Oracle® Data Miner

Installation and Administration Guide

Release 4.1

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Oracle Data Miner Installation and Administration Guide, Release 4.1

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Preface

Oracle Data Miner Installation and Administration Guide explains how to use the Data Miner scripts that are included with SQL Developer to install and administer the Data Miner repository in Oracle Database.

Audience

This document is intended for database administrators and database developers.

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 that have purchased support 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 Documents

For more information, see the following documents in the Oracle Database Online Documentation Library:

Oracle Database 12*c* Release 1 (12.1)

- *Oracle Data Miner Release Notes*
- *Oracle Data Miner User's Guide*
- *Oracle SQL Developer User's Guide*
- *Oracle Data Mining Concepts*

- *Oracle Data Mining User's Guide*
- *Oracle R Enterprise User's Guide*

Oracle Database 11*g* Release 2 (11.2)

- *Oracle SQL Developer User's Guide*
- *Oracle Data Mining Concepts*
- *Oracle Data Mining User's Guide*
- *Oracle Data Mining API Guide (Virtual Book)*
- *Oracle R Enterprise Installation and Administration Guide*
- *Oracle R Enterprise User's Guide*

Conventions

The following text conventions are used in this document:

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

1

Oracle Data Miner System Overview

This chapter introduces Oracle Data Miner and the programmatic interfaces of Oracle Data Mining. It also supplies links to resources to help you learn more about the product.

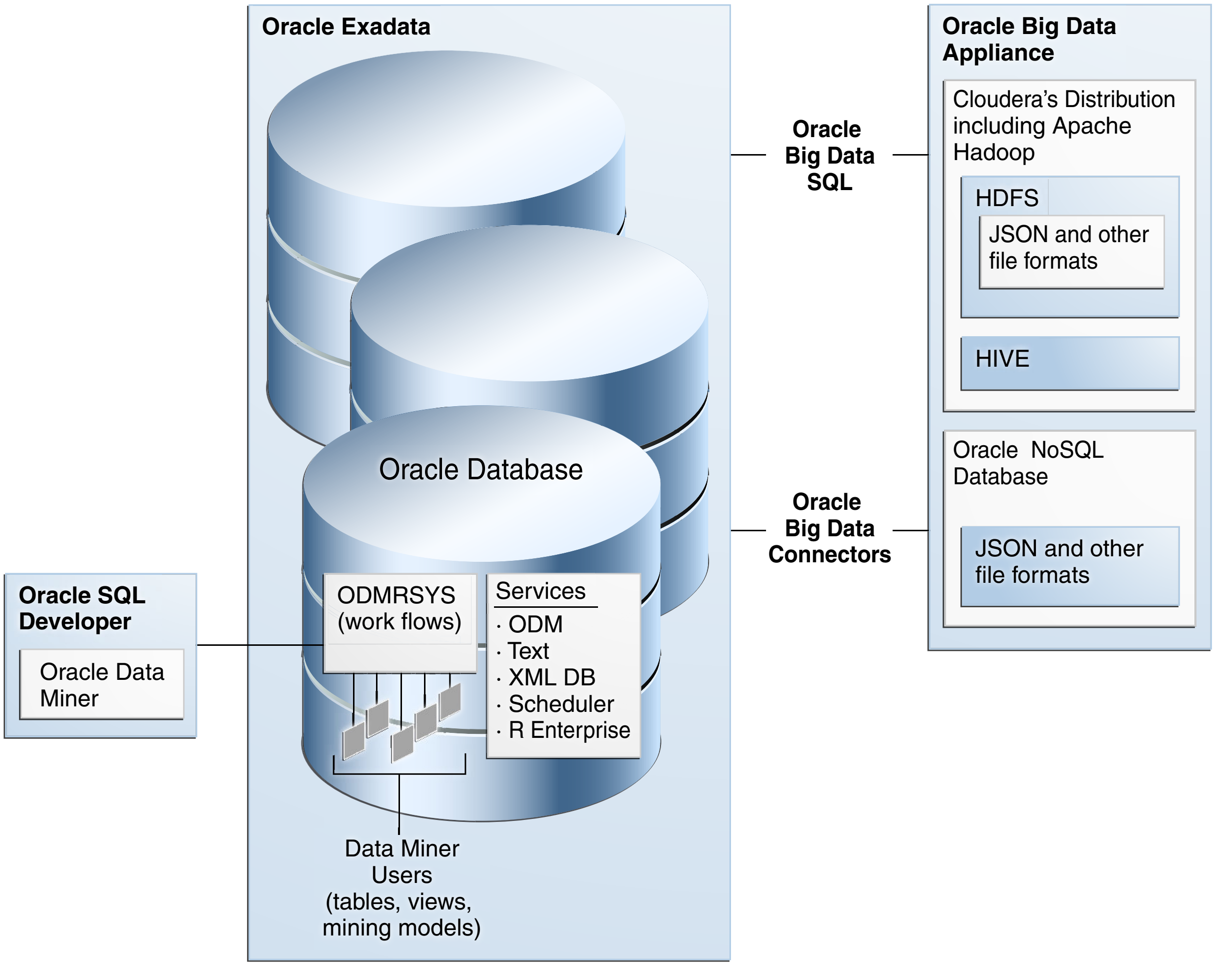
Oracle Data Miner Architecture

Oracle Data Miner is an extension of Oracle SQL Developer, a graphical development environment for Oracle SQL.

