property definition in your workspace.

OMBDESCRIBE

You can use `OMBDESCRIBE` on any class definition to view the attributes for a metadata element. Among other tasks, use `OMBDESCRIBE` to list the UDPs for a given object type. For instance, the following command lists the UDPs for dimensions:

```
OMBDESCRIBE CLASS_DEFINITION 'DIMENSION' GET PROPERTY_DEFINITIONS
```

You can also use `OMBDESCRIBE` to inspect the properties of a property definition. For instance, for a UDP called `UD_DOCID`, you can know its data type, default value, and business name using the following command:

```
OMBDESCRIBE CLASS_DEFINITION 'DIMENSION' PROPERTY_DEFINITION  'UD_DOCID'
     GET PROPERTIES (TYPE, DEFAULT_VALUE, BUSINESS_NAME)
```

8.1.1.2 Naming Conventions for UDOs and UDPs

It is mandatory to include the prefix UD_ while naming UDOs and UDPs. This ensures that the names of UDOs and UDPs are not identical to the names of predefined objects in the workspace.

Note: If in a previous release you named a UDP with the prefix UDP_, then it is still valid. However, for all subsequent UDOs and UDPs, use the UD_ prefix.

8.2 Adding New Properties to Workspace Objects

To define new properties on Workspace objects, complete the following steps:

1. Carefully plan the new additions to the workspace.

   If possible, you should define all user-defined properties into the workspace before enabling end users to access it. In doing so, you avoid the task of supplying values for UDPs on existing objects.

2. Log in as the workspace owner, in single user mode.

   If another user is logged on within the GUI or OMB Plus, then you will be prevented from running commands that alter the structure of the workspace.

If already logged into the Design Center, then you can start OMB Plus from the Window option on the main menu of Design Center. To ensure that no other users access the workspace, connect to the workspace and issue the command `OMBSWITCHMODE SINGLE_USER_MODE`.

3. Use the command OMBREDEFINE on the workspace object to which you want to add a custom property definition.

   For examples on how to use this command, see the section OMBREDEFINE on page 8-2.

4. To view the changes in OMB Plus, use the command OMBDESCRIBE.
5. Once you create the UDP using scripting, users can view and assign values to the new property in the graphical user interface.
6. Notify users that they can log in to the Design Center.

8.2.1 Creating UDPs: An Example

To create UDPs for an object, complete the following steps:

1. Log in to the client as an administrator.
2. Open the OMB Plus client.
3. Ensure that you are in single user mode. You can verify this with the command `OMBDISPLAYCURRENTMODE`. If you are in multiple user mode, then switch to single user mode by using the command:

   ```
   OMBSWITCHMODE SINGLE_USER_MODE
   ```

4. In the OMB Plus client, enter the following command to create four UDPs for the object `View`:

   ```
   OMBREDEFINE CLASS_DEFINITION 'VIEW' \
   ADD PROPERTY_DEFINITION 'UD_OWNER' SET PROPERTIES \
   (TYPE, DEFAULT_VALUE, BUSINESS_NAME) VALUES \
   ('STRING', 'REP_OWNER', 'Object Owner')

   OMBREDEFINE CLASS_DEFINITION 'VIEW' \
   ADD PROPERTY_DEFINITION 'UD_FILE' SET PROPERTIES \
   (TYPE, DEFAULT_VALUE) VALUES ('FILE', 'C:\\vw.sql')

   OMBREDEFINE CLASS_DEFINITION 'VIEW' \
   ADD PROPERTY_DEFINITION 'UD_LINK' SET PROPERTIES \
   (TYPE, DEFAULT_VALUE) VALUES ('URL', 'http://www.oracle.com')

   OMBREDEFINE CLASS_DEFINITION 'VIEW' \
   ADD PROPERTY_DEFINITION 'UD_VERSION' SET PROPERTIES \
   (TYPE, DEFAULT_VALUE) VALUES ('DATE', '2006-1-7')

   OMBSAVE
   ```

   This creates the following UDPs: `UD_OWNER`, `UD_FILE`, `UD_LINK`, and `UD_VERSION`.

   Note that the valid UDP types are: integer, string, float, double, date, timestamp, boolean, long, file, and url.

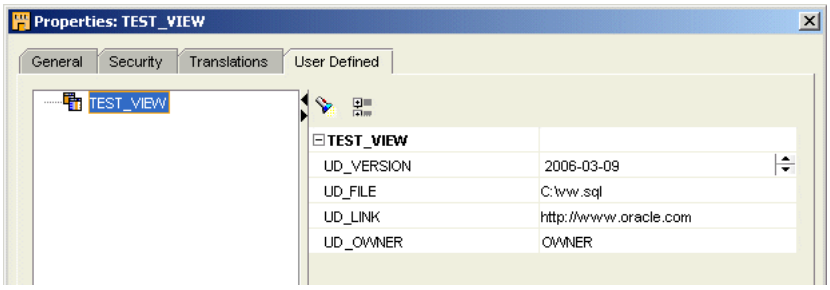
5. From the Project Explorer create a view in any module.
6. Open the property inspector for the view by right-clicking the view and selecting **Properties**.

7. Click the User Defined tab and select the view in the left-hand panel. The newly created UDPs are displayed.

   You can modify the values of any of the UDPs from the graphical user interface.

   Figure 8–1 displays the UDP that was created in the User Defined tab.

Figure 8–1 UDPs for TEST_VIEW



To remove a UDP from the workspace, use the `DELETE` clause. For example, to delete UD_VERSION, use the following command:

```
OMBREDEFINE CLASS_DEFINITION 'VIEW' DELETE PROPERTY_DEFINITION 'UD_VERSION'
```

8.3 Adding UDOs to the Workspace

UDOs are objects that you define and add to the workspace in addition to existing workspace objects.

All UDOs must belong to a module, and the module itself is a UDO. This module acts as the topmost container holding other objects within it. A module can contain folders, first class objects (FCOs), and second class objects (SCOs). Similarly, a folder can contain other folders, FCOs, and SCOs. An FCO can contain one or more SCOs.

UDOs exhibit a parent-child relationship. The module is the topmost parent. An FCO within a module is a child element of the module. Similarly, an SCO within an FCO is a child element of the FCO. For example, an Oracle module is a parent module. A table within this module is an FCO and a column within the table is an SCO.

To define new objects for the workspace, complete the following steps:

1. Carefully plan the new additions to the workspace.

   Before you begin, fully review the remainder of this chapter and become familiar with the necessary scripting commands.

2. Log in to the client as an administrator and in single user mode.

3. Design the UDO based on the steps described in "Writing Scripts to Define UDOs".

4. Use the OMBDEFINE command to create a new module definition, and FCOs and SCOs within that module. Use the OMBREDEFINE command to make any changes to the UDOs or to set properties for these objects.

   Once you create the UDO through scripting, you can use the graphical user interface to create and edit the objects it contains.

5. Log in to the Design Center and view the new objects as described in "Working with UDOs and UDPs" on page 8-11.

   Verify that the new objects display as intended.

6. (Optional) Assign a new icon to the UDO, as described in"Creating New Icons for Workspace Objects" on page 8-13.
7. Notify users that they can log in to the client.

8.3.1 Writing Scripts to Define UDOs

To define a UDO, write a script that completes the following steps:

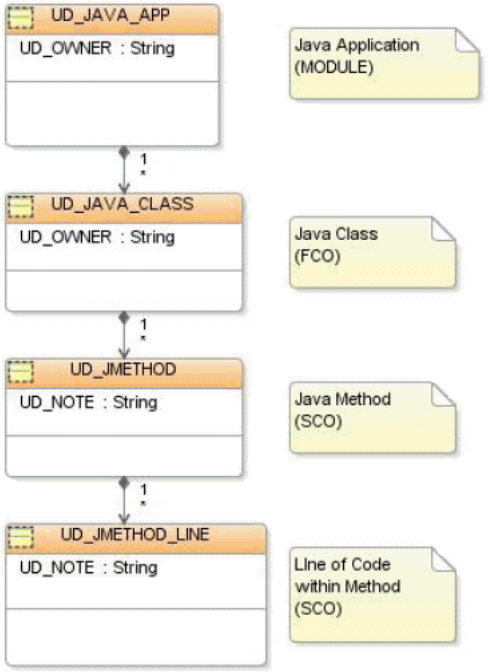
- **Create a user defined module**: This will be the parent module.
- **Define the object type**: Define the module as a folder that can contain other objects.
- **Define FCOs and SCOs**: Create user-defined FCOs and SCOs for the UDO, and assign physical names to these objects. For example, `UD_WORKBOOK` is a valid physical name. You can also indicate a business name and plural name, both of which are displayed in the Design Center and in editors. Continuing the previous example, `Workbook` and `Workbooks` are likely entries for the business name and plural name, respectively. If you do not specify these values, then they default to the physical name.
- **Define object properties**: Define the properties for all the objects you create. Some properties, such as Name, Business_Name, Plural_Name, and Description, are assigned automatically to any newly created object.
- **Add component definition**: All parent objects need to be assigned a component definition. The child elements have to be added to the component definition. The component definition determines the lifetime of child elements. For example, a column cannot exist if the parent table is deleted.
- **Define association types**: Create association types to indicate the types of relationships a UDO can have with workspace objects and other UDOs. You need to perform this step only if you want end users to later relate the UDO to specific instances of objects. For instance, in your script you could associate the UDO with tables and views. In the Design Center, end users could then relate instances of the UDO with specific tables and views. Warehouse Builder displays these relationships in impact and lineage analysis reports.
- **Assign icons (optional)**: See "Creating New Icons for Workspace Objects" on page 8-13.
- Save the changes.

8.3.2 Creating UDOs: An Example

This section provides an example to create UDOs modeled on a Java application. The Java application acts as a module. This module contains classes (FCOs), and those classes contain methods (SCOs). Within a method, you can model the lines of code. From a business standpoint, this is of interest because a particular line of code in an application may be impacted by a change in a database table if it is used within a SQL (JDBC) statement.

Figure 8–2 displays the structure of the UDO.

Figure 8–2 Structure of the UDOs



To create the UDOs, perform the following steps:

1. Log in to the Oracle Warehouse Builder client as an administrator and open the OMB Plus window. Make sure that you are logged in single user mode.
2. First create a module definition and set properties for this module:

   ```
   OMBDEFINE MODULE CLASS_DEFINITION 'UD_JAVA_APP' \
   SET PROPERTIES (BUSINESS_NAME, PLURAL_NAME) \
   VALUES ('Java Application', 'Java Applications')
   ```

   This defines the module definition and sets certain properties common to all objects. BUSINESS_NAME is the user-friendly name for an object. If the Naming mode preference for the Design Center is switched to Business mode, then the value set for BUSINESS_NAME is displayed for the object. PLURAL_NAME is the label that is used to show where multiple instances of an object are shown, such as the label used for a tree node in the Design Center that contains several instances of the object.
3. Now create a folder definition with the same name as the module so that the module assumes the role of a folder:

   ```
   OMBDEFINE FOLDER_DEFINITION 'UD_JAVA_APP'
   ```

4. Now create an FCO:

   ```
   OMBDEFINE FIRST_CLASS_OBJECT CLASS_DEFINITION \
   'UD_JCLASS' SET PROPERTIES (BUSINESS_NAME, PLURAL_NAME) \
   VALUES ('Java Class File', 'Java Class Files')
   ```

5. Add the FCO as a child of the folder class:

   ```
   OMBREDEFINE CLASS_DEFINITION 'UD_JAVA_APP' \
   ADD CHILD_TYPE 'UD_JCLASS'
   ```

6. Create a component definition for the FCO:

```
OMBDEFINE COMPONENT_DEFINITION 'UD_JCLASS'
```

7. Add the component definition to the folder definition:

```
OMBREDEFINE FOLDER_DEFINITION 'UD_JAVA_APP' \
ADD 'UD_JCLASS'
```

8. Create an SCO and set its properties:

```
OMBDEFINE SECOND_CLASS_OBJECT \
CLASS_DEFINITION 'UD_JMETHOD' \
SET PROPERTIES (BUSINESS_NAME, PLURAL_NAME) \
VALUES ('Method', 'Methods')
```

9. Add the SCO as a child of the FCO:

```
OMBREDEFINE CLASS_DEFINITION 'UD_JCLASS' \
ADD CHILD_TYPE 'UD_JMETHOD'
```

10. Add the SCO to the component definition:

```
OMBREDEFINE COMPONENT_DEFINITION 'UD_JCLASS' \
ADD 'UD_JMETHOD'
```

11. Create an SCO and set its properties:

```
OMBDEFINE SECOND_CLASS_OBJECT \
CLASS_DEFINITION 'UD_JMETHOD_LINE' \
SET PROPERTIES (BUSINESS_NAME, PLURAL_NAME) \
VALUES ('Java Method Line', 'Java Method Lines')
```

12. Add this SCO as a child of the initially created SCO:

```
OMBREDEFINE CLASS_DEFINITION 'UD_JMETHOD' \
ADD CHILD_TYPE 'UD_JMETHOD_LINE'
```

13. Add this SCO to the component definition:

```
OMBREDEFINE COMPONENT_DEFINITION 'UD_JCLASS' \
ADD 'UD_JMETHOD_LINE'
```

This creates the following UDOs:

- A module folder called UD_JAVA_APP
- An FCO named UD_JCLASS, within the module
- An SCO named UD_JMETHOD, which is the child of UD_JCLASS
- Another SCO named UD_JMETHOD_LINE, which is the child of UD_JMETHOD

You can access the UDOs from the Project Explorer under the User Defined Modules icon. To create a new instance of the UDO, right-click the UDO and select **New**. You can create new modules and SCOs as well as edit these modules and SCOs.

Note: For the newly created UDO to be visible in the Project Explorer, you must shut down Oracle Warehouse Builder completely, and then start it up again, saving any changes if prompted.

8.3.3 Associating UDOs with Objects

UDOs can be associated with other objects. By creating these associations, UDOs become a part of Lineage and Impact Analysis diagram just like any other object.

Associating a Java Application with a Table

This example associates the SCO, UD_JMETHOD, with one or more tables. This is modeling the fact that a method could be referencing tables in JDBC calls.

To associate the Java method to table, use the command:

```
OMBDEFINE ASSOCIATION_DEFINITION 'UD_XJMETHOD2TABLE' \
SET PROPERTIES (CLASS_1,CLASS_2,ROLE_1,ROLE_2 \
,ROLE_1_MAX_CARDINALITY,ROLE_1_NAVIGABLE) \
VALUES ('UD_JMETHOD','TABLE','TABLEUSED','JM2TABLE' \
,'INFINITE','true') ADD DEPENDENCY_DEFINITION 'DATAFLOW'
```

CLASS_1 and CLASS_2 can be any classes (FCO or SCO). At least one of the classes should be a user defined class. The other class can be either a user defined class or one of the main Oracle Warehouse Builder classes, such as table or column. In this example, the association is between the UDO, UD_JMETHOD, and table.

Role_1 and Role_2 are the names you use to identify Class_1 from the point of view of this association. A class may have multiple associations and it plays a role in each one of them.

MAX_CARDINALITY allows you to limit the number of objects of that class which participate in that association. For example, consider the association between uniqueKey and foreignKey. The max_cardinality of uniqueKey is 1, because a given foreignKey object can be associated with at most one uniqueKey object. MAX_CARDINALITY can be set to any positive integer, or the reserved word INFINITE.

ROLE_1_NAVIGABLE is used by Lineage/Impact analyzer. If set to TRUE, it means that the analyzer can traverse the association in either direction between Class_1 and Class_2. If the property is set to FALSE, it means that the analyzer can traverse the relationship from Class_1 to Class_2, but not the other way around.

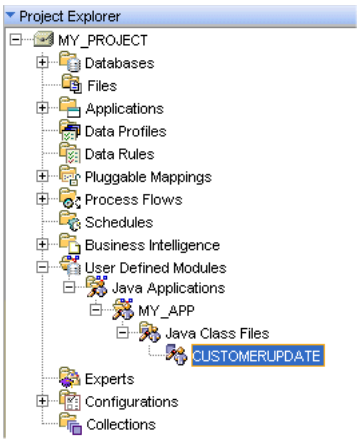
DEPENDENCY_DEFINITION is a mandatory parameter of an association and must always be set to DATAFLOW.

To associate the UDO to a table, complete the following steps:

1. In the Project Explorer, expand the node User Defined Modules.
2. Right-click Java Applications and select **New**.
3. Specify a name for the application.
4. Right-click the node Java Class Files and select **New**.
5. Specify a name for the Java class.

   Figure 8–3 shows a new user defined module created from the Project Explorer.

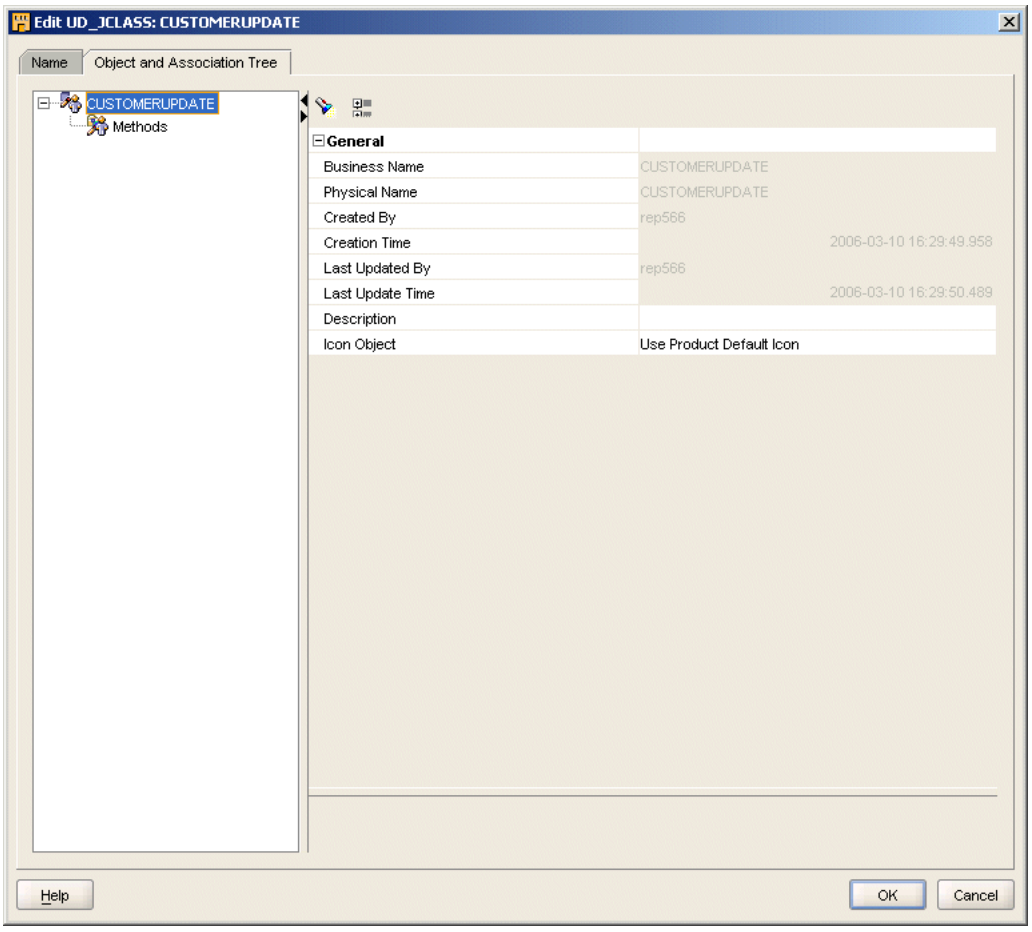
Figure 8–3 Creating User Defined Modules from the Project Explorer



6. Right-click the object you just created, and select **Open Editor** to open the UDO Editor.
7. Click the Object and Association Tree tab and select CUSTOMERUPDATE. You can see the properties for the FCO, UD_JCLASS.

   Figure 8–4 displays the editor for an FCO.

Figure 8–4 Editor for UD_JCLASS



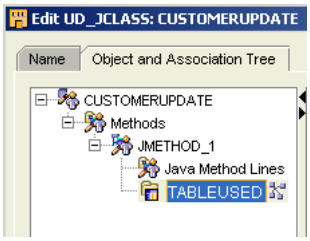
8. Right-click **Methods** and select **Create**.

   An SCO called JMETHOD_1 is created.

9. JMETHOD_1 contains two nodes: Java Method Lines, which is the child SCO, and TABLEUSED, which is the value specified for ROLE_1 when the association UD_XJMETHOD2TABLE was created.

   Figure 8–5 displays the nodes in an SCO.

Figure 8–5 Nodes Within an SCO

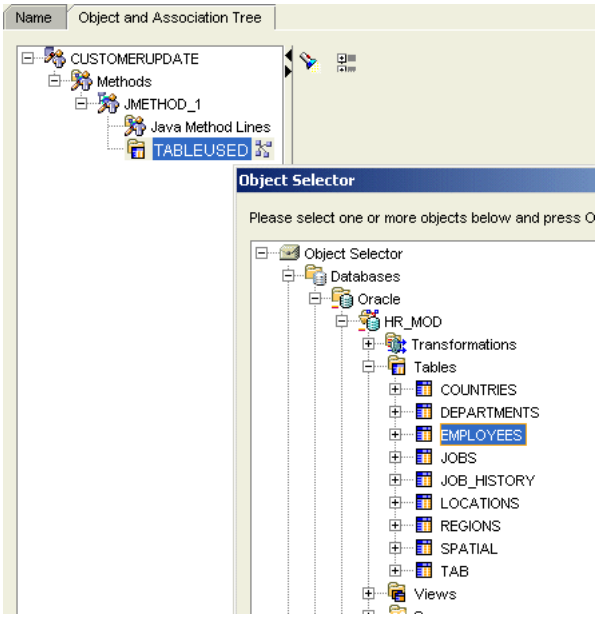


10. Right-click TABLEUSED and select **Reference**.

    The Object Selector dialog box is displayed, and allows you to select the table to which you want to connect the UDO.

    Figure 8–6 displays the Object selector dialog box.

Figure 8–6 The Object Selector Dialog Box



8.4 Working with UDOs and UDPs

In the graphical user interface, you can view UDOs and UPDs in the Project Explorer and in the Repository Design Browser. However, in the Project Explorer, you can also edit the UDOs and UDPs.

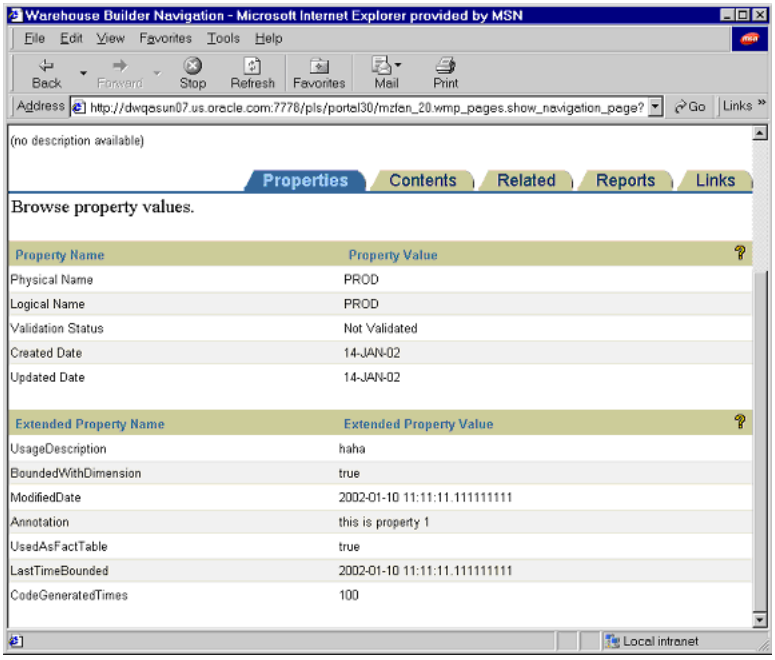
Repository Design Browser

The Repository Browser is a metadata management and reporting portal. This browser displays objects, object properties, object relationships, including UDOs and UDPs. The browser also displays lineage and impact analysis reports for all objects including UDOs.

If you define a UDP for a given object, then the browser lists the UDP name and values as Extended Property Name and Extended Property Value.

Figure 8–7 displays the sample properties sheet.

Figure 8–7 Sample Properties Sheet with User-Defined Properties



8.4.1 Propagating UDOs and UDPs to Other Workspaces

The primary method for propagating changes from one workspace to another is by using MDL. MDL enables you to export and import the metadata definition of the UDP and its contents.

Exporting UDOs and UDPs

You can export UDOs and UDPs as any other object.

In the MDL Control file, the option is `DEFINITIONFILE=`*`filename`* to export the metadata definition. For example:

```
## Sample Export file
USERID=UserName/Password@HostName:PortID:OracleServiceName
#
DEFINITIONFILE=Drive:\DirectoryName\filename.mdd

FILE=Drive:\DirectoryName\filename.mdl
LOG=Drive:\DirectoryName\filename.log
```

Importing UDOs and UDPs

You can import UDPs from the command line only. During import, MDL updates the UDPs for all objects. In the MDL Control file, the option is DEFINITIONFILE=filename to import the metadata definition. For example:

```
## Sample Import file
USERID=UserName/Password@HostName:PortID:OracleServiceName
#
DEFINITIONFILE=Drive:\DirectoryName\filename.mdd

FILE=Drive:\DirectoryName\filename.mdl
LOG=Drive:\DirectoryName\filename.log
```

You can import UDPs using one of the following search criteria:

- **Universal ID**: The metadata definition contains a Universal Object ID (UOID). The UOID uniquely identifies objects across workspaces. If you import the MDL file by UOID, then MDL looks up the metadata definition by UOID. If the metadata definition name in the source MDL file is different from the metadata definition in the workspace, then MDL renames it.
- **Physical Name**: MDL looks up the metadata definition by physical name.

Regardless of the import mode, MDL either adds the metadata definition if it does not exist in the workspace, or updates the metadata definition if it already exists. MDL does not delete metadata definitions in the workspace.

When updating the metadata definition, MDL only renames the object if the names are different (search criteria is by UOID), and updates the default value. MDL does not change the data type.

8.5 Creating New Icons for Workspace Objects

Icons are graphics that visually suggest the availability of a function or type of an object to end users. There are many types of pre-defined workspace objects, each with their own icon. You may want to change the icon associated with an existing object or instance of an object to something more recognizable. For example, you could visually highlight a particular table by altering its icon. Additionally, for UDOs, you may want to change the default icon to something representative of the object. You can create your own icons using a graphics editor or third-party software.

In the Design Center, you can associate icon sets with an instance of an object. Or, use the OMB Plus scripting language to associate icon sets at the object type level (and thus inherited by any instance of that object).

> **Note:** You can assign new icons to most workspace objects with the exception of pre-defined objects like public transformations and public data rules and DEFAULT_CONFIGURATION, DEFAULT_CONTROL_CENTER, and OWB_REPOSITORY_LOCATION.

Every object has a set of icons of varying sizes to represent it throughout the various editors and toolbars. Each icon set includes a canvas icon, palette icon, and a tree icon as described in Table 8–1. When you define a new icon set, follow the sizing guidelines. If you specify a new icon with an incorrect size, it is automatically resized, which may distort your intended design.

Table 8–1 Icon Sets

Type	Description
Canvas Icon	Represents instances of objects in the canvas of an editor. For example, it displays a table icon in the canvas of the Mapping Editor or in a Lineage Report. The correct size is 32 x 32 pixels in GIF or JPEG format.
Palette Icon	Represents types of objects in editor palettes. For example, it displays the table operator in the Mapping Editor operator palette. The correct size is 18 x 18 pixels in GIF or JPEG format.
Tree Icon	Represents types and instances of objects in navigation trees such as the Project Explorer in the Design Center. The correct size is 16 x 16 pixels in GIF or JPEG format.

8.5.1 Creating Icon Sets

To create a new icon set, complete the following steps:

1. Log in to the client as an administrator.
2. In the Global Explorer, right-click the Icon Sets node and select **New**.
3. The Create Icon Set dialog box is displayed. For details on the values to be entered on this page, see "Create Icon Set Dialog Box" on page 8-14.

8.5.1.1 Create Icon Set Dialog Box

The Create Icon Set dialog box enables you to specify values for the Icon Set. Enter the following values and click **OK** to define a new Icon Set:

- **Name**: The name of the Icon Set.
- **Group**: You can assign the Icon Set to any of the groups available in the list. This is useful when you are creating a large number of icon sets and want to organize them into different groups.
- **Description**: A description of the Icon Set.
- **File Name**: Navigate and select the image that you want to assign to the new Icon Set. You need to select an image for Canvas, Palette, and Tree Icon.

> **Note:** You can use any image of your choice to represent the new icon.

The newly created icon set will be available under Icon Sets in the Global Explorer.

8.5.2 Assigning New Icon Sets to Workspace Objects

You can change the default icon setting for any object by editing its properties. In any of the Explorers in the Design Center, right-click an object and select **Properties** to assign a new icon set to an object. When you save your changes, the new icon set appears throughout the user interface.

To revert back to the original icon, select Use Product Default Icon.

For more information about icon sets, see "Creating New Icons for Workspace Objects" on page 8-13.

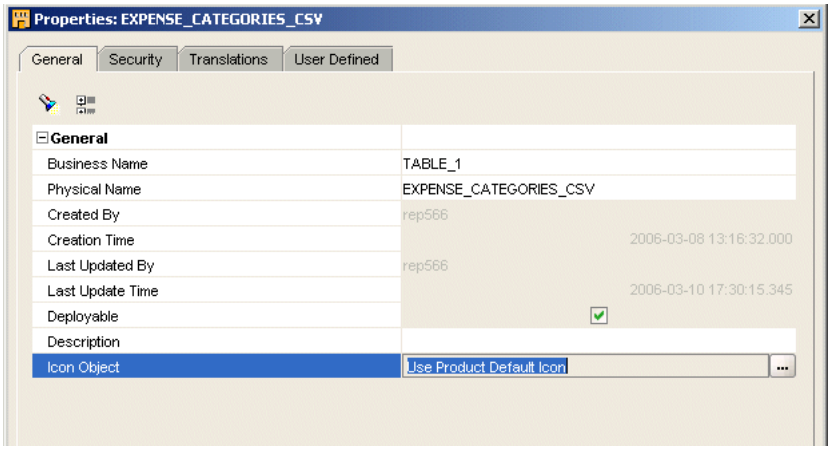
8.5.2.1 Assigning a New Icon Set to an Object

Complete the following steps to assign a newly created icon set, CSV_ICONSET, to an instance of an object.

1. Right-click any instance of an object and select **Properties** to open Property Inspector.
2. On the General tab, click the field **Use Product Default Icon**.

   An Ellipsis button is displayed in this field as shown in Figure 8–8.

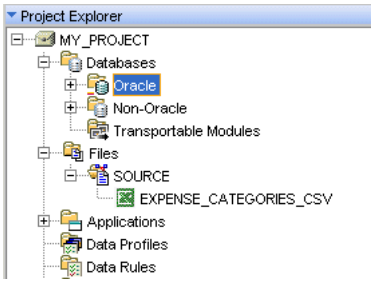
Figure 8–8 Properties Inspector for EXPENSE_CATEGORIES_CSV



3. Click the Ellipsis button to open the Icon Object dialog box.
4. Select CSV_ICONSET and click **OK**.
5. CSV_ICONSET is now assigned to the instance EXPENSE_CATEGORIES_CSV.

   Figure 8–9 shows the Project Explorer in which the icon set is assigned to the instance.

Figure 8–9 Icon Set for EXPENSE_CATEGORIES_CSV



8.5.2.2 Assigning New Icon Sets to Activities in Process Flow

You can assign new icon sets to the activities in a process flow. The Explorer panel of the Process Flow Editor contains the Select Icon button at the top. This button is enabled when you select an activity.

To assign a new icon set to an activity:

1. Select the activity and click the Select Icon button. The Select Icon Set dialog box displays.

2. Select an icon from the list and click **Select**.

The icon set is assigned to the activity.

8.5.2.3 Assigning New Icon Sets to Tasks in Expert Editor

You can assign new icon sets to the tasks in Expert Editor using the Select Icon button available on the Expert Editor. This is similar to assigning icon sets to activities in a process flow.

To assign a new icon set to a task:

1. Select the task and click the Select Icon button. The Select Icon Set dialog box displays.
2. Select an icon from the list and click **Select**.

The icon set is assigned to the task.

For information about experts, see *Oracle Warehouse Builder API and Scripting Reference*.

9

Managing Metadata Dependencies

The Metadata Dependency Manager enables you to detect and resolve the impact of the changes made to the object definitions or the metadata in the workspace.

This chapter contains the following topics:

9.1 Introduction to the Metadata Dependency Manager

The Metadata Dependency Manager generates lineage and impact diagrams for any data object. A lineage diagram traces the data flows for an object back to the sources and displays all objects along those paths. An impact diagram identifies all the objects that are derived from selected object.

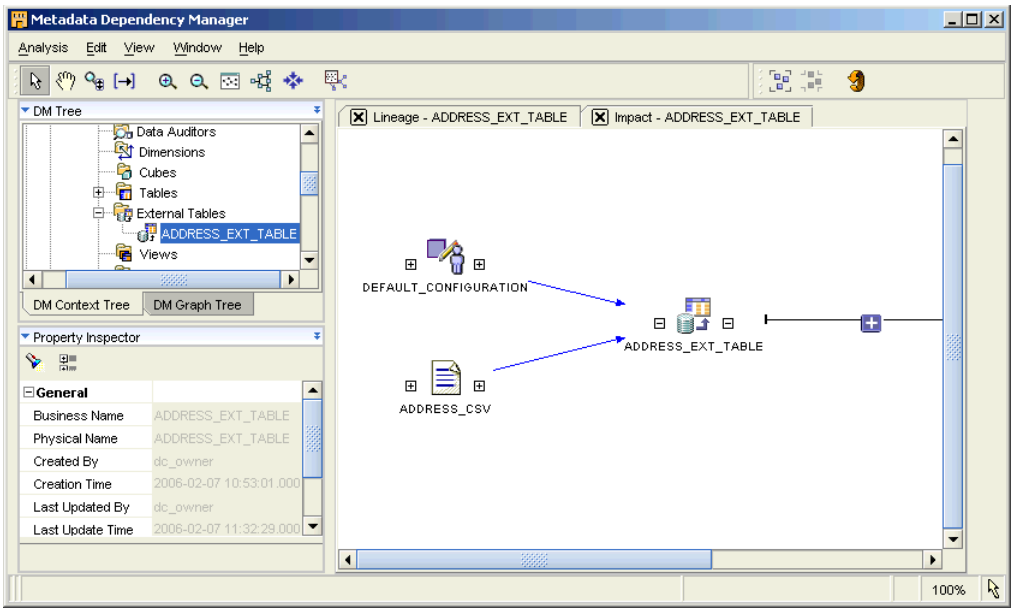
This type of information can help you in many circumstances such as the following:

- Comply with government regulations or other audits that require tracking of financial data.
- Modify the system design because of changes in the source data.
- Modify the system design because of new requirements for reporting and analysis.
- Assess the impact of design changes in a pluggable mapping that is used throughout a project.

The Dependency Manager enables you to plan your project by previewing the impact of the changes or future changes. If you are planning to introduce changes to your source systems, you can use the Dependency Manager to gauge the impact of that change on your warehouse design. Or, if the change has already been introduced, then you can plan the time required to update your ETL design and rebuild your data warehouse.

Figure 9–1 shows the Metadata Dependency Manager. Like other windows in Warehouse Builder, the Dependency Manager has menus, toolbars, a navigator, a property inspector, and a canvas. The canvas displays one or more diagrams.

Figure 9–1 Metadata Dependency Manager



9.1.1 Usage Scenario

The metadata from sources such as files, databases, and applications can change even after the design and implementation of a data intergration system. A change in the source metadata implies a corresponding impact in your Warehouse Builder implementation. Warehouse Builder enables you to reimport the modified source definitions into the workspace. However, your original warehouse design may no longer remain valid with the reimported definitions, and you may need to make changes to the design and fix the inconsistencies.

You need to first find out how the warehouse design is effected by the changes in source and then determine all the design objects that are dependent upon the sources must synchronize the metadata so that all the effected design objects are updated to reflect the changes in the source. After this process is complete, you can redeploy the updated design to rebuild your data warehouse and synchronize the data.

In this scenario, a company retrieves all its statistical reports from a flat file named `CUSTOMERS`. Over a period of time, the file definition needs to be changed to generate reports on additional parameters. The statistical analysis database hosted on the Oracle Database has also recently migrated to the latest version of the Database.

The designers at this company first need to synchronize the modified metadata definitions for this file in the design workspace with all the design objects and mappings that are based on its data. The `CUSTOMERS` flat file is part of multiple mappings in the ETL design, and any changes to its definitions invalidate all them. Manually tracking all the areas impacted by the `CUSTOMERS` flat file and updating the definitions is a process prone to errors.

The Dependency Manager enables them to identify all of the objects that are effected by this change to the data source. They can be sure that each related design object is updated so that the ETL designs remain valid. After finishing this process, they can redeploy the effected tables and the updated ETL design objects to their data warehouse.

9.1.2 What are Lineage and Impact Analysis Diagrams?

Lineage and Impact Analysis (LIA) diagrams show the relationships among objects managed by Warehouse Builder. These relationships are constructed by mappings and structural relationships (for example, a primary key and foreign key relationship). The lineage diagram for a particular object shows its source objects, and the impact diagram shows its targets.

Lineage and impact are mirror images of each other. If Object A is part of the lineage diagram of Object B, then Object B is part of the impact diagram of Object A. When you read a diagram from left to right, you are seeing impact. When you read it from right to left, you are seeing lineage.

For example, you might have a mapping that extracts data from a file and loads it into a table by way of an external table. This is the relationship:

```
flat_file > external_table > table
```

Figure 9–2 shows a lineage diagram of an external table named ADDRESS_EXT_TABLE. ADDRESS_CSV is a flat file, and it is part of the lineage of ADDRESS_EXT_TABLE. Thus, any change to ADDRESS_CSV will impact ADDRESS_EXT_TABLE.

Figure 9–2 Lineage Analysis Diagram for ADDRESS_EXT_TABLE

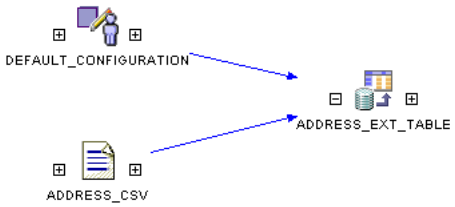
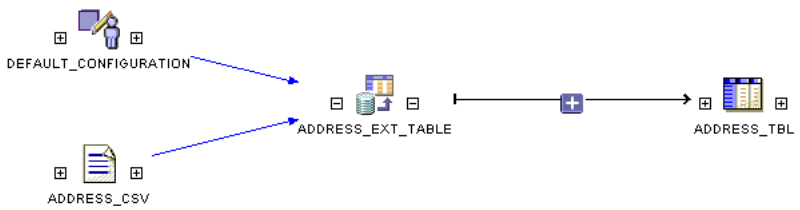


Figure 9–3 shows an impact diagram of ADDRESS_EXT_TABLE, which includes the ADDRESS_TBL. Any change to ADDRESS_EXT_TABLE will impact ADDRESS_TBL. ADDRESS_EXT_TABLE is part of the lineage of ADDRESS_TBL.

Figure 9–3 Impact Analysis Diagram for ADDRESS_EXT_TABLE

You can see both the lineage and the impact of an object by clicking the plus signs (+) on either side of the object icon, as shown in Figure 9–4.

Figure 9–4 Lineage and Impact Analysis Diagram



9.2 Generating an LIA Diagram

You can generate an LIA diagram from the Project Explorer in the Design Center or by first opening the Metadata Dependency Manager.

To generate a diagram from the Design Center:

1. Expand the Project Explorer until you see the object that you want to analyze.
2. Right-click the object and select **Lineage** or **Impact**.

   The Metadata Dependency Manager will open with the diagram.

The Lineage and Impact commands are also available from the View menu.

To generate a diagram from the Metadata Dependency Manager:

1. From the Design Center Tools menu, select **Metadata Dependency Manager**.

   The Metadata Dependency Manager is displayed.
2. Expand the DM Context Tree until you see the object that you want to analyze.
3. Right-click the object and select **Show Lineage** or **Show Impact**.

   The diagram will be displayed on the canvas.

9.3 Modifying the Display of an LIA Diagram

Your initial selection of an object and a diagram type simply determine the initial starting point and the direction that the diagram branches from that object. You can modify an LIA diagram in the following ways:

- Drag-and-drop another object onto the diagram.
- Click the plus (+) and minus (-) signs next to an object icon to expand or collapse a branch of the diagram.
- Use the grouping tool to collapse a section of the diagram into a single icon, as described in "Using Groups in an LIA Diagram" on page 9-5.
- Double-click an object to display its attributes, as described in "Displaying an Object's Attributes" on page 9-5.

9.3.1 Using Groups in an LIA Diagram

Groups enable you to organize the objects in a complex diagram so that they are easier to locate and edit. By reducing the number of objects in a diagram, you can more easily focus on the objects currently of interest.

To create a group:

1. Select a group of objects by dragging and dropping a box around them.
2. Click the Group Selected Objects tool.

   The Group Selected Data Objects dialog box is displayed.
3. Enter a name for the group.