Oracle Data Miner uses the data mining technology embedded in Oracle Database to create, execute, and manage workflows that encapsulate data mining operations. It uses the `ODMRSYS` schema as a dedicated system repository.

The architecture of Oracle Data Miner is illustrated in Figure 1-1.

Figure 1-1 Oracle Data Miner Architecture for Big Data


Oracle Exadata
Oracle Database
ODMRSYS (work flows)
Services
· ODM
· Text
· XML DB
· Scheduler
· R Enterprise
Data Miner Users (tables, views, mining models)
Oracle SQL Developer
Oracle Data Miner
Oracle Big Data SQL
Oracle Big Data Connectors
Oracle Big Data Appliance
Cloudera's Distribution including Apache Hadoop
HDFS
JSON and other file formats
HIVE
Oracle NoSQL Database
JSON and other file formats

About the Oracle Data Miner Repository

Oracle Data Miner requires the installation of a repository, the `ODMRSYS` schema, in the database server. Oracle Data Miner users must have the privileges that are required for accessing objects in `ODMRSYS`.

Oracle Data Miner repository manages:

- **Storage:** The repository stores the projects and workflows of all the Oracle Data Miner users that have established connections to this database.
- **Runtime Functions:** The repository is the application layer for Oracle Data Miner. It controls the execution of workflows and other runtime operations.

Database Features Used by Oracle Data Miner

Oracle Data Miner uses a number of Oracle Database features such as Oracle Data Mining, Oracle XML DB, Oracle R Enterprise and so on.

Oracle Data Miner uses the following Oracle Database features:

- **Oracle Data Mining:** Provides the model building, testing, and scoring capabilities of Oracle Data Miner.

- **Oracle XML DB:** Manages the metadata in the Oracle Data Miner repository.
- **Oracle Text:** Supports text mining.
- **Oracle Scheduler:** Schedules workflow execution.
- **Oracle R Enterprise:** Executes embedded R scripts supplied by the user.

> **Note:**
>
> With the exception of Oracle R Enterprise, these features are all included by default in Oracle Database Enterprise Edition. Oracle R Enterprise requires additional installation steps, as described in *Oracle R Enterprise Installation and Administration Guide*

Related Topics:

Oracle Data Mining Concepts

Oracle Data Mining User's Guide

Oracle XML DB Developer's Guide

Oracle Text Application Developer's Guide

Oracle Database Administrator's Guide

Oracle R Enterprise User's Guide

Oracle Data Miner and Oracle Advanced Analytics

Oracle Data Miner is the Graphical User Interface (GUI) for Oracle Data Mining, the data mining engine in Oracle Database.

Oracle Data Mining is a component of the Oracle Advanced Analytics option of Oracle Database Enterprise Edition.

Components of Oracle Advanced Analytics:

- **Oracle Data Mining** (required by Oracle Data Miner)

  Oracle Data Mining is a powerful data mining engine embedded in the Database kernel. Oracle Data Mining supports algorithms for classification, regression, clustering, feature selection, feature extraction, and association (market basket analysis). The Data Mining PL/SQL Application Programming Interface (API) performs data preparation and creates, evaluates, and maintains mining models. Data Mining SQL functions score data using mining models or predictive queries.

- **Oracle R Enterprise** (not required by Oracle Data Miner)

  Oracle Data Miner provides limited support for Oracle R Enterprise. If a user supplies a script that includes embedded R in the Oracle Data Miner SQL Query node, then Oracle Data Miner uses Oracle R Enterprise to execute the script.

  Oracle R Enterprise integrates the open source R statistical programming language and environment with Oracle Database. Oracle R Enterprise supports a transparency layer, which allows R to act transparently on Oracle data, and embedded R execution, which allows the execution of R scripts in the database.

Related Topics:

Oracle Data Mining Concepts

Oracle R Enterprise User's Guide

About Data Mining APIs

Oracle Data Miner is an application based on the Data Mining APIs in Oracle Database.

The APIs are public and can be used directly for application development. The APIs are summarized in the following topics:

Data Mining PL/SQL Packages
PL/SQL APIs manipulate mining models, which are database schema objects.