   The selected objects are collapsed into a single folder icon.

To display the individual objects in a group, double-click the folder icon. You can work on these objects in the same way as ungrouped objects.

To ungroup the objects, select the group and click the Ungroup Selected Object tool.

9.3.2 Displaying an Object's Attributes

You can expand an object icon in a diagram so that you can examine its attributes. To expand an icon, double-click it. To reduce it to an icon, click the down arrow in the upper right corner.

To generate an LIA diagram for an attribute:

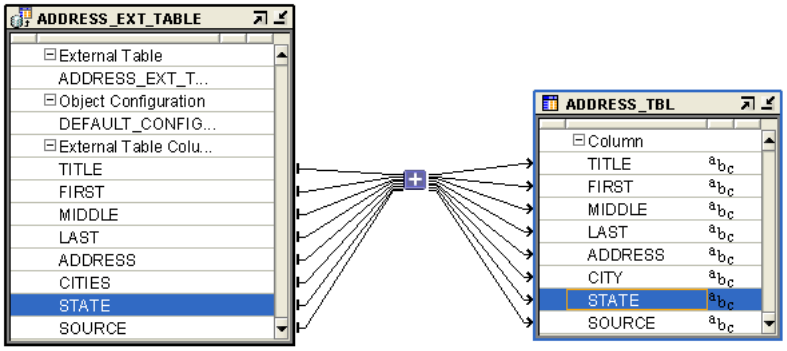
1. Generate an LIA diagram for an object.
2. Double-click the icons to display their attributes.
3. Right-click an attribute and select **Show Lineage** or **Show Impact**.

   The attributes along the lineage or impact path for the selected attribute are highlighted in a different color.

You may use this detailed information for auditing or when planning to propagate changes.

Figure 9–5 shows two expanded icons whose column attributes are connected by a mapping.

Figure 9–5 Expanded Icons in an LIA Diagram



9.4 Propagating Metadata Changes Throughout Warehouse Builder

The LIA diagrams identify all of the objects that may be invalidated by a change to one or more objects. With this knowledge, you can examine the effected objects and modify them as necessary.

You can either modify objects manually or instruct the Dependency Manager to propagate the changes for you.

To manually modify objects:

1. In the Dependency Manager, navigate to the first object to be changed. For example, navigate to a source table.
2. Right-click the object icon in a diagram and select **Open Editor**.

   Warehouse Builder opens the editing tool for the object. For example, if you selected a table, then Warehouse Builder open the Data Object Editor.
3. Make the necessary changes in the editing tool and then save your changes.
4. Repeat these steps for all objects identified in the LIA diagram as needing change.

In the case that only a few objects are effected by a change, then you may prefer to modify the object manually. However, if many objects are effected, you can reduce the possibility of human error by utilizing the propagate change functionality.

To instruct the Dependency Manager to propagate metadata changes for you:

1. Double-click the object icon in a diagram.

   For example, double-click the icon for a source table.
2. Right-click the metadata that you want to change, and select **Propagate Change**.

   For example, right-click a column in the table.
3. Change the attributes as described in "Propagating Changes in the Dependency Manager".
4. Click **OK**.

9.4.1 Propagating Changes in the Dependency Manager

In the Propagate Change dialog box, you specify metadata changes which Warehouse Builder propagates to all dependent objects, as indicated in the Lineage Impact Analysis diagram.

Begin by marking **Propagate** for each attribute you want to change. For example, if you want to change the data type and length for a column, ensure that there are two check marks under Propagate.

Go to **New Value** and type the desired values for each attribute.

9.5 About the Metadata Dependency Manager User Interface

The Metadata Dependency Manager is a graphical interface that represents the potential impact of a change in the definition of an object. It has the following components:

- Menu Bar
- Toolbars
- DM Tree

- Property Inspector
- Canvas
- Bird's Eye View

Menu Bar

The Metadata Dependency Manager menu bar provides commands for performing various tasks. Some of these commands are also available on the toolbars.

Analysis

The Analysis menu contains the following commands:

- **Close**: Closes the Dependency Manager.
- **Export Diagram**: Exports the active diagram to the local file system as an SVG or JPEG file.
- **Print Options**: Provides Print Setup, Preview, and Print options for printing the diagram.

Edit

The Edit menu contains the following commands:

- **Open Editor**: Opens the Editor for the currently selected object.
- **Hide**: Removes the selected objects from the canvas. Use the Refresh command on the View menu to restore the hidden objects.
- **Select All**: Selects all objects displayed on the canvas.
- **Propagate Changes**: Displays the Propagate Changes dialog box for a selected attribute. Use it to change the value of an attribute and to propagate that change to all objects downstream. For example, you can select a column in a table object and change its metadata such as its name or data type.
- **Group Selected Objects**: Creates a group containing the selected objects on the canvas. A folder icon represents all objects in the group. Double-click the icon to display the individual objects in the group. Grouping enables you to reduce clutter on the canvas when there are many objects.
- **Ungroup Selected Objects**: Eliminates the selected group so that all objects are represented individually.
- **Group By Module**: Automatically groups all objects by module. A folder icon represents the module and all objects in the module. Double-click the icon to display the individual objects in the group.
- **Ungroup Modules**: Eliminates the module groups so that all objects are represented individually.

View

The View menu contains the following commands:

- **Toolbars**: Displays or hides the Graphic tools or the Edit tools.
- **Mode**: Sets the pointer for one of these actions:
  - **Select**: Selects one or more objects on the canvas.
  - **Pan**: Moves the entire diagram on the canvas.

  - **Interactive Zoom**: Expands the diagram as you move the pointer down, or shrinks the diagram as you move the pointer up.
  - **Navigate Edge**: Selects the next object in the flow.
- **Zoom**: Displays a list of percentages that expand or shrink the diagram.
- **Fit in Window:** Automatically chooses a size for the diagram so that it fits on the canvas.
- **Auto Layout**: Organizes the objects and displays the diagram at its default size.
- **Center:** Centers the diagram on the canvas.
- **Show Full Impact**: Generates the full impact diagram of the selected object.
- **Show Full Lineage**: Generates the full lineage diagram of the selected object.
- **Show Lineage**: Displays the next level of objects in the lineage diagram of the selected object.
- **Hide Lineage**: Hides the lineage of the selected object.
- **Show Impact**: Displays the next level of objects in the impact diagram of the selected object.
- **Hide Impact**: Hides the impact of the selected object.
- **Expand**: Expands the selected icon in the diagram. The expanded icon shows the details of the object, such as the columns in a table or the attributes in a dimension.
- **Expand All**: Expands all the object icons in the diagram.
- **Collapse**: Collapses the expanded icon for a selected object.
- **Collapse All**: Collapses all the expanded icons on the canvas.
- **Refresh**: Refreshes the Dependency Manager diagram to reflect recent changes in the workspace.

Window

The Metadata Dependency Manager Window menu contains commands for toggling between displaying and hiding the following windows:

- **Property Inspector**
- **Bird's Eye View**
- **Tree View**

Toolbars

The Metadata Dependency Manager provides two toolbars as shortcuts to frequently used commands:

- **Graphic toolbar**: Provides icons for commands on the View menu. Refer to "View" on page 9-7 for descriptions of these commands.
- **Edit toolbar**: Provides icons for commands on the Edit menu. Refer to "Edit" on page 9-7 for descriptions of these commands.

Bird's Eye View

Use the Bird's Eye View to quickly change the portion of the diagram currently displayed on the canvas. This view displays a miniature version of the diagram on the canvas, with a scrollable box that represents the dimensions of the canvas. Drag the box to the area of the diagram currently of interest to you.

DM Tree

Use the DM Tree to change the content of the canvas. The DM Tree has these tabs:

- **DM Context Tree**: Lists objects in the current project. Right-click an object, and use the menu to generate a new diagram or to add the object to the current diagram. You can also drag-and-drop an object onto the current diagram.
- **DM Graph Tree**: Lists the current diagrams. You can close a diagram on the canvas, then use this list to redisplay the diagram without regenerating it.

Property Inspector

Use the Property Inspector to view an object's properties.

To change the current object in the Property Inspector, right-click the object on the canvas and select **Update Property Inspector**.

For a description of a property, select the property in the Inspector. The description appears at the bottom of the window.

Canvas

Use the canvas to display one or more lineage and impact diagrams. Each diagram is displayed on a separate tab.

You can use these techniques to create and manipulate diagrams on the canvas:

- To open a new diagram, right-click an object in the DM Context Tree and select **Show Lineage** or **Show Impact**.
- To close a diagram, click the **X** on the tab. You can redisplay the diagram from the DM Graph Tree until you close the Metadata Management window.
- To add an object to the canvas, drag-and-drop it from the DM Context Tree.
- To display more of the lineage of an object, click the plus sign (+) to the left of its icon. To hide the lineage, click the minus sign (-) to the left.
- To display more of the impact of an object, click the plus sign (+) to the right of its icon. To hide the impact, click the minus sign (-) to the right.
- To display the details of an object, double-click it. You can then select an individual property and edit it by choosing **Propagate Changes** from the Edit menu.
- To edit an object, right-click its icon and select **Open Editor**.

10

Version and History Management

Warehouse Builder provides several solutions for copying and moving metadata for the purposes of backup, history management, and version management. You can either take snapshots of your metadata or use the Metadata Loader (MDL) utility.

Note: A third solution is to utilize Transportable Modules, which requires the licensing of the Oracle Warehouse Builder Enterprise ETL Option. Refer to Chapter 12, "Moving Large Volumes of Data with Transportable Modules" for more information.

Snapshots enable you to capture the metadata definitions of design objects created in the Project Explorer. You can capture all the design objects in a project or selectively choose objects in a project to include in a snapshot.

The Metadata Loader utility enables you to copy and move all types of metadata objects in a repository. With this utility, you can move metadata between Oracle Database repositories that reside on platforms with different operating systems.

With both solutions, you can export the metadata into a third-party version control tool such as Oracle Repository, ClearCase, or SourceSafe.

This chapter includes the following topics:

10.1 Snapshots Versus the Metadata Loader

Because snapshots and the Metadata Loader have overlapping capabilities, it may not be readily apparent when to use one versus the other. In general, snapshots address the needs a development team for tracking changes to an evolving design; the Metadata Loader facilitates the more traditional adminstrative tasks of backing up, restoring, and migrating repositories.

A key factor to understand is that snapshots and the Metadata Loader differ in the scope of objects they handle. Snapshots are limited to handling only the design objects users create in the Project Explorer. The Metadata Loader, however, handles everything in the repository including all design objects and information related to location and security.

Refer to Table 10–1 for a list of important differences between the two tools.

Table 10–1 Snapshots Versus the Metadata Loader

Feature	Snapshots	Metadata Loader
Scope	Captures metadata related to objects in the Project Explorer only. Captures metadata for mappings, process flows, and other design objects. Does not capture information about locations, security, and user defined objects.	Captures all metadata related to a repository including all design objects and information about locations, security, and user defined objects.
Output	You can create a full snapshot from which to restore objects. Or you can create a signature snapshot which requires less space and enables you to track changes but not restore objects. Both types of snapshots are stored in the Oracle Database.	When exporting, the Metadata Loader creates a ZIP file with the extension .mdl.You can use the output to restore a repository or populate a new repository on a different Oracle Database.
Integration with Version Control Tools	You can save the output as a file and then export the file into a version control tool.	You can export MDL files into a version control tool. When using the GUI, first extract the MDL file before putting the objects into the version control system. When using the OMB Plus scripting language, set ZIPFILEFORMAT=N as described in "About Metadata Loader Control Files" on page 10-9.
Compatibility	Snapshots are not compatible between releases of Warehouse Builder.	MDL files are upwards compatible with newer releases of Warehouse Builder. When you import an MDL file from a previous release, the utility automatically upgrades the metadata to the new release.
Object Locking		To import, the Metadata Loader must obtain a lock on all the primary objects. If a necessary lock is not available, the import fails and the Metadata Loader rolls back any changes.
Compare	You can compare snapshots by launching a command in the user interface.	You can compare MDL files by using a third party diff tool.

10.2 About Snapshots

Using snapshots, you can backup and restore your metadata, maintain a history of metadata changes, and compare different versions of the metadata.

A snapshot captures all the metadata information about the selected objects and their relationships at a given point in time. While an object can only have one current definition in a workspace, it can have multiple snapshots that describe it at various points in time. Warehouse Builder supports the following types of snapshots:

- *Full snapshots* provide backup and restore functionality.
- *Signature snapshots* provide historical records for comparison.

Snapshots are stored in the Oracle Database, in contrast to Metadata Loader exports, which are stored as separate disk files. You can, however, export snapshots to disk files.

Snapshots can be useful to both warehouse managers and designers. Managers can use full snapshots to perform large-scale actions, such as deploying a warehouse or restoring a warehouse to a previous point in history. Designers can create full snapshots of a particular component under development so that, if necessary, they can restore the component to its previous state. They can also use signature snapshots to track the changes made to a particular component.

When used with other facilities, such as MDL metadata imports and impact analyses, snapshots can help you manage your metadata. For example, you can use snapshots to

determine the impact an MDL metadata import will have on the current metadata workspace. With the knowledge gained by the comparison, you might import the metadata at a lower level of detail to avoid overwriting the definition of related metadata objects.

Snapshots are also used to support the recycle bin, providing the information needed to restore a deleted metadata object.

This chapter describes the metadata change management feature using the graphical user interface. For information about creating and managing snapshots using scripts, see *Oracle Warehouse Builder API and Scripting Reference*.

10.2.1 Creating Snapshots

When you take a snapshot, you capture the metadata of all or specific objects in your workspace at a given point in time. You can use a snapshot to detect and report changes in your metadata.

You can create snapshots of any objects that you can access from the Project Explorer.

Note that a snapshot of a collection is not a snapshot of just the shortcuts in the collection but a snapshot of the actual objects.

10.2.1.1 Opening the Create Snapshot Wizard

To open the Create Snapshot wizard and create a snapshot:

1. In the Project Explorer, select all the components you want to include in the snapshot. You do not need to select parent or child objects, because the wizard does that for you.

   For example, if you select a collection that contains two cubes, then the snapshot includes both cubes and any gives you the option to include any dependent objects such as dimensions and source tables.

2. Right-click and select **Snapshot**, then **New**.

   or

   From the Design menu, select **Snapshot**, then **New**.

3. On the Name page, specify a name and the type of snapshot.

   You can optionally provide a description.

4. Click **Next** to open the Components page of the wizard.

   The page displays the components to be captured in the snapshot. If a component is a node level object, such as a module, then select the Cascade option to include the subcomponents.

5. On the Dependency page, specify the depth of dependency to include dependent objects in the snapshot.

6. Click **Next** to view the Finish page which provides the details of the snapshot.

7. Click **Finish** to create the snapshot.

10.2.2 Adding Components to a Snapshot

After you create a snapshot, you can add more components. Keep in mind, however, that when you add components, you are changing the historical record provided by the snapshot, so its creation date changes.

To update a snapshot, use the Add to Snapshot wizard.

10.2.2.1 Opening the Add to Snapshot Wizard

To open the Add to Snapshot wizard and add new components:

1. In the Design Center Project Explorer, select all the components you want to add to the snapshot. For example, you can select tables, mappings, and dimensions from an Oracle module.
2. From the Design menu, select **Snapshot**, then **Add to Existing**.

   or

   Right-click and select **Snapshot**, then **Add to Existing**.

   The Welcome page of the Add to Snapshot wizard is displayed. The Welcome page lists the steps of the wizard.
3. Click **Next**.

   The Snapshot page is displayed. From the list, select the snapshot to which you want to add the components.
4. Click **Next**.

   The Components page is displayed. The page displays the components to be added to the snapshot. If a component is a folder level object, such as a module, then select the Cascade option to include the subcomponents.
5. Click **Next**.

   The Finish page displays the details of the components to be added.
6. Click **Finish** to add the components to the snapshot.

10.2.3 Managing Snapshots

You can manage your snapshots from the Metadata Change Management window in the Design Center. To open this window, select **Change Manager** from the Tools menu.

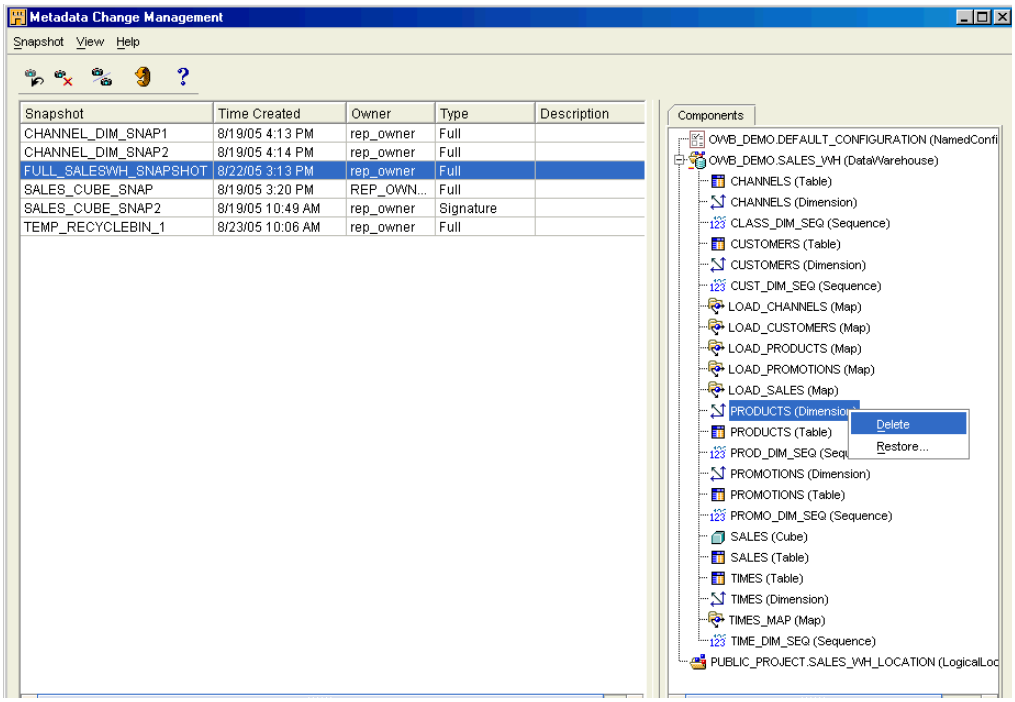
The Metadata Change Management window contains a menu bar and a toolbar. You can start most tasks in several different ways, either by using the menus, clicking the tools, or right-clicking a snapshot or a component.

You can perform the following activities from the Metadata Change Management window:

- Managing Snapshot Access Privileges
- Comparing Snapshots
- Restoring Workspace Objects From Snapshots
- Exporting and Importing Snapshots
- Deleting Snapshots

Figure 10–1 shows the Metadata Change Management window.

Figure 10–1 Metadata Change Management Window



10.2.3.1 Managing Snapshot Access Privileges

You can control access to snapshots just like any other object. By default, everyone has full access rights to the snapshots.

To change access privileges:

1. In the left section of the Metadata Change Management window, right-click the name of the snapshot.
2. Click **Security** from the menu.

   The Snapshot Privilege Management dialog box is displayed.
3. For each role and user, select the privileges you want to grant and clear the privileges you want to deny. Click **Help** for additional information.

10.2.4 Comparing Snapshots

You can compare two snapshots or a snapshot with a current workspace object. The results list all objects and identify which objects are identical, which objects appear only in one place, and which objects appear in both but are not the same.

If you take a snapshot of a parent object and a child object changes, a snapshot comparison will show the parent object as having changed. For example, if you create a Cascade snapshot of a project, all the modules in that project are its children. If any of the modules change, a comparison of the snapshot to the workspace will show that the project has changed.

The Metadata Change Manager uses Universal Object Identifiers (UOIDs) as the basis for all comparisons. When you delete an object and re-create it with the same metadata, the object has a different UOID although it may be identical to the deleted object in all other aspects. When you compare the re-created object to its original version, the results show that all the metadata has changed. Likewise, objects will not

match if they have been deleted and re-created during an import or Intelligence Object derivation.

10.2.4.1 Comparing Two Snapshots

Use one of the following methods:

1. From the Metadata Change Management window, select **Compare** from the Snapshot menu.

   Or

   Select the two snapshots you want to compare, right-click, and select **Compare**.

   The Compare Two Snapshots dialog box is displayed. Snapshots that were selected in the Metadata Change Management window are also selected in the Compare Two Snapshots dialog box.

2. If you have not selected two snapshots for comparison yet, select one from each list.

3. Click **Compare.**

   The Snapshot Comparison window displays the differences between the two objects. If there are none, then a message informs you that the objects are the same. For more information, click **Help**.

10.2.4.2 Comparing a Workspace Object with a Snapshot Component

To compare the current version of an object with a snapshot version:

1. Select the object you want to compare from the Design Center Project Explorer.

2. Right-click, select **Snapshot**, and then **Compare**.

   The Choose Snapshot dialog box is displayed with a list of all the snapshots containing versions of that object.

3. Select the snapshot you want to compare with the current workspace object.

4. Click **OK.**

   The Snapshot Comparison window displays the differences between the two objects. If there are none, then a message informs you that the objects are the same.

10.2.5 Converting a Full Snapshot to a Signature Snapshot

You can convert full snapshots to signature snapshots when they are no longer needed for backup. Conversion preserves the snapshot history and results in significant space savings in your workspace.

> **Note:** Converting a full snapshot to a signature snapshot means that you can no longer use that snapshot to restore metadata objects.

To convert a full snapshot:

1. Open the Metadata Change Management window, as described in "Managing Snapshots" on page 10-4.

2. Select the snapshot that you want to convert.

3. From the Snapshot menu, select **Convert to Signature**.

4. On the Warning box, click **Yes**.

10.2.6 Restoring Workspace Objects From Snapshots

You can replace the current definition of an object in the workspace with the snapshot image of that object. You can only use full snapshots; you cannot restore objects from signature snapshots. You can restore all components or only selected components of the snapshot.

Note: When you restore a collection from a snapshot, you restore both the collection and the actual objects.

Similarly, when you restore a container, all its child objects are also restored.

To restore only the collection or selected objects within a container, use the Components tab.

To restore objects from a snapshot:

1. Save any work that you have done in the current session.
2. Open the Metadata Change Management window, as described in "Managing Snapshots" on page 10-4.
3. Select the snapshot that contains the version of the objects you want to restore.
4. To restore all objects, right-click the snapshot and select **Restore**.

   or

   To restore selected components, select them on the Components tab, right-click, and select **Restore**.

   The Restore Snapshot dialog box is displayed.
5. Review the objects in the list and verify that the correct objects will be restored.
6. Select **Cascade Up** to restore a component whose parents no longer exists in the workspace. Warehouse Builder creates new parent objects for the component. Otherwise, the procedure will fail.
7. Click **Restore**.

10.2.7 Exporting and Importing Snapshots

You can export a full snapshot to an MDL file and use this file to re-create metadata objects either in the same database or a different one. You cannot export signature snapshots or individual components of a snapshot.

To export a snapshot:

1. Open the Metadata Change Management window and select the full snapshot you want to export.
2. From the Snapshot menu, select **Export**.

   The Metadata Export dialog box is displayed.
3. Click **Help** for information about completing the dialog box.

To import a snapshot:

1. Open the Design Center and select **Import** from the Design menu.

2. Select **Warehouse Builder Metadata** from the menu.

   The Metadata Import dialog box is displayed.

3. Click **Help** for information about completing the dialog box.

The imported snapshot will be listed in the Metadata Change Management window.

10.2.8 Deleting Snapshots

You can delete snapshots or components within a snapshot from the Metadata Change Management window.

To delete a snapshot:

1. Open the Metadata Change Management window and select the snapshot you want to delete.
2. Right-click the snapshot and select **Delete**.

   Or

   From the Snapshot menu, select **Delete.**

   Warehouse Builder displays a delete confirmation box.

3. Click **Yes** to delete the selected snapshot from the workspace.

To delete components from a snapshot:

1. Open the Metadata Change Management window and select the snapshot from which you want to delete components.
2. On the Components tab, select the components, right-click, and select **Delete**.

   Or

   From the Snapshot menu, select **Delete.**

   Warehouse Builder displays a delete confirmation dialog box.

3. Click **Yes** to delete the selected component from the snapshot.

10.3 Version and History Management with the Metadata Loader (MDL)

Using the Metadata Loader (MDL) utility, you can import and export metadata from any object in the Project Explorer, Global Explorer, and Connection Explorer. You can then move exported files into a third-party version control tool such as Oracle Repository, ClearCase, or SourceSafe. You can enter annotations for your MDL export file to keep track of the information contained in the file.

The Metadata Loader (MDL) enables you to populate a new repository and transfer, update, or restore a backup of existing repository metadata. You can copy or move metadata objects between repositories, even if those repositories reside on platforms with different operating systems.

10.3.1 Accessing the Metadata Loader

You can access the Metadata Loader using either the graphical user interface described in this chapter or using the OMB Plus scripting language described in Oracle Warehouse Builder API and Scripting Reference.

While the graphical interface guides you through the most commonly performed export and import tasks, the OMB Plus scripting language enables you to perform more specialized export and import tasks and enbables you to manage a control file.

About Metadata Loader Control Files

When you use the OMB Plus commands related to the Metadata Loader, a control file provides you with greater control over how objects are imported or exported. For example, by default, the Metadata Loader exports objects into a binary zip format. To override the default of exporting to a zip file, use OMBEXPORT MDL_FILE with the CONTROL_FILE option with a control file that contains the option ZIPFILEFORMAT=N.

For more information about using a control file with the Metadata Loader, refer to the appendix in Oracle Warehouse Builder API and Scripting Reference. For information about each command, look up the following commands also in the Oracle Warehouse Builder API and Scripting Reference.

- OMBIMPORT
- OMBEXPORT
- OMUIMPORT
- OMUIMPORT MDL_FILE
- OMBIMPORT MDL_FILE
- OMUEXPORT MDL_FILE
- OMBEXPORT MDL_FILE

10.4 Using Metadata Loader in the Design Center

You can use the Design Center to run the Metadata Loader utilities. The Design Center provides a graphical interface that guides you through the process of exporting and importing metadata.

10.4.1 Exporting Metadata from the Design Center

You can use Design Center to export objects from a workspace into an MDL file. This includes objects that are part of the Project Explorer, Connection Explorer, and Global Explorer. The information related to the exported objects, such as table columns and their constraints, data loading configuration parameters, and named attribute sets, are also exported.

You have two option for exporting metadata. You could either export the entire design or you could export selected objects in the workspace. If you want to export select objects, then those objects must be within the same explorer. For example, you cannot export a table from the Project Explorer and a public transformation from the Global Explorer at the same time. You can export them in two separate steps.

To export metadata from a workspace using the Design Center:

1. Ensure that you are the only user accessing the objects to be exported.

   To ensure that you are exporting the most up-to-date metadata, it is adviseable to ask all other users to log out of the workspace. For more details, see "Multiple Session Concurrency and MDL" on page 10-23.

Also ensure you have the READ privilege on the objects to be exported. For details, see "Access Privileges Required to Export Metadata" on page 10-10.

2. From the Design Center, select the object or objects you want to export.

   You can select multiple objects by holding down the Ctrl key and selecting the objects.

   You can export individual objects such as tables or groups of objects. When you export projects nodes, or modules, you also export the objects they contain. When you export collections, you also export the objects they reference.

3. From the **Design** menu, select **Export** and then **Warehouse Builder Metadata**.

   If you made changes to the repository metadata prior to running the export utility, a warning dialog box is displayed. Click **Save** to save changes or **Revert** to revert to the previously saved version.

   If you have not made any changes to the repository metadata after last saving the design, the Metadata Export Dialog Box is displayed.

4. Ensure the destination computer has sufficient disk storage.

   If you lack sufficient disk space on the computer to which you export the metadata, the export fails. Your destination computer must be able to contain the entire metadata file. The export utility cannot save portions of the metadata file.

Access Privileges Required to Export Metadata

Before you attempt to export metadata, ensure you have READ privileges on any object that you want to export. You also need to have READ privileges on folder objects. If you do not have READ privileges on a folder object, such as projects or modules, the folder object and all objects that it contains will not be exported. During an export, the Metadata Export Utility skips objects for which you do not have READ privileges. It logs information about the list of objects that have not been exported due to lack of security privileges in the Metadata Loader Log File.

By default, READ privileges are provided on all the workspace objects to all registered users. If you want to export security information such as users, roles, role assignments, and object privileges, see "Export Advanced Options Dialog Box" on page 10-11.

10.4.1.1 Metadata Export Dialog Box

The Metadata Export dialog box displays the names and the types of objects being exported. It also contains the following:

- **Annotations:** Use this field to enter any comments about the file that contains the exported objects.
- **File Name:** Displays a default path and file name for the export file. You can retain this default or specify a directory and file name. Type the name of the export file to create or click **Browse** to locate a directory or file. The file name extension commonly used is .mdl.
- **Log File:** Use this field to specify the file name and path for the log file that stores diagnostic and statistical information about the export. For more information about log files, see "Metadata Loader Log File" on page 10-23.
- **Export all object dependencies:** Select this option to export all the dependencies of the objects being exported. For example, when you export a table, the location to which the table is deployed is also exported.

> **Note:** Public objects such as locations, public transformations, public experts, public icon sets, or public data rules belong to a project called PUBLIC_PROJECT. You can export the PUBLIC_PROJECT and its objects if the selected exported objects have a dependency on the public objects and if you select the **Export all object dependencies** option.

- **Advanced:** Use the Advanced button to export additional metadata such as user-defined properties, security information, and additional languages. For more information about the advanced options, see "Export Advanced Options Dialog Box" on page 10-11.

Click **Export** to export the metadata for the selected objects. The Metadata Export Progress dialog box is displayed. For more information about the contents of this dialog box, see "Metadata Progress Dialog Box" on page 10-11.

10.4.1.1.1 Metadata Progress Dialog Box The Metadata Progress dialog box displays a progress bar that indicates the progress of the metadata export, import, or upgrade activity. If the export or import is successful, a message indicating this is displayed just above the progress bar. An error in the process is displayed too.

To view detailed information about the metadata export or import, click **Show Details**. The message log is displayed. The message log contains the following information:

- Start time of the export or import
- Names and types of objects exported or imported
- Warning or error messages
- End time of the export or import
- Location of the export or import log file
- Total export or import time in hh:mi:ss or milliseconds

You can hide the message log by clicking **Hide Details**.

To view details about the exported or imported objects, click **Show Statistics**. The Metadata Export Results dialog box is displayed. For more information about this dialog box, see "About Metadata Loader Results" on page 10-24.

Once the export or import completes, the Close button is enabled. To exit the Metadata Export or Metadata Import Utility, click **Close**.

10.4.1.2 Export Advanced Options Dialog Box

Use the Export Advanced Options dialog box to export any of the following:

- Additional language metadata
- User-defined definitions
- Security information

This dialog box contains two sections: Languages and Administration.

Languages

The **Base Language** field displays the base language of the repository. Warehouse Builder exports data in the base language.

You can specify additional languages to export for the objects that contain translations for their business names and descriptions. The **Available Languages** list displays the list of languages that are installed in the repository. To export additional languages, select the language and click the arrows to move the language from the Available Languages list to the **Selected Languages** list. You can choose multiple languages at the same time by holding down the Ctrl or Shift key while making your selection.

> **Note:** The Available Languages list will contain language entries only if you installed additional languages in the repository.

For example, the repository has the base language as American English and additional languages Spanish and French. While exporting metadata from the repository, you can select French as the additional language. The Metadata Export Utility then exports the base language of the object, American English, and the additional language French for objects that contain a French translation. Note that additional languages will be exported for an object only if they contains translations for the business names and descriptions.

Administration

You can export additional metadata if you have administrator privileges. The options you can choose to export additional metadata are as follows:

- **Export user-defined definition:** Select this option to export the definitions of user-defined objects and user-defined properties. This option is enabled only if you have created any user-defined objects or properties for the objects being exported.
- **Export security information:** Select this option to include security information such as object privileges or role assignments made to users. For more information about security, see *Oracle Warehouse Builder Installation and Administration Guide*.

After you specify the options on the Export Advanced Options dialog box, click **OK** to close this dialog box and return to the Metadata Export dialog box.

10.4.2 Importing Metadata Using the Design Center

You can use the Design Center to import metadata. The Metadata Import Utility also automatically upgrades metadata that was created using an earlier version of Warehouse Builder to the current version. For more information about upgrading metadata, see "Upgrading Metadata from Previous Versions" on page 10-19.

Before Importing Metadata

Before you attempt to import metadata, ensure you have the following:

- **Required access privileges:** To import metadata, the user performing the import must have the following privileges:
  - `EDIT` privilege on existing objects that are being replaced by the import.
  - `CREATE` privilege on existing folder objects under which new objects will be created by the import.

  By default, the `FULL_CONTROL` privilege is assigned on all workspace objects to registered users. The Metadata Import Utility skips objects for which the user importing metadata does not have the required privileges. The list of objects that have not been imported due to security privileges are logged to the Metadata Loader Log File.

You can import security information such as users and roles as described in "Import Advanced Options Dialog Box" on page 10-16. When importing user metadata, if a corresponding database user does not exist for a user, the import will fail and an error message is written to the Metadata Loader Log File.

Because the Metadata Import Utility is altering the repository, the metadata objects must be locked prior to importing. For more details, see "Multiple Session Concurrency and MDL" on page 10-23.

- **A backup of your current workspace:** Consider taking a backup of your existing workspace (either in the form of an export or a metadata snapshot) before attempting a large or complex import.
- **Multiple Language Support base language compatibility:** The base language is the default language used in the repository and is set using the Repository Assistant during installation. You cannot alter this setting after installing the repository. For more information about setting the base language in a repository, see *Oracle Warehouse Builder Installation and Administration Guide*.

To import objects from an export file using the Design Center:

1. From the Design Center, select **Design**, **Import**, and then **Warehouse Builder Metadata**.

   If you had made changes to the repository metadata prior to running the import utility, a warning dialog box is displayed. Click **Save** to save changes or **Revert** to revert to the previously saved version.

   If you have not made any changes to the repository metadata after last saving the design, the Metadata Import dialog box is displayed.

10.4.2.1 Metadata Import Dialog Box

Use the Metadata Import dialog box to specify the information required to import metadata contained in an export file. Specify the following information on this dialog box:

- File Name
- Log File
- Object Selection
- Import Option
- Match By

Click **Advanced** to import metadata for additional languages, security information, or user-defined properties. For more information about advanced options, see "Import Advanced Options Dialog Box" on page 10-16.

Click **Show Summary** to view a summary of the export file contents. For more information about the export file contents, see "File Summary Dialog Box" on page 10-17.

After specifying the options on the Metadata Import dialog box, click **Import** to import the metadata from the MDL file. The Metadata Import Progress dialog box that indicates the progress of the import is displayed. For more information about this dialog box, see "Metadata Progress Dialog Box" on page 10-11.

Note: If the MDL file that you selected for import was created using an earlier version of Warehouse Builder, clicking **Show Summary**, **Advanced**, or **Import** displays the Metadata Upgrade dialog box. This dialog box enables you to automatically upgrade the selected MDL file to the current version of Warehouse Builder. For more information about this dialog box, see "Metadata Upgrade Dialog Box" on page 10-20.

File Name Type the name of the MDL file or click **Browse** to locate the MDL file you want to import.

Log File Type the name of the log file, along with the path, that will store diagnostic and statistical information about the import. You can also click **Browse** to locate the log file. For more information about log files, see "Metadata Loader Log File" on page 10-23.

Object Selection The Metadata Import Utility enables you to select the objects that you want to import from the MDL file. The Object Selection section contains the following options:

- **Import all objects from file**

  Select this option to import all objects contained in the export file.

- **Import selected objects from file**

  Select this option to import only some of the objects contained in the MDL file. Click **Select Objects** to select the objects that you want to import. The Import Object Selection dialog box is displayed. This dialog box contains two sections: Available and Selected. The Available section contains the primary objects such as projects, modules, tables, views, connections that are specified in the MDL file. Expand the nodes in this section to view the objects they contain. When you select a node, all the objects that it contains are included in the import. For example, if you select a module node, all the objects contained in the module are imported. Use the shuttle buttons to move the selected objects from the Available section to the Selected section.

  The MDL file being imported can also contain administrative objects. To import these administrative objects, the user performing the import must have administrative privileges. If the user performing the import does not have the required privileges:

  – If the MDL file contains some administrative objects, the Available section of the Import Object Selection Page dialog box does not displays these objects.

  – If the MDL file contains only administrative objects, the Import Utility displays an alert informing that the user does not have the required administrative privileges to perform the import.

Import Option Use the Import Option section to select the import mode. You can select one of the following options for the import mode:

- **Create new metadata only**

  This option adds new objects to a workspace. It is referred to as the create mode.

- **Update metadata (replace existing objects and create new metadata)**

This option is referred to as the update mode. Selecting this option adds new objects to a workspace and replaces existing objects with those in the MDL file being imported.

- **Merge metadata (merge existing objects and create new metadata)**

  When you select this option, the MDL adds new objects and overwrites existing objects in the workspace only if they differ from those in the MDL file. This option is referred to as the merge mode. The merge mode does not delete existing objects.

  Note: You cannot import metadata using the Merge mode for mappings, pluggable mappings, and data auditors.

- **Replace existing objects only**

  Selecting this option replaces existing objects in your workspace but does not add new objects. When importing metadata objects, the Metadata Import Utility overwrites any existing metadata when you use this mode. This mode is called the replace mode.

When you import metadata using the Update or the Replace modes, the import completely replaces the child objects of existing objects so that the final object is exactly the same as the source object. Any existing children of a repository object that are not replaced or added are deleted. This occurs regardless of whether a child object occurs in a mapping or is a foreign, primary, or unique key column in a table or view.

For example, in the MDL export file, the `CUST` table contains three columns with the physical names: `last_name`, `first_name`, and `middle_init`. In the workspace, the same table already exists, and contains four columns with the physical names: `last_name`, `first_name`, `status`, and `license_ID`. During a replace operation, the columns `last_name` and `first_name` are replaced, column `middle_init` is added, and column `status` and `license_ID` are deleted. The final result is that the `CUST` table in the workspace contains the same metadata from the `CUST` table in the export file.

Tip: Using the replace and update modes can result in lost data constraints, metadata physical property settings, data loading properties, and mapping attribute connections. If you choose to use replace or update modes, ensure that you can restore your workspace, from a backup, to that state it was in prior to importing metadata in replace or update mode.

Match By

When you use the metadata import utility, it first searches the workspace for metadata objects that exist in the workspace and compares them to those in the file you are importing. To compare metadata in the import file with the existing workspace metadata, it uses the matching criteria. How the comparison is made is determined by the import mode and by the search method you choose.

The Match By section provides the following options for matching criteria:

- **Universal Identifier:** Searches your workspace using the Universal Object Identifiers (UOIDs) of the objects you are importing. The Metadata Import Utility uses these UOIDs to determine whether an object needs to be created, replaced, or merged during the import operation. Use this method if you want to maintain UOIDs across different workspaces even when object names in the target workspace have changed.

- **Names:** Searches your workspace using the names of the objects that you are importing. Physical names are exported to the export file. The physical name determines whether an object needs to be created, replaced, or merged during an import operation. Use this method when object names in the target schema change, and you want to create new UOIDs for those objects.

  By default, the import utility searches by UOIDs.

  Note: MDL import does not support merging existing mappings.

10.4.2.2 Import Advanced Options Dialog Box

Use the Import Advanced Options dialog box to import any of the following:

- Additional language metadata
- User-defined definitions
- Security information such as object privileges and role assignments to users

The Import Advanced Options dialog box contains the following sections: Languages and Administration.

Languages

The Base Language displays the base language of the repository. By default, data is imported in the base language.

You can specify additional languages to import. The Metadata Import Utility imports the translations of the object for business name and description. The Available Languages list displays the list of languages that are specified in the MDL file. For example, the MDL file contains the additional languages French, German, and Spanish. But your repository contains only Spanish and German as the additional languages. Then the Available Languages list displays only Spanish and German. Select the language you want to import and click the arrow to move the language to the Selected Languages list. You can choose multiple languages at the same time by holding down the Ctrl or Shift key while making your selection. For more information about importing metadata in additional languages, see "Import Different Base Languages" on page 10-18.

Administration

This option is available only if you have administrator privileges and the metadata exists in the MDL file being imported. This section enables you to import the following additional metadata:

- **User-defined definitions:** To import the definitions for the user-defined objects and the user-defined properties, select the **Import User-defined Definitions** option.
- **Security Grants:** Select **Import security information** to import security information such as object privileges and role assignments made to users.

If the MDL file contains any of these objects, then you can import this additional metadata.

When you import and MDL file into a new workspace, if you want to inherit the security information from the old workspace, you must import the security information before you import other objects. To do this you need to be connected to the workspace as a user with administrator privileges.

After you make your selections on the Import Advanced Options dialog box, click **OK** to save your selections and return to the Metadata Import dialog box.

Name Conflicts

Name conflicts can occur in one of the following cases:

- A different object with the same name already exists in the target workspace.
- A different object with the same business name already exists in the target workspace.
- A different object with the same UOID already exists in the workspace.

When a name conflict occurs, the MDL reports an error and terminates the import.