Data Mining SQL Scoring Functions
A set of specialized SQL functions provides the primary mechanism for scoring data in Oracle Data Mining. When called as single-row functions, the SQL Data Mining functions apply a user-supplied mining model to each row of input data.

Data Mining Data Dictionary Views
The data dictionary views store information about mining models in the Oracle Database system catalog. All views are available for DBA, USER, and ALL access.

Data Mining PL/SQL Packages

PL/SQL APIs manipulate mining models, which are database schema objects.

Table 1-1 lists the PL/SQL packages and their descriptions.

Table 1-1 Oracle Data Mining PL/SQL Packages

Package	Description
`DBMS_DATA_MINING`	DDL procedures for managing mining models. Mining model settings. Procedures for testing mining models, functions for querying mining models, and an `APPLY` procedure for batch scoring.
`DBMS_DATA_MINING _TRANSFORM`	Procedures for specifying transformation expressions and applying the transformations to columns of data. Transformations can be passed to the model creation process and embedded in the model definition, or they can be applied externally to data views.
`DBMS_PREDICTIVE_ ANALYTICS`	Procedures that perform predict, explain, and profile operations without a user-created mining model.

Note:

The mining operations in the DBMS_PREDICTIVE_ANALYTICS package are available in code snippets in Oracle Data Miner, as described in *Oracle Data Miner User's Guide*.

See Also:

Oracle Database 12.1: *Oracle Database PL/SQL Packages and Types Reference*:

Oracle Database 11.2: *Oracle Database PL/SQL Packages and Types Reference*

Data Mining SQL Scoring Functions

A set of specialized SQL functions provides the primary mechanism for scoring data in Oracle Data Mining. When called as single-row functions, the SQL Data Mining functions apply a user-supplied mining model to each row of input data.

In Oracle Database 12*c*, the functions can also be called as analytic functions, in which case the algorithmic processing is performed dynamically without a user-supplied mining model. The term *predictive query* refers to this mode of scoring.

Table 1-2 Data Mining SQL Scoring Functions

Function Name	Function Description
CLUSTER_DETAILS	Returns cluster details for each row in the input data.
CLUSTER_DISTANCE	Returns the distance between each row and the centroid.
CLUSTER_ID	Returns the ID of the highest probability cluster for each row.
CLUSTER_PROBABILITY	Returns the highest probability cluster for each row.
CLUSTER_SET	Returns a set of cluster ID and probability pairs for each row.
FEATURE_DETAILS	Returns a set of feature and value paris for each row.
FEATURE_ID	Returns feature details for each row in the input data.
FEATURE_SET	Returns a set of feature ID and feature value pairs for each row.
FEATURE_VALUE	Returns the value of the highest value feature for each row
PREDICTION	Returns the prediction for each row in the input.
PREDICTION_BOUNDS	Returns the upper and lower bounds of prediction for each row (GLM only).
PREDICTION_COST	Returns a cost for each row.
PREDICTION_DETAILS	Returns prediction details for each row.

Table 1-2 (Cont.) Data Mining SQL Scoring Functions

Function Name	Function Description
`PREDICTION_PROBABILITY`	Returns the probability of each prediction.
`PREDICTION_SET`	Returns the prediction or cost with probability for each row.

Note:

The SQL scoring functions are available in code snippets in Oracle Data Miner, as described in *Oracle Data Miner User's Guide*.

See Also:

Oracle Database 12.1:

- *Oracle Database SQL Language Reference*
- *Oracle Data Mining Application Developer's Guide*

Oracle Database 11.2:

- *Oracle Database SQL Language Reference*
- *Oracle Data Mining Application Developer's Guide*
- *Oracle Data Mining Application Developer's Guide*

Data Mining Data Dictionary Views

The data dictionary views store information about mining models in the Oracle Database system catalog. All views are available for DBA, USER, and ALL access.

Table 1-3 lists the Data mining data dictionary views and their descriptions.

Table 1-3 Data Mining Data Dictionary Views

View Name	Description
`*_MINING_MODELS`	Provides information about all accessible mining models
`*_MINING_MODEL_ATTRIBUTES`	Provides information about the attributes of all accessible mining models
`*_MINING_MODEL_SETTINGS`	Provides information about the settings of all accessible mining models

See Also:

- Oracle Database 12.1: *Oracle Database Reference*
- Oracle Database 11.2: *Oracle Database Reference*

Resources For Learning About Oracle Data Miner

Lists the resources for Oracle Data Miner documentation and training.