10.4.2.3 File Summary Dialog Box

The File Summary dialog box contains a brief summary of the contents of the export file. The information on this page is divided into the following sections: File, Administration, and Statistics.

File

The File section contains the name of the data file, the creation timestamp, the name of the export user, the workspace connection information, the version of the Design Center used for the export, and annotations.

Administration

The Administration section contains information about the users and roles. It also lists the following details:

- Base language of the export file
- Additional languages in the export file
- Whether security information were included in the export file
- Whether user-defined definitions were included in the export file

Statistics

The Statistics section contains details about the types of objects contained in the export file and the number of objects of each type.

10.4.2.4 Combining Import Modes and Matching Criteria

Each search method used as matching criteria can be combined with an import mode in several different combinations. Each combination can offer different results in the import process. The mode that you select determines how the metadata import utility will search for metadata objects in the workspace prior to importing.

For example, if the search is by the name of a repository object in the export file, the Metadata Import Utility searches the workspace for the object's name. If an object with the corresponding name is not found, the resulting actions are based on the import mode you select.

Table 10–2 describes what happens in the available import modes for repository objects that do not match the object names.

Table 10–2 Import Mode without Matching Names

Import Mode	Result
Create Mode	A new object is created.
Replace Mode	A warning message is written to the log file that the object cannot be replaced because it does not exist in the workspace. The object is skipped.
Update Mode	A new object is created.
Merge Mode	A new object is created.

Table 10–3 describes what happens in the available import modes for repository objects that match the object names.

Table 10–3 Import Mode with Matching Names

Import Mode	Result
Create Mode	A message is written to the log file that the object already exists and the object is skipped.
Replace Mode	The object is replaced.
Update Mode	The object is replaced.
Merge Mode	The object is merged.

The MDL reads and processes the imported metadata and writes status and diagnostic information in the log file.

10.4.2.5 Import Different Base Languages

When you import metadata in multiple languages, the language settings in the target repository can be different from the language settings in the export file. For example, the target repository can have the base language as English and additional language as French and German. But the export file can have the base language as French and additional language as English and German. This section describes how the MDL handles these conditions.

Base Language of the MDL Import File Different From the Base Language of the Target Repository

When you import metadata, MDL compares the ISO identification of the base language in the import file with the ISO identification of the base language of the target repository. The ISO identification consists of the language ID followed by the locale, in the format *language_locale*. For example, en_US is American English and fr_FR is French.

If the base ISO identification languages are different, MDL displays a warning dialog box informing you that the base languages are different and warns you that Oracle recommends that you import metadata with the same character set and base language. You have the option to continue with the import. Click **Yes** to continue with the import. Click **No** to cancel the import.

WARNING: Under certain circumstances, continuing to import metadata when the base languages are different could mean corruption of the metadata being imported.

It is recommended that you move metadata between repositories with the same character set and base languages.

If the base ISO identification languages are the same, but the locales are different, the Metadata Import Utility displays a warning dialog box asking if you want to continue with the import. For example, the export file contains English and the base language of the repository is American English. Click **Yes** to import metadata. Click **No** to cancel the import.

Importing Supported Languages

During an import, MDL checks if the additional languages in the import file exist in the target repository. If the import file contains additional languages that do not exist in the target repository, and you specify that these additional languages are to be imported, the Metadata Import utility writes a warning message in the MDL log file stating that the additional languages are not installed in the repository.

10.4.2.6 Validation Rules Governing Import

When you import a set of definitions from exported metadata, the import utility can update existing definitions in a project. However, certain metadata definitions require attention to ensure that they are updated. The following are examples of some of the errors you can see:

- **Mapping Definitions.** The Metadata Import Utility will bind imported mapping operators to their physical objects if the associated objects exist in the workspace. However, if the associated physical objects do not exist in the workspace, the imported mapping operators are unbound. The Metadata Import Utility writes a warning message in the log file stating that the mapping operators are not bound. You must then synchronize the new mapping operators with the physical objects they represent.
- **Foreign Key Definitions.** It is possible that a source MDL file can contain foreign key references to unique or primary keys that are not in the target workspace. If the referenced unique or primary keys for any foreign key appearing in the MDL file does not exist in the target workspace, the MDL Import Utility writes a warning message in the log file. This message will state that the workspace does not contain a referenced key for the foreign key.

10.4.3 Upgrading Metadata from Previous Versions

While importing metadata, the Metadata Import Utility automatically upgrades metadata created using previous versions to Oracle Warehouse Builder 11*g* Release 1 (11.1). You do not need to manually upgrade your metadata from a previous version of Warehouse Builder.

When you import an MDL file, the version used to create the file is detected. If the MDL file was created using an earlier version earlier, the Metadata Upgrade dialog box is displayed. This dialog box enables you to upgrade the MDL file to the current version. For more information about the contents of this dialog box, see "Metadata Upgrade Dialog Box" on page 10-20.

If you import an .mdl file containing metadata for gateway Modules, such as DB2 or Informix, from an older version of Warehouse Builder, the file may not import the metadata into the corresponding source module folders in a project. The imported files are stored under the Others node in the Project Explorer. You need to manually copy the metadata for the gateway modules into the correct source module folders.

The production versions of Warehouse Builder from which metadata is automatically upgraded to Oracle Warehouse Builder 11*g* Release 1 (11.1) are as follows:

- Oracle Warehouse Builder 2.0.4 and 2.0.5
- Oracle Warehouse Builder 2.1.1
- Oracle Warehouse Builder 3.0 and 3.1
- Oracle Warehouse Builder 9.0.2, 9.0.3, and 9.0.4
- Oracle Warehouse Builder 9.2
- Oracle Warehouse Builder 10*g* Release 1
- Oracle Warehouse Builder 10*g* Release 2

10.4.3.1 Metadata Upgrade Dialog Box

This dialog box is displayed automatically when it is determined that the MDL file being imported was created using a previous version. Use the **File Name** field to specify the name of the file that stores the upgraded MDL file. You can also click **Browse** to locate a directory or MDL file.

Click **Upgrade** to upgrade the MDL file to the current version. After the Upgrade completes, the Metadata Upgrade dialog box is closed. Click **Cancel** if you do not want to upgrade the MDL file.

10.4.3.2 Changes to Workspace Objects After Upgrading to Oracle Warehouse Builder 11*g* Release 1

When you upgrade from previous versions to the current version, the upgrade utility makes the following changes to objects in the workspace:

- **My Project:** The sample project that is prepackaged in Warehouse Builder is renamed from My Project to `MY_PROJECT` to comply with physical name requirements.
- **External Processes:** External processes are upgraded to external process activities in a process flow. If you defined an external process in a mapping in a previous release, MDL Upgrade Utility redefines the object as an external process in a process flow.
- **Business Areas:** Business areas are upgraded to Collections. If you defined a business area in a previous release, the MDL File Upgrade Utility prefixes the module name to the business area name and redefines it as a collection. For example, a business area named `ORDERS` in a module named `REGION1` is upgraded to a collection named `REGION1_ORDERS`.
- **External process mappings:** External process mappings will be migrated to process flows.
- **Dimension and Cube Mapping Operators:** The mapping operators for dimensions and cubes are converted to table operators. These table operators use the physical tables created by the MDL Upgrade Utility for dimensions and cubes.

- **Dimensions:** An associated dimension table is created with the same name as the dimension. The table contains the columns, constraints, and attribute sets defined in the Dimension Editor Table Properties of the dimension in the previous release.
- **Mapping Display Sets for Dimension Hierarchies:** Any mapping sets originally created based on the named attribute set for a dimension hierarchy are removed. This is because display sets for dimension hierarchies are no longer automatically created and maintained.
- **Dimension Attributes:** For each level attribute upgraded, a dimension attribute with the same name is created, if it does not already exist in the dimension.
- **Cubes:** An associated cube table is created with the same name as the cube. The cube table contains columns, constraints, and attribute sets defined in the Cube Editor Table Properties of the cube in the previous release.
- **Cube Dimension Reference:** If a foreign key in the cube does not reference a unique key in the lowest level of a dimension, the dimension reference is not imported. A warning is written to the import log file.
- **Intelligence Objects and Reports:** In the previous release, intelligence objects and reports were available only using OMB Plus scripting. These objects are not upgraded.
- **Locations and Runtime Repository Connections:** Locations and runtime repository connections are moved out of the projects that own them so that they can be shared across the entire workspace. Thus the statistics in the import log file will display an additional project for these objects.
- **Control Centers and Locations:** After an upgrade, there is no association between the locations and the control centers that they reference. You must review the control center details using the Edit Control Center dialog box and select the locations associated with this control center.
- **Advanced Queues:** An associated queue table is created based on the property AQ queue table name. The queue table created by the MDL File Upgrade Utility contains a column whose data type is the object type for that advanced queue.
- **Advanced Queue Operator in a Mapping:** Mapping Advanced Queue operators are changed to contain only one attribute called PAYLOAD. For Mapping Advanced Queue operators that are used as a source, a new Expand operator is added after the Mapping Advanced Queue operator. For Mapping Advanced Queue operators that are used as a target, a new Construct operator is added before the Mapping Advanced Queue operator.
- **Mapping Operator Names:** The MDL Upgrade Utility ensures that the physical names and business names of all mapping operators are unique.
- **MIV Objects:** MIV objects are not upgraded.

10.4.3.3 Checking for Warnings and Error Messages

After upgrading the metadata, check the log file for warnings and errors.

- If you receive warnings during the upgrade, the upgrade utility completes and logs the warnings. If you receive errors, the upgrade utility terminates and logs the errors.
- If warnings and errors are shown after an upgrade, search for the words Warning and Error in the log file to determine the problem.
- If an unexpected error occurs and the upgrade terminates, the log file contains the details. Check your log file or contact Oracle Support.

10.4.4 Metadata Loader Utilities

The Metadata Loader consists of the following two utilities:

- Metadata Export Utility

  Use the Metadata Export Utility to export metadata from a workspace.

- Metadata Import Utility

  Use the Metadata Import Utility to import metadata into a workspace.

MDL uses its own format, and the Metadata Import Utility only reads files of MDL format (files created by the Metadata Export utility). The Metadata Loader file is a formatted ZIP file.

10.4.4.1 Metadata Export Utility

The Metadata Export Utility extracts metadata objects from a workspace and writes the information into a ZIP format file. This ZIP file has a .mdl extension and contains the following files:

- Metadata Loader XML file

  This file contains the objects extracted from the workspace and formatted in XML. It has the same name as the of the ZIP file, but with the extension .mdx.

- Catalog

  The catalog file is called `mdlcatalog.xml` and it contains internal information about the Metadata Loader XML file.

The Metadata Export Utility enables you to specify a file name and a path for the exported MDL file. For example, you export the repository metadata into a file called `sales.mdl`. When you unzip this MDL ZIP file, you obtain two files. The file `sales.mdx` contains the repository objects. The file `mdlcatalog.xml` contains internal information about the MDL XML file.

You can export an entire project, collections, public objects, locations, or any subset of objects. If you export a subset of objects, the MDL exports definitions for each object that you have selected and the parent objects to which the subset belongs. This enables the MDL to maintain the tree relationships for those objects during metadata import.

For example, if you export a single dimension, the export file contains definitions for:

- The dimension
- The module to which the dimension belongs
- The project to which the module belongs

If you are exporting a subset of objects, make sure you export all referenced objects and import them as well. You can export the objects referenced by a set of objects by selecting the **Export All Dependencies** option on the Metadata Export dialog box. For example, if you export a table `DEPT` and it contains a foreign key reference to the table `EMP`, you can choose to export `EMP` along with `DEPT`.

10.4.4.2 Metadata Import Utility

The Metadata Import Utility reads the metadata information from an exported MDL file and creates, replaces, or merges the metadata objects into a workspace. It imports information belonging to exported metadata objects such as table columns and their constraints, data loading configuration parameters, and named attribute sets. The Metadata Import Utility enables you to import repository objects even if the references for those objects cannot be satisfied.

You can use the Metadata Import Utility to import objects into a project or a collection. The Metadata Import Utility only reads files created by the metadata export utility.

If the MDL file being imported was created using an earlier product version, the Metadata Import Utility automatically upgrades it to the current version. For more information about the automatic upgrade of MDL files, see "Upgrading Metadata from Previous Versions" on page 10-19.

10.4.5 Multiple Session Concurrency and MDL

The repository allows multiple clients to access the same workspace concurrently. Warehouse Builder uses locks to allow only one client to change repository objects. While an object is locked, other clients can only view it as it existed after the last transaction instigated by any user is saved.

When replacing or merging objects, the MDL acquires locks on the primary objects that exist both in the repository and in the MDL file. Primary objects include, but are not limited to projects, modules, tables, dimensions, cubes, mappings, views, and flat files. Secondary objects, such as columns and mapping attributes, are not locked. If locks cannot be obtained because other users are locking the primary objects, then the import fails. Therefore, you must be able to hold locks for primary objects that you are importing.

Tip: To ensure a successful metadata import, you may need to be the sole client accessing the workspace.

The MDL saves changes made to the workspace after a successful metadata import (any import with no error messages, including imports with only information or warning messages). The MDL also executes a rollback after an unsuccessful import.

10.4.6 Metadata Loader Log File

Whenever you export or import repository metadata, the MDL writes diagnostic and statistical information to a log file. You can specify the location of the log file when you call the MDL.

The log file enables you to monitor and troubleshoot export and import activities in detail and contains the following information:

- Name of the data file
- Start time and end time of the export or import
- Time taken for the export or import in hours, minutes, and seconds (in hh:mi:ss format) or milliseconds
- Object types exported or imported
- Number of objects of each object type exported or imported

  The import log file also displays the total number of objects that have been added, replaced, skipped, and deleted.
- Status messages

  Status messages provide information about the import or export process. They are of the following types:

- **Informational:** Provides information about the import or export, such as missing metadata objects, whether objects were imported, and any reasons why objects were not imported or exported.
- **Warning:** Cautions you about the import or export of an object but does not indicate a failed or terminated export or import. A warning notifies you of the possibility of unexpected results that could occur as a result of the export or import.
- **Error:** Indicates that the MDL export or import was terminated and did not complete successfully. The error message provides a brief description of the reason for the failure.

10.4.7 About Metadata Loader Results

When you use the Metadata Loader Export or Import utilities, you can view the results of a successful export or import task. Use the Metadata Export Results dialog box or the Metadata Import Results dialog box to ensure that all of the objects were exported or imported. To view the results dialog box, click **Show Details** on the Metadata Export Progress dialog box or the Metadata Import Progress dialog box. This displays the Message Log. Click **Show Statistics** at the end of this log.

The results dialog box contains the following information:

- The name of the project exported or imported (if applicable).
- The number of objects of each type exported or imported.
- The number of objects of each object type skipped.

  Details about the number of skipped objects is displayed only when you import metadata.

11

Managing Multiple Environments from Development to Production

This chapter discusses the strategies for managing multiple environments such as development, test, and production environments. This chapter includes the following sections:

11.1 Strategies for Managing Multiple Environments

To methodically implement mission critical projects, organizations typically maintain separate environments for developing and testing prior to releasing a project into a production environment. Although you can replicate the same Warehouse Builder project across environments, it is often desirable to assign different physical properties for each environment. For example, when loading a target table in the production environment, you may want to save all error messages to a log file; however, when loading the target in the development environment, you may decide to not save the error messages.

Furthermore, although the same logical design may be initially replicated in each environment, the designs can evolve separately. In the development environment, the development team continually implements new features and makes changes to improve performance. In the production environment, the design evolves slowly and in a controlled manner based on the discovery and correction of bugs.

Therefore, to maintain separate environments for development, testing, and production, it becomes necessary to utilize the same logical design across different physical environments and also to manage any differences in designs across those environments.

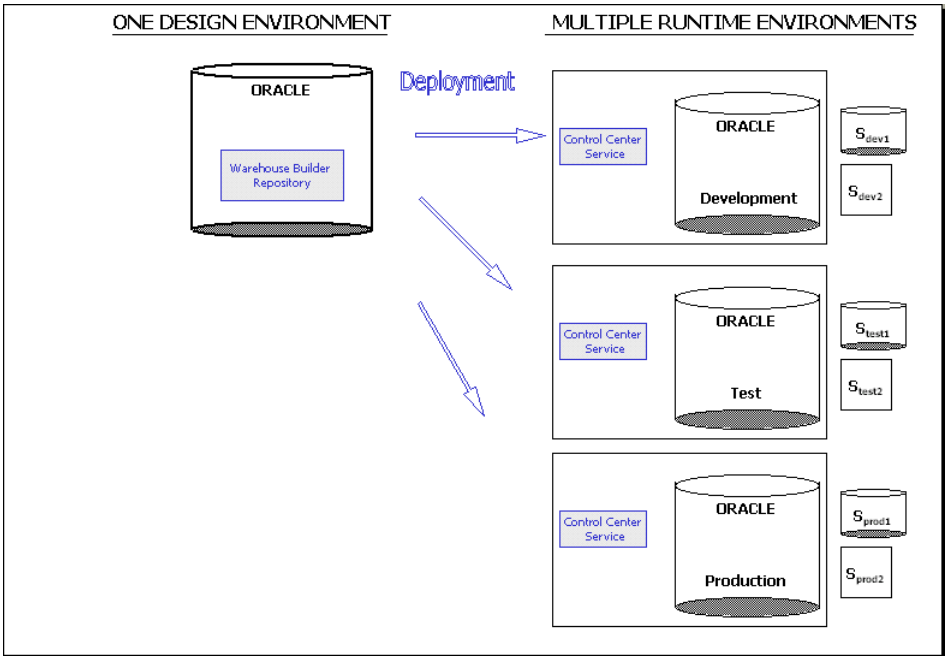
In Warehouse Builder, you can manage multiple environments by implementing either of the following solutions:

- Multiple Environments Based on a Single Design Environment (requires the Warehouse Builder Enterprise ETL Option)
- Multiple Environments Based on Multiple Design Environments on page 11-7

11.1.1 Multiple Environments Based on a Single Design Environment

In this strategy, all design work resides within a single Warehouse Builder repository as depicted in Figure 11–1.

Figure 11–1 Multiple Environments Based on a Single Design Environment



In the single design repository, you define a configuration and a collection for each runtime environment. You promote the design from one environment to the next by activating the appropriate configuration and then deploying the associated collection.

To promote a single design across multiple runtime environments, complete the following general steps:

1. Ensure that Warehouse Builder components are installed on the necessary computers.

   Any computer designated for design work requires the Warehouse Builder repository. Any computers designated as runtime environments require the Warehouse Builder control center service. Computers that simply host source data do not require Warehouse Builder components.

   Figure 11–1 depicts the design repository as hosted exclusively on its own Oracle Database. In practice, however, you could host the design repository and, for example, the development runtime on the same Oracle Database.

2. Create a configuration for each of the runtime environments, as described in "Using Configurations to Manage Multiple Environments" on page 11-3.

3. Instruct the development team to use Warehouse Builder with the `DEV` configuration active.

   The development team implements the logical design by creating the objects such as mappings and process flows. The objects they deploy are subsequently executed in the `DEV` environment.

4. To manage which objects are ready to be deployed to the test and production environments, create collections as described in the Oracle Warehouse Builder User's Guide.

   A collection is a group of shortcuts to objects in the same project. For the purposes of this example, you create two collections named `Deploy To Test` and `Deploy To Production`.

   When the development team determines that various design objects are ready for testing, they can add shortcuts to the Deploy To Test collection.

5. Instruct QA users to use Warehouse Builder with the `TEST` configuration active.

   QA users can now deploy the objects in the Deploy To Test collection. They can deploy each object singularly or deploy all objects in the collection at once.

   When a user selects a shortcut in a collection, they acquire a lock on the underlying object.

6. After deploying objects, QA users can execute the objects in Deploy To Test collection.

   The executed jobs effect the targets associated with `TEST` configuration only. The development and production environments are not effected.

7. The pattern continues with QA users adding shortcuts to the Deploy To Production collection. And production users ensure that the `PROD` configuration is active when they use Warehouse Builder.

11.2 Using Configurations to Manage Multiple Environments

The preferred method for managing multiple environments begins with creating a *configuration* for each environment. A configuration is a Warehouse Builder entity for containing the physical details of all objects that are required to deploy a data system.

Note: Use of the multiple configuration functionality requires the Warehouse Builder Enterprise ETL Option. If your organization has not licensed this option, you can follow the instructions in "Using Snapshots to Manage Multiple Environments" on page 11-8.

A common scenario is to have separate environments for development, test, and production. Although the same design objects exist in all environments, it may be desirable to apply different physical configuration settings to the objects.

As a example, Table 11–1 demonstrates how you may want to specify a table to have different configuration properties depending on the environment.

Table 11–1 Configuration Properties for a Table in Different Environments

Configuration Property	Development Environment	Test Environment	Production Environment
Tablespace	`DEV`	`TEST`	`PROD`
Parallel Access Mode	`PARALLEL`	`NOPARALLEL`	`PARALLEL`
Logging Mode	`NOLOGGING`	`NOLOGGING`	`LOGGING`

To implement this scenario, create a *configuration* for each environment and define the tablespace settings unique to each environment.

11.2.1 About Configurations

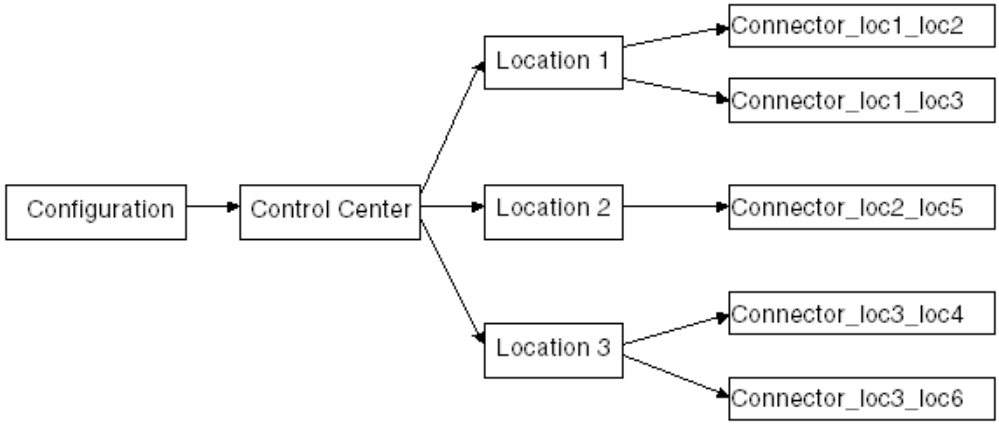
Upon installing Warehouse Builder or creating a new repository, expand the Configurations node in the Project Explorer. Notice that there is a single configuration, the `DEFAULT_CONFIGURATION`. Also observe that the configuration is listed at the bottom left corner of the Design Center as *Active Configuration: DEFAULT_CONFIGURATION.*

This default configuration contains the physical properties of all the data objects in the Design Center which are necessary for deploying those objects. As a single entity, the DEFAULT_CONFIGURATION is a device that is required for the internal workings of Warehouse Builder. Namely, it enables deployment to the default control center, `DEFAULT_CONTROL_CENTER`.

When you define new configurations, however, then you can manage how the same logical object is defined across multiple environments. That is, you can define multiple physical properties and deployment details for a single table, view, or other such data object.

A common approach is to create three new configurations such as `DEV`, `TEST`, and `PROD`. Each configurations works in conjunction with a single control center and its locations, as depicted in Figure 11–2.

Figure 11–2 Relationship Between Configurations, Control Centers, and Locations



Configurations specify physical object properties that correspond to the environment to which the objects are deployed. A configuration can only be associated with one control center at a time. You can change the control center that is associated with a configuration.

A control center refers to a repository on a target computer and it manages a set of source and target locations. A control center can be associated with only one configuration at a time.

A location corresponds to the database, file, or application that Warehouse Builder sources data from or deploys data to. A location can be owned by only one control center. Each location can have one or more connectors that provide connections to other locations.

When you deploy objects, Warehouse Builder creates these objects in the target associated with the currently active configuration. In a given session, only a single configuration may be active at a time. If you switch to a different configuration as described in "Activating Configurations" on page 11-6, the name of the newly activated configuration is displayed along the bottom left corner of the Design Center.

11.2.1.1 Benefits of Using Multiple Configurations

Configuration property values belong to the configuration object and are preserved. You do not have to reset configuration values when you switch between configurations. The configuration properties that you see in the Design Center are the settings associated with the active configuration. The status bar at the bottom of the Design Center displays the name of the active configuration.

For example, the configuration associated with the development environment is currently active. Therefore, any changes you make to configuration property values are made to the development environment. For the table `MY_TABLE`, you set the Tablespace configuration parameter to *DEV*. Next activate the configuration associated with the production environment. The configuration values displayed will be the same values that you set the last time the production configuration was active. The Tablespace configuration parameter for `MY_TABLE` is null. You set it to *PROD*. This change effects only the production configuration. Switching back to the development configuration will show the Tablespace configuration parameter for `MY_TABLE` remains as *DEV.* Every object instance in a project has unique configuration values. So, in this example, setting tablespace value for `MY_TABLE` has no effect on any other table. Each table instance must be individually configured.

Another advantage of multiple configurations is the ease with which it enables you to make changes to your existing environment. For example, you design objects, implement your development environment, deploy objects, and then move to the testing environment. You then need to change some objects in the development environment. To do this, you just activate the configuration associated with the development environment, make the changes to objects, regenerate scripts, and deploy objects. To return to the testing environment, you activate the testing configuration.

11.2.2 Deploying a Design to Multiple Environments

Creating multiple configurations enables you to deploy the same design to multiple environments. To deploy a design to a particular environment, you activate the configuration associated with the environment and deploy your design.

To deploy a set of design objects to multiple environments:

1. Create a configuration for each environment to which design objects are deployed as described in "Creating New Configurations" on page 11-6.

   For each configuration, ensure that you create a separate control center that points to the environment.

2. Set the configuration properties for design objects in each configuration, as described in "Setting Configuration Properties for a Configuration" on page 11-6.

3. Activate the configuration associated with the environment to which design objects must be deployed as described in "Activating Configurations" on page 11-6.

4. Resolve errors related to deployment or execution.

   You may encounter some errors even if you validated data objects before deploying them. These errors could be caused by configuration properties you set. Configuration property values represent physical property information that is not semantically checked before deployment. For example, the value you specify for the Tablespace Name property is not checked against the database at validation time. Such errors are encountered during deployment.

5. Deploy the design objects.

6. Repeat steps 2 to 5 for each environment to which design objects must be deployed.

11.2.2.1 Creating New Configurations

To create a new configuration:

1. In the Project Explorer, select a project and expand the navigation tree.
2. Select **Configurations**.
3. From the Design menu, select **New**.

   The Create Configuration wizard opens.
4. On the Name page, provide a name and an optional description.

   Click **Set and save as my active configuration for this project** to set the new configuration the active configuration. Any configuration parameters that you set for design objects are saved in this configuration. Also, any objects that you deploy are deployed to the control center associated with this new configuration.
5. On the Details page, select the control center that should be associated with this configuration.

   If you have not already created the control center, click **New** to create one and associate it with the configuration.
6. Click **Finish** to close the wizard and create the configuration.

The new configuration appears in the Configurations folder.

11.2.2.2 Setting Configuration Properties for a Configuration

To set configuration properties for a particular configuration:

1. Ensure the desired configuration is active.

   The name of the active configuration is displayed along the lower left corner of the Design Center. To switch to another configuration, see "Activating Configurations" on page 11-6.
2. In the Project Explorer, right-click the object that you want to configure and select **Configure**.
3. Specify the configuration properties for the selected object.
4. Repeat steps 2 and 3 for all objects in the project for which you want to set configuration properties.

You can now deploy the design objects. The Control Center that is presented in the Deployment Manager is the Control Center that is associated with the active configuration.

11.2.2.3 Activating Configurations

There can be only one active configuration at a time. Any objects that you deploy are deployed to the control center associated with the active configuration. To implement your design to a different environment, you must deploy objects to the control center associated with that environment. You can do this by activating the configuration associated with the control center.

To activate a configuration:

1. Right-click the configuration you want to activate and select **Open Editor**.

2. On the Name tab, select **Set and save as my Active Configuration for this project**.

To activate a configuration for the current session only:

1. In the Project Explorer, select a project and expand the navigation tree.
2. Expand the Configurations folder.
3. Select a configuration.
4. From the Design menu, select **Set As Active Configuration**.

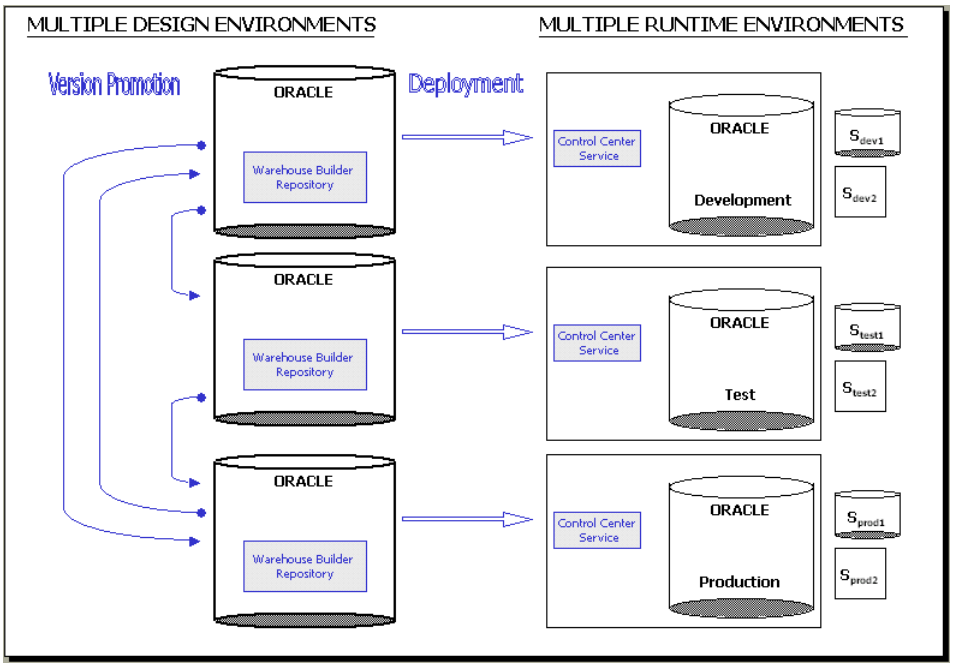
   The selected configuration is set as the active configuration for the current session. If you exit Warehouse Builder and log in subsequently, then the changes are not saved.

Any changes that you make to the configuration parameters of objects are saved in the active configuration. If you switch to the previous configuration, then these parameters maintain their previous settings. The Control Center associated with this configuration is now active and stores all new information about validation, generation, and deployment of objects in the project.

11.3 Multiple Environments Based on Multiple Design Environments

In this strategy, there is a separate design environment for each runtime environment as depicted in Figure 11–3.

Figure 11–3 Multiple Design Environments



With this strategy, it becomes necessary to manage the differences between the three design environments. You can use either snapshots or the Metadata Loader to share design components between the design environments. Each time you introduce or change design metadata in an environment, you must subsequently deploy the design to the respective runtime environment.

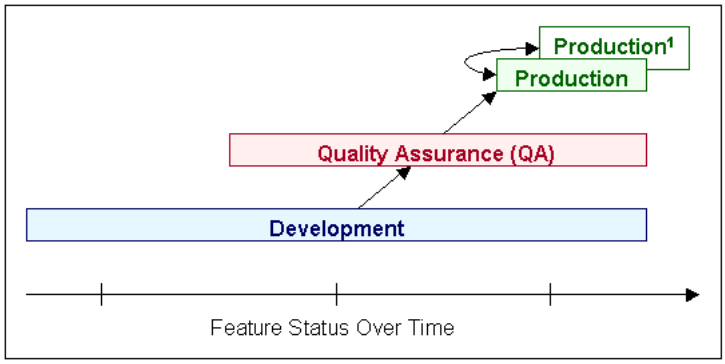
11.4 Using Snapshots to Manage Multiple Environments

Scenario

After a period of development and testing, a company puts into production a data integration project. The production version of the project, however, is not static. It is subject to change due to the discovery and correction of bugs. Meanwhile, the development version also continues to evolve as the development team incrementally implements new features. This company now faces a challenge familiar to all companies: how to best manage changes in different versions of the system.

One version of this common scenario is depicted in Figure 11–4, where the development environment is consistently more advanced than the functionality in production, and QA is somewhere between the two extremes. Development changes are incrementally propagated to QA and subsequently to production. At the same time, production has its own cycle of changes, denoted in Figure 11–4 as the shadow environment labeled 'Production^{1}', and used for controlled problem solving. 'Production' and 'Production^{1}' are at the same stage of development, and serve to illustrate the errors that occur in Production, which are fixed and implemented directly in Production, but that must somehow be merged with Development. Other companies may have fewer or more differing environments, but the same maintenance challenges still apply.

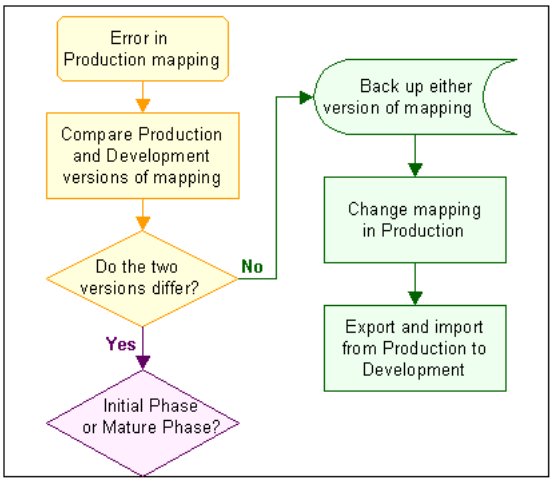
Figure 11–4 Typical Lifecycle of a Project



Companies may need multiple environments, as illustrated in Figure 11–4, because they typically implement incremental changes to the system. However, some companies implement only whole projects in production. Figure 11–4 does not apply to these companies.

In this case study, a company finds a problem with a mapping in production. The first step is to compare the production version of the mapping with the development version of the mapping, as illustrated in Figure 11–5. If the mapping is identical in both environments, the solution is simple: make the changes in either environment and copy the mapping to override the older version. If the mapping in production differs from its development version, then the approach you take depends on the maturity of the project.

Figure 11–5 Comparing the Production Mapping to Development

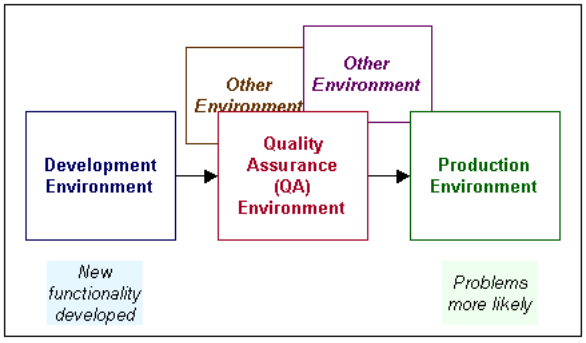


Typically, there are two phases that mark the lifecycle of a project: Initial Phase and Mature Phase. The two phases present different needs and call for two different version management methodologies, each of which has benefits and drawbacks.

11.4.1 Initial Phase

After implementation of a project in Production, the system is generally in its initial phase, depicted in Figure 11–6. The initial phase is marked by aggressive changes in the Development environment, coupled with errors sometimes found in Production. Because Production bugs are more likely in this mode, consider a management methodology that facilitates quick updates to each environment.

Figure 11–6 Initial Phase: Changes in Production More Likely



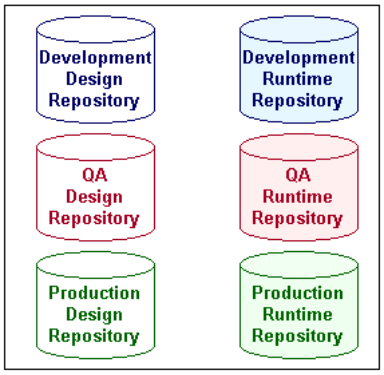
Companies often have two to five different environments. For the initial phase, this company keeps a separate definition of the metadata in each different environment (in this case, Development, QA, and Production). To propagate a change from Production, the company exports only those portions of the system that have changed and imports them into the Development definition.

11.4.2 Case Study

The company has recently implemented its a data integration project in production, and the system is still in its initial phase, where many additional features are yet to be tested and rolled out. The production system is fairly new, and therefore the occurrence of problems is higher in this phase.

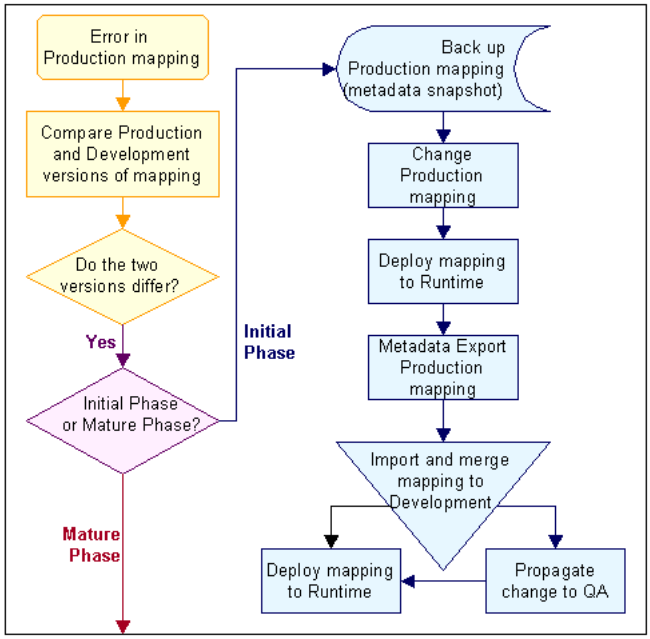
The company decides to keep a separate design repository—or definition of the system design—for each environment, as depicted in Figure 11–7. In addition, they implement their processes into a separate runtime repository for each environment.

Figure 11–7 Initial Phase: Separate Design Repositories



In this example, an error occurs in a Production mapping. The company changes the mapping in Production, then exports its definition, and merges it into Development, as illustrated in Figure 11–8.

Figure 11–8 Initial Phase: Propagate Changes from Production to Development



To correct an error found in a Production mapping during the initial phase:

1. For backup, capture the definition of any mapping before modifying it.

   Create a full metadata snapshot of the mapping in the Production Design Repository. Do the same with the Development and QA versions of the mapping. Because you can restore objects from full snapshots only, a full snapshot is essential when you create a backup.

2. Correct the mapping in the Production design repository and deploy it to the Production target schema.

This results in a changed version of the mapping that must be propagated to other environments.

3. Use Metadata Export utility to export only the changed mapping from Production.

   From the Design menu, select **Export** and then **Warehouse Builder Metadata**. This displays the Metadata Export dialog box.

4. Use Metadata Import to import and merge the change to Development and QA.

   - From the Metadata Import dialog box Import Options, select **Merge metadata**.
   - From the Metadata Import dialog box Match By options, select the **Universal Identifier** option.

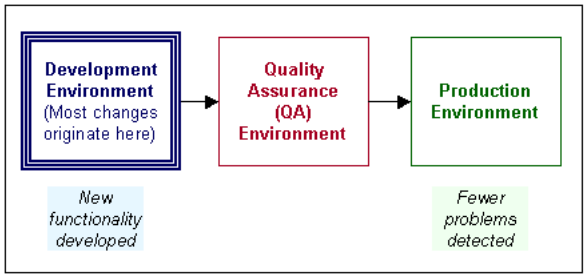
     Matching objects by Universal Identifier is important when maintaining multiple individually changing environments.

   Merging the change into Development and QA can vary in complexity depending on the changed object. If the change in the mapping in this example consists of increasing the column width of a table, the merge is simple. A merge can be more complicated and time-consuming if, for example, join criteria are changed, and other dependencies exist.

11.4.3 Mature Phase

The second is the mature phase, depicted in Figure 11–9. The mature phase is marked by continued changes in the Development environment, but a decrease in changes required in Production.

Figure 11–9 Mature Phase: Fewer Changes in Production



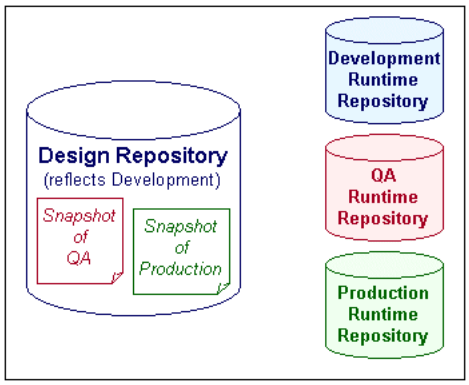
For this mode, the company chooses a methodology that saves space and administration costs: it maintains only one active definition of the design, and this definition reflects the development state of the system. The company stores the design definitions of the QA and Production environments in backup, and extracts and restores changed portions of these systems when required.

11.4.4 Case Study

At this stage, the project has stabilized and is now in its mature phase. Some additional functionality is still being developed in the Development environment, but fixes originating in Production are rare.

Although they continue to implement their processes into a separate runtime repository for each environment, the company decides to keep only one design repository, as depicted in Figure 11–10.

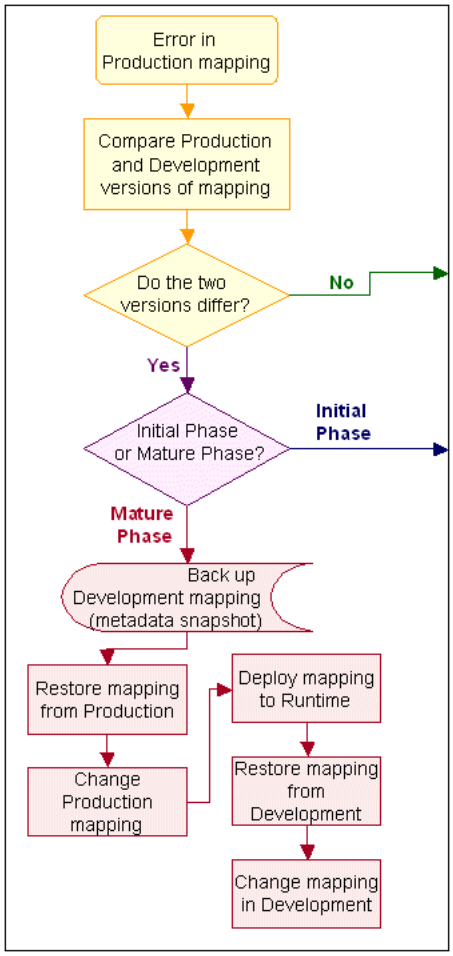
Figure 11–10 Mature Phase: One Design Repository Reflecting Development



The one design repository reflects the Development environment, because it is the one active environment that regularly originates design changes. The design repositories from the QA and Production environments are stored as metadata snapshots inside the Development Design Repository. Snapshots are a backup mechanism that consumes minimal space, and still provides access to any objects that you need to restore. Because design changes rarely originate in Production or QA, storing those definitions in snapshots makes sense.

Although it is more rare during the mature phase, errors still occur in the Production environment. In this example, an error occurs in a Production mapping. The company changes the mapping in Production, then restores its definition from a snapshot in Development and makes the same change there, as illustrated in Figure 11–11.

Figure 11–11 Mature Phase: Propagate Changes from Production to Development



To correct an error found in a Production mapping during the mature phase:

1. Compare the Production version of the mapping in your Production snapshot to the Development version of the same mapping in your Design Repository.

   - If the two differ, the company follows the rest of the steps in this procedure.
   - If the two are identical, correct the mapping as in Step 8, then deploy it to their Design and Production Runtime Repositories, and then update their Production snapshot with the changed mapping.

   Consult the online help for instructions on comparing snapshots to objects, deploying, and on updating snapshots.

2. Back up the Development version of the mapping by creating a full metadata snapshot of it.

   The Development version of the mapping may differ from the Production version if developers have been working on a new iteration of that mapping. This step preserves their work. Creating a full snapshot is essential, because you can only restore from a full snapshot.

3. Restore the mapping in question from the Production snapshot.

   This mapping should be identical to the one running in Production.

Consult the online help for instructions on restoring objects from metadata snapshots.

4. Correct the mapping that you have restored from the Production snapshot.
5. Deploy the corrected mapping to the Production Runtime Repository.
6. Remove the existing definition of the mapping from the snapshot of the Production Design Repository and update the snapshot with the new version of the mapping.
7. Restore the mapping from the full snapshot you took as a backup in Step 2.

   This is the mapping from the Development Design Repository. Typically, this mapping has had other work done to it as part of development of new features.

   Optionally repeat this same step for QA.
8. Make the same correction to this Development version of the mapping that you made in Step 4 to the Production version of the mapping.

The cost of this methodology is that every change has to be made at least twice, in the Production and Development versions of the object. The company uses this methodology only because the mature phase does not require frequent changes originating in Production. The benefits of this approach are the minimal administration costs and reduced space requirements on the database.

12

Moving Large Volumes of Data with Transportable Modules

Oracle Warehouse Builder enables you to build and publish an enterprise data warehouse in stages. You can improve the performance and manageability of the data warehouse.

Warehouse Builder mappings access remote data through database links. Processing overhead and network delays make this data access process slower than local data access by the mappings. You can use one of the following strategies to speed up data access:

- Create a transportable module to copy remote objects (tables, views, materialized views, and so on) from a source database into a target database. The mappings in the target data warehouse can then access data locally.
- Data can be partially processed in the source database and then the preprocessed data can be copied, using a transportable module, from source to target database for final loading into the data warehouse.

A transportable module functions like a shipping service that moves a package of objects from one site to another at the fastest possible speed.

Note: To utilize transportable modules, ensure that your organization has licensed the Oracle Warehouse Builder Enterprise ETL Option.

The following sections provide information about transportable modules:

12.1 About Transportable Modules

Transportable modules enables you to rapidly copy a group of related database objects from one database to another.

Using the Design Center, you first create a transportable module, and specify the source database location and the target database location. Then, you select the database objects to be included in the transportable module. The metadata of the selected objects are imported from the source database into the transportable module. The metadata is stored in the workspace. To physically move the data and metadata from source into target, you need to configure and deploy the transportable module to

the target location. During deployment, both data and metadata are extracted from the source database and created in the target database.

A combination of the following technologies enables the movement of data and metadata:

- Oracle Data Pump
- Transportable Tablespace
- DBMS_FILE_TRANSFER
- Binary FTP
- Local file copy
- code generated and deployment

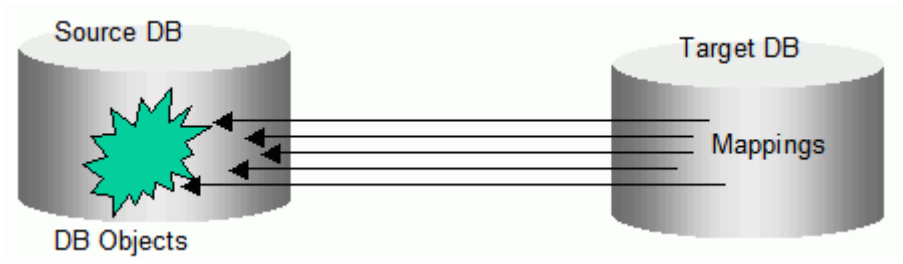
You can configure transportable modules to influence which technologies are used.

You can add the following source objects to transportable modules:

- Tablespaces
- Schemas
- Tables
- Views
- Sequences
- Materialized Views
- External Tables (including their data)
- PL/SQL Functions, Procedures, and Packages
- Object Types
- Varying Array Types (Varrays)
- Nested Table Types

In Figure 12–1, the traditional Extract, Transform, and Load (ETL) process extracts data from remote databases through multiple remote accesses using database links.

Figure 12–1 Extraction Of Data From Remote Databases Through Multiple Remote Accesses Using Database Links

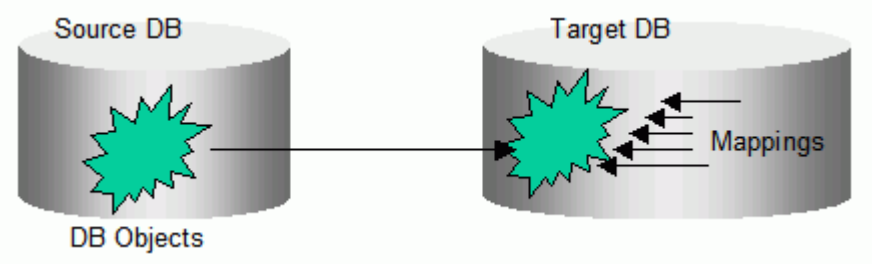


During remote accesses using database links, significant performance degradation occurs due to serial queries and serial DMLs, and network latencies. The performance degradation will appear more if the same source tables are accessed multiple times.

The transportable modules technology works as shown in Figure 12–2. In this architecture, all the source objects needed by the mappings are bundled together and

moved to the target during a deployment. The transportable modules deployment uses Oracle Data Pump, FTP, and Oracle transportable table space to achieve very high transportation performance. This transportation absorbs the cost of the network delays just once. After deployment, mappings access data locally, which can easily benefit from parallel queries and parallel DMLs. Repeated accesses to the same data increases the performance benefit of transportable modules.

Figure 12–2 Transportable Modules Deployment



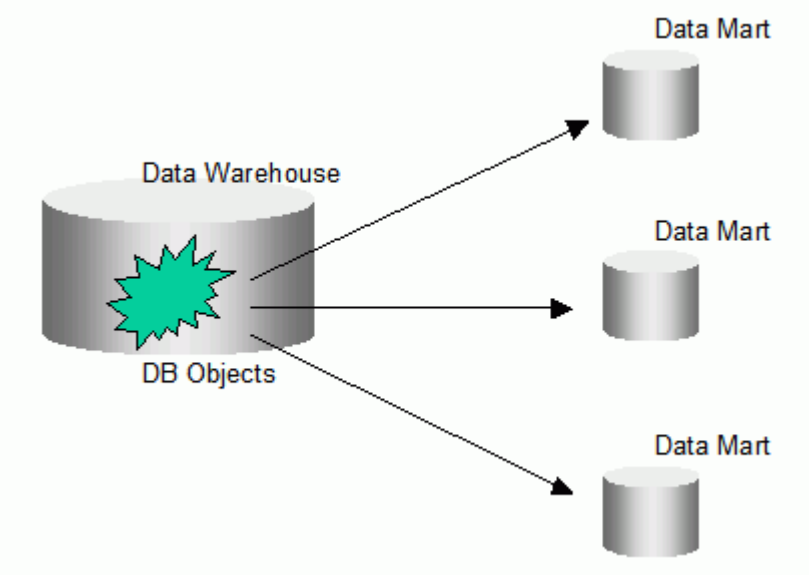
Using transportable modules, data warehouse loadings become more manageable. The source database needs to be shut down only for a short period of time for the transportable module to complete the deployment. Users of the source database do not have to wait until the entire data is loaded into the data warehouse. For example, if you are using the transportable tablespace implementation, transportable modules can copy a tablespace of 20 GB in about five minutes, resulting in a down time of five minutes in the source database.

Data copied into the target database is a snapshot of the information present in the source database. This can be used to create a data versioning system. Advanced users can create streams on the transported tables for capturing real-time changes from the source. The transported tables can also be copied into larger tables as a partition.

In a multidepartmental enterprise environment, the target database may actually be an operational data store that is used for intermediate reporting and updating purposes. This target database could in turn, serve as a source to the next stage of data collection. You can use the transportable modules at multiple stages, along the path on which the data is moved before it is stored in the data warehouse.

Transportable modules can also be used for publishing data marts. A data mart is normally a portion of a larger data warehouse for single or departmental access. At times, creating a data mart amounts to copying what has already been collected and processed in the data warehouse. A transportable module can be created to perform this task, as shown in Figure 12–3. You can also use the same transportable module to deploy a data mart to multiple locations.

Figure 12–3 Data Marts in a Data Warehouse



Because a transportable module deploys a snapshot of the source database objects, the deployment time can be used to track the version of the data marts.

12.1.1 About Transportable Modules and Oracle Database Technology

Transportable modules work by leveraging technology in Warehouse Builder plus technology in the Oracle Database. A transportable module replicates parts of a source database into a target database. The parts of the source database that can be replicated include tablespaces, tables, indexes, constraints, and other relational objects.

Depending on the database version, the Oracle Database replicates the tablespace. When you transport data between two releases of 8*i* databases or between two releases of 9*i* databases, the database calls the Oracle transportable tablespaces functionality. When you transport data between two Oracle 10*g* databases, the database calls the Oracle Data Pump functionality.

In the case of Oracle Database 10*g* and Oracle Data Pump, you can transport tables without transporting their tablespaces. For example, if your table is 100 KB and its tablespace size is 10MB, then you can deploy the table without deploying the entire tablespace. Only Oracle Data Pump provides the option to copy an entire schema. For Oracle 10*g* release database, you specify either data pump or transportable tablespaces during configuration as described in "Configuring a Transportable Module" on page 12-12.

> **See Also:** For more information about transportable tablespace and Data Pump, see the Oracle Database 10*g* documentation.

12.2 Benefits of Using Transportable Modules

Before the introduction of transportable modules, the most scalable data transportation method relied on moving flat files containing raw data. This method required data to be unloaded or exported into files from the source database, and then these files were loaded or imported into the target database. The transportable modules method entirely bypasses the unload and reload steps and gives you access to the Oracle Database technologies Transportable Tablespaces and Data Pump.

High Performance Data Extraction

Transportable modules reduce the need for mappings to access data remotely. If you have large volumes of data on remote computers, then use transportable modules to quickly replicate the source onto the Oracle target database. Warehouse Builder mappings can then directly access a local copy of the data. In addition, because the source becomes part of the target, you can perform the ETL operations directly on the source data.

Distribute and Archive Data Marts

A central data warehouse handles ETL processing while dependent data marts are read-only. You can use transportable modules to copy from a read-only data mart to multiple departmental databases. In this way, you can use your central data warehouse to periodically publish new data marts and then replace old data marts by dropping the old tablespace and importing a new one. Because duplication and distribution takes relatively less time, you can publish and distribute a data mart for daily analytical or business operations.

Archive Sources

You can set the source tablespaces to read-only mode and then export them to a target. All the data files are copied, creating a consistent snapshot of the source database at a given time. This copy can then be archived. The archived data can be restored in the source and target databases.

12.3 Instructions for Using Transportable Modules

Before You Begin

Ensure that you can connect to source and target databases as a user with the necessary roles and privileges as described in Verifying the Requirements for Using Transportable Modules on page 12-6.

Ensure that your organization has licensed the Oracle Warehouse Builder Enterprise ETL Option.

To use transportable modules, refer to the following sections:

Note to Database Administrators: Step 1 of these instructions requires some powerful database roles and privileges. Step 3 requires knowledge of schema passwords. Depending on security considerations, you can allow developers to perform Step 3 or restrict it to database administrators only.

1. Specifying Locations for Transportable Modules on page 12-7

   Ensure to successfully test these connections before proceeding to the next step.

2. Creating a Transportable Module on page 12-8
3. Configuring a Transportable Module on page 12-12
4. Generating and Deploying a Transportable Module on page 12-15
5. Designing Mappings that Access Data through Transportable Modules on page 12-17
6. Editing Transportable Modules on page 12-18

12.3.1 Verifying the Requirements for Using Transportable Modules

When creating a Transportable Module source location, the source location user must possess specific roles and/or privileges depending on the version of the source database.

- If the source database is earlier than Oracle 10*g*, then the SYSDBA role is required for the source location user.
- If the source database is Oracle 10*g*, then the SYSDBA role is not required, but the following must be assigned to the source location user.
  - CONNECT role
  - EXP_FULL_DATABASE role
  - ALTER TABLESPACE privilege

When creating a Transportable Module target location, the target location user must possess specific roles and/or privileges depending on the version of the target database.

- If the target database is earlier than Oracle 10*g*, then the SYSDBA role is required for the target location user.
- If the target database is Oracle 10*g*, then the SYSDBA role is not required but the following must be assigned to the target location user.
  - CONNECT role with admin option
  - RESOURCE role with admin option
  - IMP_FULL_DATABASE role
  - ALTER TABLESPACE privilege
  - EXECUTE_CATALOG_ROLE with admin option
  - CREATE MATERIALIZED VIEW privilege with admin option
  - CREATE ANY DIRECTORY privilege

> **Note:** Transportable Module source and target location users need to be assigned many powerful roles and privileges in order for the transportable modules to read objects from the source database and for creating objects in the target database. In a production environment, if necessary, the DBA may choose to create the transportable module source and target locations (using the Connection Explorer) for the data warehouse developers, and conceal the passwords.

The following is a SQL script for the DBA to assign source location users the required roles and privileges in the source database:

```
grant connect to <TM src location user>;
grant exp_full_database,alter tablespace to <TM src location user>;
```

The following is a SQL script for the DBA to assign target location users the required roles and privileges in the target database:

```
grant connect,resource to <TM tgt location user> with admin option;
grant imp_full_database,alter tablespace to <TM tgt location user>;
grant execute_catalog_role to <TM tgt location user> with admin option;
```

```
grant create materialized view to <TM tgt location user> with admin option;
grant create any directory to <TM tgt location user>;
```

12.3.2 Specifying Locations for Transportable Modules

Before you create a transportable module, first define its source and target locations in the Connection Explorer. Each transportable module can have only one source and one target location.

To specify a transportable module location:

1. In the Connection Explorer, expand the **Locations** node.
2. Expand the **Databases** node.
3. Right-click either the **Transportable Modules Source Locations** or **Transportable Modules Target Locations** node and then select **New.**

   Warehouse Builder displays a dialog box for specifying the connection information for the source or target location.
4. The instructions for defining source and target locations are the same except that you do not specify optional FTP connection details for targets. Follow the instructions in "Transportable Module Source Location Information" to specify the connection information and then test the connection.

12.3.2.1 Transportable Module Source Location Information

Warehouse Builder first uses this connection information to import metadata for the transportable module from the source computer into the workspace. During deployment, the connection information is used to move data from the source to the target.

Name

A name for the location of the source or target database.

Description

An optional description for the location.

User Name/Password

Warehouse Builder uses the database user name and password to retrieve the metadata of the source objects you want to include in the transportable module. Warehouse Builder also uses this information during deployment to perform transportable tablespace or data pump operations.

To access databases for use with transportable modules, you must ensure that the user has the necessary database roles and privileges as described in Verifying the Requirements for Using Transportable Modules on page 12-6.

Host

Host name of the computer on which the database is installed.

Port

Port number of the computer on which the database is installed.

Service

Service name of the computer on which the database is installed.

Version

Choose the Oracle Database release number from the list.

FTP User Name/Password (Optional)

Specify FTP account credentials if you intend to use Oracle Transportable Tablespace as the method for transporting data. FTP credentials are not required if you do not plan to configure the Transportable Tablespace method.

You can leave the FTP account credentials blank, if you configure to use the Transportable Tablespace, but both source and target databases are located in the same computer, or both source and target can access shared disk volumes. Without the FTP credentials, an attempt is made to perform a plain copy of the source files from the source directory to target directory.

Test Connection

Click **Test Connection** to validate the connection information. Warehouse Builder attempts to connect to the source database and, if applicable, to the FTP service on the source computer. A success message is displayed only after both credentials are validated.

12.3.3 Creating a Transportable Module

To create a transportable module:

1. From the Project Explorer, expand the **Databases** node.
2. Right-click the **Transportable Modules** node and select **New**.

   The Welcome page of the Create Transportable Module Wizard is displayed.
3. The wizard guides you through the following tasks:

   Describing the Transportable Module

   Selecting the Source Location

   Selecting the Target Location

   Selecting Tablespaces and Schema Objects to Import

   Reviewing the Transportable Module Definitions

12.3.3.1 Describing the Transportable Module

On the Name and Description page, type a name and optional description for the transportable module.

12.3.3.2 Selecting the Source Location

Although you can create a new source location from the wizard page, it is recommended that you define locations for transportable modules before starting the wizard as described in "Transportable Module Source Location Information" on page 12-7.

When you select an existing location, the wizard tests the connection and does not allow you to proceed until you specify a location with a valid connection.

12.3.3.3 Selecting the Target Location

Select a target location from the list. If no target locations are displayed, click **New** and define a target location as described in "Transportable Module Source Location Information" on page 12-7.

12.3.3.4 Selecting Tablespaces and Schema Objects to Import

Use the Define Contents page to select tablespaces and schema objects to include in the transportable module. On the left pane, Available Database Objects lists all source tablespaces, schemas, and available schema objects. On the right pane, Selected Database Objects displays the objects after you select and move the objects.

Expand the tablespaces to display the schemas in each tablespace and the objects in each schema. Non-tablespace schema objects such as views and sequences are also listed under their respective schema owners, even though these objects are not stored in the tablespace. To select multiple objects at the same time, hold down the Ctrl key while selecting them. You can include the following types of objects in transportable modules:

- Tables
- Views
- Materialized Views
- Sequences
- External Tables
- PL/SQL Functions, Procedures, and Packages
- Object Types, Varray Types, and Nested Tables Types

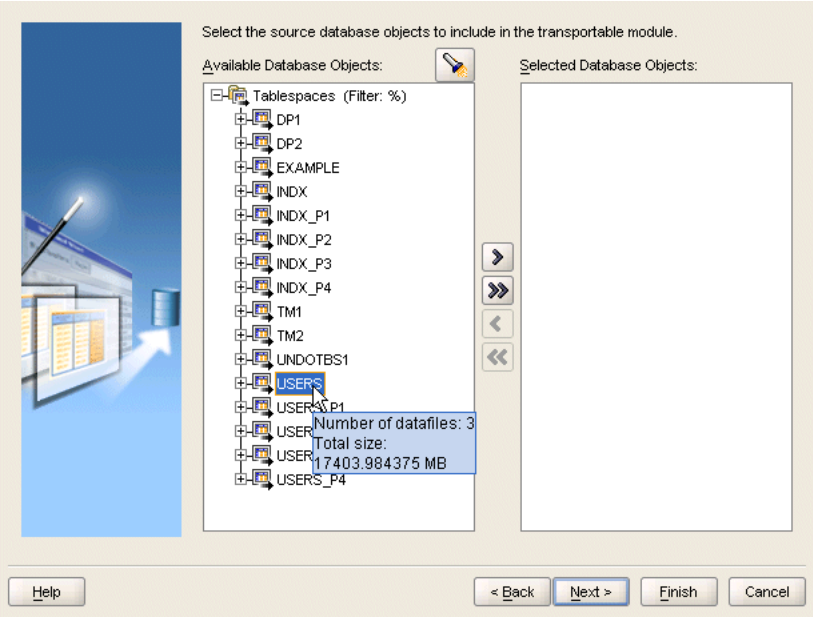
Select the tablespaces and schema objects from the Available Database Objects field and click the arrow buttons in the center to move the objects to the Selected Database Objects field.

12.3.3.5 Available Database Objects

You can view the number of data files and their total size by placing your mouse over a node. The wizard displays the information in a tooltip.

Figure 12–4 displays the wizard with the tooltip.

Figure 12–4 Viewing the Number of Data Files and Total Size



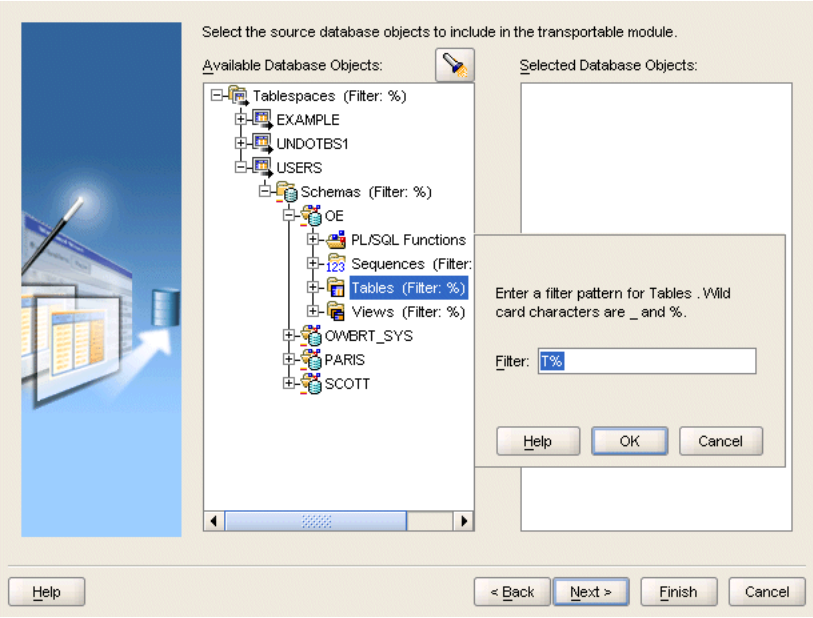
12.3.3.5.1 Finding Objects in the Available Database Object List: Double-click the flashlight icon to find source data objects by type or name. In the **Object** field, type a name or a letter by which to filter your search. From the **Type** list, indicate the object type you are searching. Check the required box to perform the search by name or by description.

For example, type 'T%' in the Object field, select tablespaces from the Type field, and click **Find Next.** The cursor on the Available Database Objects navigation tree selects the name of the first tablespace that starts with a 'T.' If that is not the tablespace you want to select, then click **Find Next** to find the next tablespace. During this searching process, the navigation tree expands all the schema names and displays all the tablespaces.

12.3.3.5.2 Filtering the Available Database Objects List: You can double-click a schema node or any of the nodes in the schema to type in a filter pattern. For example, if you type T% and click **OK,** the navigation tree displays only those objects that start with the letter T.

Figure 12–5 displays the Define Contents page with a schema selected.

Figure 12–5 Schema Node Selected on Define Contents Page

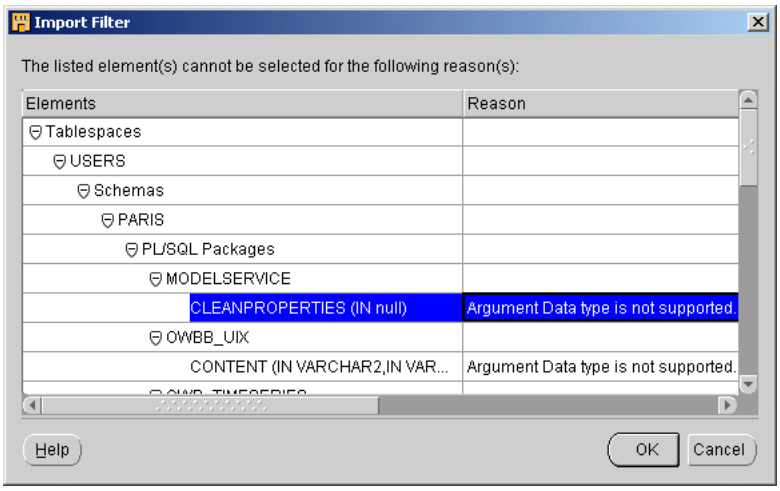


12.3.3.5.3 Objects Not Available for Inclusion in Transportable Modules

If you select items that cannot be included in a transportable module, then a dialog box is displayed listing items that cannot be included and describing why.

Figure 12–6 displays the Import Filter dialog box.

Figure 12–6 Import Filter Dialog Box



12.3.3.6 Reviewing the Transportable Module Definitions

Review the summary information and click **Finish** to import the metadata of the selected tablespace and schema objects.

After the transportable module is created in your workspace, you can locate it on the Project Explorer under the Transportable Modules node. Expand the tree to display the imported definitions.

Warehouse Builder creates separate modules for separate schemas. The schema names on the Project Explorer mirror the schema names in your source database.

Because the objects contained in a transportable module mirror the source database, you cannot edit these objects using the user interface. If the source database changes, then you can reimport the objects. If you want to delete objects from the transportable module, then right-click the object and select **Delete.** This action deletes the object from the definition of the transportable module but does not effect the underlying source database.

12.3.4 Configuring a Transportable Module

In the Project Explorer pane, right-click a transportable module and select **Configure** to configure it for deployment to the target database. You set configuration properties at the following levels:

- Transportable Module Configuration Properties
- Schema Configuration Properties
- Target DataFile Configuration Properties
- Tablespace Configuration Properties

For most used cases, you can accept the default settings for all the configuration properties with the exception of the Password setting. You must specify a password for each target schema. If the schema already exists in the target, then specify an existing password. If the schema does not already exist, then the schema can be created with the password you provide.

Depending on your company security polices, knowledge of schema passwords may be restricted to database administrators only. In that case, the database administrator must specify the password for each schema. Alternatively, developers can define new passwords for new schemas if the target has no existing schemas that match source schemas.

12.3.4.1 Transportable Module Configuration Properties

Set the following run-time properties for the transportable module:

Target OS Type

Select the type of operating system for the target. For versions earlier than Oracle Database 10*g*, the type of operating system on the target computer must be the same as the source computer. For versions Oracle Database 10*g* or higher, you can deploy to any operating system from any operating system.

Work Directory

You should create a directory on the target computer dedicated to the deployment of transportable modules. This dedicated directory stores files generated at run time including temporary files, scripts, log files, and transportable tablespace data files. If you do not create a dedicated directory and type its full path as the **Work Directory,** then the generated files are saved under the runtime home directory.

What to Deploy

Warehouse Builder enables you to select whether you want to deploy only the tables in your transportable module or all the related catalog objects, such as views and sequences, as well. Select the **TABLES_ONLY** if you want to deploy only tables. Otherwise, select the **ALL_OBJECTS**.

Use the **TABLES_ONLY** option to refresh the data in a transportable module. If you had previously deployed a transportable module with the **ALL_OBJECTS** option and want to replace only the tablespace from the same source, then redeploy the transportable module with the **TABLES_ONLY** option. The deployment drops the existing tablespace in the target, inserts the new one, and then recompiles the previously deployed metadata.

Similarly, if you previously deployed the transportable module using Data Pump, then the redeployment will only modify the tables in the transportable module.

Transport Tablespace

By default, this setting is enabled and the tablespaces are transported. If you enable this setting, then also specify the settings under Target DataFile Configuration Properties.

If both the source and target databases are Oracle 10*g* or higher, then consider disabling this setting. For example, if your table is 100 KB and its tablespace size is 10 MB, then you can deploy the table without deploying the entire tablespace. When you disable **Transport Tablespace,** Oracle Data Pump is used to deploy the table and you can specify the Table Exists Action setting.

> **Note:** If source or target location is not Oracle 10*g*, the Transport Tablespace option is selected by default. In that case, Transportable Tablespace is the only implementation method for data movement. If both source and target locations are Oracle 10*g*, then you can deselect Transport Tablespace and use Data Pump.

If Transport Tablespace is selected, then there are further restrictions, depending on the versions of the source and target locations, as described in Table 12–1. When planning for data replications, take these restrictions into consideration. In general, Oracle 10*g*, particularly Oracle10*g* release 2, is the preferred target database.

Table 12–1 Requirements for Replicating Data Between Database Versions

Source location	Target location
10*g*	Targeting another Oracle 10*g* location requires that both databases must have the same character set and the same national character set. Targeting an Oracle 8*i* or 9*i* location is not possible.
9*i*	Targeting an Oracle 9*i* or 10*g* location requires that both databases must have the same character set, the same national character set, and both databases must be on the same operating system platform. Targeting an Oracle 8*i* or 9*i* location is not possible.

Table 12–1 (Cont.) Requirements for Replicating Data Between Database Versions

Source location	Target location
8*i*	Targeting an Oracle 8*i*, 9*i*, or 10*g* requires all of the following: ■ Both source and target databases must have the same character set. ■ Both source and target databases must have the same national character set. ■ Both source and target databases must be on the same operating system platform. ■ Both source and target databases must have the same block size. ■ Cannot change schema names during transporting tablespaces. ■ Cannot change tablespace names during transporting tablespaces.

12.3.4.2 Schema Configuration Properties

Set the following schema properties for the transportable module:

Target Schema Name

This property enables you to change the name of the source schema when it is deployed to the target. Select the Default or click the Ellipsis button to type the new name for your schema in the target and click **OK.** For example, you can change SCOTT to SCOTT1.

Password

For existing schemas, type a valid password for the schema. For schemas to be created, Warehouse Builder creates the schema with the password you provide.

Default Tablespace

Specify the default tablespace to be used when creating the target schema. If you leave this setting blank, then the default specified by the target are used.

Schema Exists Action

Specify what action should be taken if the schema already exists in the target. The default value is Skip.

Schema Does Not Exist Action

Specify what action should be taken if the schema does not already exist in the target. The default value is Create.

Table Exists Action

When Transport Tablespace is disabled, use this property to specify what action should be taken if the table already exists in the target. The default value is Skip.

Copy Source Schema

When you use Oracle Data Pump by deselecting Transport Tablespace, you can select this option to copy the entire source schema into the target.

Parallel

When you use Oracle Data Pump by deselecting Transport Tablespace, specify the maximum number of processes for the Oracle Database to use for carrying out the transfer of data.

12.3.4.3 Target DataFile Configuration Properties

You need to set the following data file properties for the transportable module:

Directory

Indicate the directory where you want the data file to be stored on your target computer. If you leave the directory unspecified, then the data file is stored in the Work Directory.

File Name

Specify the name of the data file to be created in the target computer. You can use this parameter to rename the data file. Accept the DEFAULT to persist the data file name from the source database or click the Ellipsis button to type a new name for the data file, and click **OK.**

Overwrite

If this parameter is selected, then the existing data file is overwritten. Otherwise, the deployment is terminated if an existing data file is found.

12.3.4.4 Tablespace Configuration Properties

When you enable Transport Tablespace, set the following tablespace properties for the transportable module:

Tablespace Name

If you are using a database prior to 10*g*, then the target tablespace name must be the same as your source tablespace name. For such cases, this field is read-only. If a tablespace with the same name already exists in your target database, then the run-time operation will first drop the existing tablespace and replace it with the new one.

If you are using Oracle Database 10*g* or higher, then you can change the target tablespace name.

Drop Existing Tablespace

If this setting is selected, the existing tablespace is dropped and recreated in the target. By default, this setting is not selected and prevents you from deleting the tablespace in the target in the event that the tablespace with the same name already exists. In this case, the deployment process stops with an error.

12.3.5 Generating and Deploying a Transportable Module

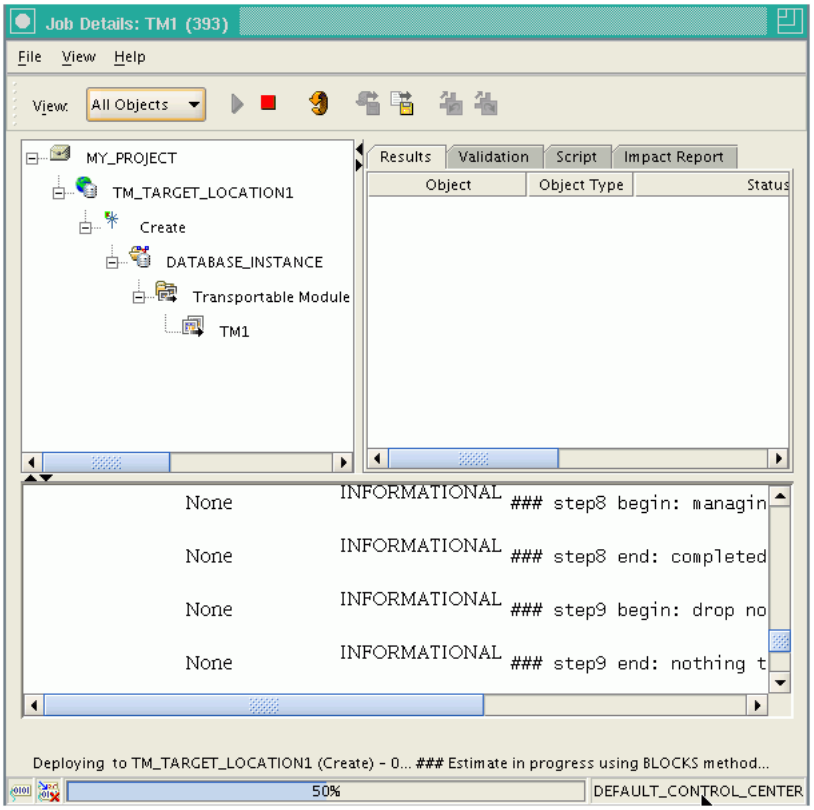
When you deploy a transportable module, the Control Center displays the transportable module as including all the tables while the other catalog objects such as views are displayed separately. When you select a deploy action for the transportable module, the Control Center sets the associated catalog objects to the same deploy action.

During deployment of a transportable module, there are two ways for users to monitor the deployment progress. The first way is by the use of the Job Details

window. The status line is instantly refreshed with the most up-to-date status. The message box immediately above the status line shows all the messages logged so far.

Figure 12–7 displays the Job Details window.

Figure 12–7 The Job Details Window



Another way of observing the progress is by viewing the log file that the transportable module deployment process generates. The transportable module log file is created in the Work Directory that the user has configured. The name of the file is always <The TM Name>.log, for example TM1.log if the name of the transportable module is TM1. This file is a plain text file containing the same messages that you can see in the message box in the Job Details window. Example 12–1 shows the contents of a transportable module log file.

Currently, there are a total of 16 steps to view the log files. Some steps may be skipped depending on the user configurations, and some steps may contain error messages that transportable module considers ignorable, such as failures in creating referential constraints due to referenced tables not found errors. This log file contains important information. It must be carefully examined during and after the transportable module deployment completes.

Example 12–1 Log file containing important information

```
step1 begin: making connection to target db ...
step1 end: connected to target
Target ORACLE_HOME = /data/oracle/ora1010
step2 begin: making connection to source db...
step2 end: skipped.
step3 begin: making source tablespaces read only...
step3 end: skipped.
```

```
step4 begin: exporting tts...
step4 end: skipped.
step 5 begin: checking for existing datafiles on target...
step5 end: skipped.
step 6 begin: drop existing tablespaces
step6 end: skipped.
step7 begin: transporting datafiles...
step7 end: skipped.
step8 begin: managing schemas/users ...
step8 end: completed setting up target schemas
step9 begin: drop non-table schema objects...
step9 end: nothing to drop.
step10 begin: converting datafiles...
step10 end: skipped.
step 11 begin: importing tts ...
find or create a usable dblink to source.
step11 end: importing tts is not requested by user.
step 11 end: import tts is successful
step 12 begin: restore source tablespaces original status ...
step12 end: skipped.
step13 end: skipped.
step14 begin: non-tts import ...

Import: Release 10.1.0.4.0 - Production on Tuesday, 04 April, 2006 10:43
Copyright (c) 2003, Oracle.  All rights reserved.

Username:
Connected to: Oracle Database 10g Enterprise Edition Release 10.1.0.4.0 -
Production
With the Partitioning, OLAP and Data Mining options
Starting "TMTGT_U"."SYS_IMPORT_TABLE_02":  TMTGT_
U/********@(DESCRIPTION=(ADDRESS=(HOST=LOCALHOST)(PROTOCOL=tcp)(PORT=1521))(CONNEC
T_DATA=(SERVICE_NAME=ORA1010.US.ORACLE.COM))) parfile=/home/ygong/tmdir/TM1_
imptts.par
Estimate in progress using BLOCKS method...
Processing object type TABLE_EXPORT/TABLE/TBL_TABLE_DATA/TABLE/TABLE_DATA
Total estimation using BLOCKS method: 64 KB
Processing object type TABLE_EXPORT/TABLE/TABLE
. . imported "TMU1"."TA"                                    2 rows
Processing object type TABLE_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS
Processing object type TABLE_EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT
ORA-39083: Object type REF_CONSTRAINT failed to create with error:
ORA-00942: table or view does not exist
Failing sql is:
ALTER TABLE "TMU1"."TA" ADD CONSTRAINT "TA_T1_FK" FOREIGN KEY ("C") REFERENCES
"TMU1"."T1" ("C") ENABLE

Job "TMTGT_U"."SYS_IMPORT_TABLE_02" completed with 1 error(s) at 10:44
step14: import has failures.
step14 end: non-tts import completed with warnings
step15 end: create flat file directories skipped.
step16 end: transporting flat files skipped.
```

12.3.6 Designing Mappings that Access Data through Transportable Modules

After you successfully deploy a transportable module, you can use the objects in the transportable module in ETL designs. When you add source and target operators to a mapping, you can select objects from the transportable module folder.

12.4 Editing Transportable Modules

A transportable module is located under the transportable modules node within the Databases node on the Project Explorer.

You can edit a transportable module by right-clicking the name of the transportable module from the Project Explorer and selecting **Open Editor**. Warehouse Builder displays the Edit Transportable Module dialog box containing four tabs.

12.4.1 Name

From the Name tab, you can edit the name and description of the transportable module.

12.4.2 Source Location

Warehouse Builder uses this connection information to access the source computer and import the metadata into its workspace. Warehouse Builder also uses this information during run-time to move the tablespace data from the source to the target.

The Source Database tab is read-only. Once you have imported tablespace definitions from a source computer, you cannot change the location information.

12.4.3 Tablespaces

The Tablespaces tab displays the tablespaces to be transported and their size. This tab is read-only. You can also view the tablespace size for individual data files in a tablespace. For details, see "Viewing Tablespace Properties" on page 12-18.

12.4.4 Target Locations

Displays the available and selected target locations. You can move a location from Available Locations to Selected Locations, or configure a new location.

12.4.5 Viewing Tablespace Properties

You can view the properties of a tablespace by right-clicking the name of the tablespace from the Project Explorer and selecting **Open Editor**. Warehouse Builder opens the Edit Tablespace dialog box. This property sheet displays the size of individual data files in a tablespace. It has two tabs, Name and Source Datafiles.

12.4.6 Reimporting Metadata into a Transportable Module

If your source data has changed since you last created a transportable module, then you can reimport the metadata to update your workspace definitions. When you open the Reimport dialog box, the source location you specified while creating the transportable module is stored and the source objects are displayed.

To reimport transportable module definitions:

1. From the Project Explorer, right-click the **Transportable Modules** name and select **Reimport**.

   The Re-create Transportable Module dialog box is displayed.

2. From the Available Database Objects column, select the objects you want to reimport.

The database objects that have been previously imported into the workspace are listed in bold. You can also choose to import new definitions.

3. Use the arrow buttons to move the objects to the Selected Database Objects column, and click **OK.**

Warehouse Builder reimports existing definitions and creates new ones. The transportable module reflects the changes and updates after the reimport is completed.

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