- Oracle Data Miner Documentation
  - *Oracle Data Miner User's Guide*
  - *Oracle Data Miner Release Notes*
  - *Oracle Data Mining Online Help*
- Oracle Data Mining 12.1 Documentation
  - *Oracle Data Mining Concepts*
  - *Oracle Data Mining User's Guide*
  - Oracle Data Mining API Guide (Virtual Book)
- Oracle Data Mining 11.2 Documentation
  - *Oracle Data Mining Concepts*
  - *Oracle Data Mining User's Guide*
  - Oracle Data Mining API Guide (Virtual Book)
- Tutorials
  - Oracle Data Mining 4.0 OBE (Oracle By Example) Series
  - Text Mining Using Oracle Data Miner 3.0
  - Star Schema Mining Using Oracle Data Miner 3.0
- Oracle Data Mining Forum
- Oracle Data Mining Blogs
- Oracle Technology Network

2

Installing the Database to Support Oracle Data Miner

This chapter explains how to install and configure Oracle Database to support Oracle Data Miner.

Database Requirements for Oracle Data Miner

Oracle Data Miner 4.1 requires Oracle Database Enterprise Edition or Personal Edition 11.2 or later.

To verify that the database meets this requirement, you can query the `database_compatible_level` setting. The value should be no lower than 11.2.

```
SELECT VALUE FROM database_compatible_level;
```

Note:

Some features of Oracle Data Miner 4.1 require Oracle Database 12.1.

Table 2-1 lists the Database installation and configuration requirements for Oracle Data Miner.

Table 2-1 Database Requirements Checklist for Oracle Data Miner

Feature	Requirement	Links to More Information
Database version	11.2.0.1 or later.	Installing Oracle Database 11.2 or 12.1
Oracle Advanced Analytics	Required for Oracle Data Miner installation.	Oracle Data Miner and Oracle Advanced Analytics
Oracle Text	Required for Oracle Data Miner installation.	Oracle Text and Oracle Data Miner
XML DB	Required for Oracle Data Miner installation.	XML DB and Oracle Data Miner
Storage Configuration	Must be configured for either binary XML storage or object-relational storage, depending on the version of the database.	Storage Configuration for Oracle Data Miner
AL32UTF8 Character Set	Required to support multibyte character data and other data formats Oracle highly recommends that you configure the database to support AL32UTF8.	Oracle Database 12.1: *Oracle Database Globalization Support Guide* Oracle Database 11.2: *Oracle Database Globalization Support Guide*
Oracle R Enterprise	Required for execution of embedded R scripts in the Oracle Data Miner SQL Query node.	*Oracle R Enterprise Installation and Administration Guide*
Oracle Database Examples	Required for Oracle Data Miner sample data. May be required for Oracle Text Knowledge Base.	Oracle Database 12.1: *Oracle Database Examples Installation Guide* Oracle Database 11.2: *Oracle Database Examples Installation Guide*
Sample Schemas	Required for some Oracle Data Miner sample data.	Oracle Database 12.1: *Oracle Database Sample Schemas* Oracle Database 11.2: *Oracle Database Sample Schemas*

Related Topics:

Database Features Used by Oracle Data Miner
Oracle Data Miner uses a number of Oracle Database features such as Oracle Data Mining, Oracle XML DB, Oracle R Enterprise and so on.

Oracle Text and Oracle Data Miner

Oracle Data Miner uses Oracle Text to support text mining. Oracle Text is included by default in Oracle Database Enterprise Edition and is required for installation of Oracle Data Miner.

Oracle Text Knowledge Base is required to support theme generation during text transformation. If you want to support this feature of Oracle Text and it is not already available in the Database, then you can obtain it with an installation of Oracle Database Examples. The Oracle Text Knowledge Base is available in English and French.

See Also:

Oracle Database 12*c*:

- *Oracle Text Application Developer's Guide*
- *Oracle Text Reference* for information about extending the supplied knowledge base
- *Oracle Database Examples Installation Guide*

Oracle Database 11*g*:

- *Oracle Text Application Developer's Guide*

  `http://www.oracle.com/pls/topic/lookup?ctx=db112&id=CCAPP`
- *Oracle Text Reference* for information about extending the supplied knowledge base

  `http://www.oracle.com/pls/topic/lookup?ctx=db112&id=CCREF`
- *Oracle Database Examples Installation Guide*

  `http://www.oracle.com/pls/topic/lookup?ctx=db112&id=EXMPL`

XML DB and Oracle Data Miner

Oracle Data Miner uses XML DB to store workflows in the Oracle Data Miner repository. XML DB is typically included in Oracle Database Enterprise Edition and is required for installation of Oracle Data Miner.

To determine if XML DB is present in the database, or to manually install XML DB, follow the instructions in *Oracle XML DB Developer's Guide*:

- Oracle Database 12.1: *Oracle XML DB Developer's Guide*
- Oracle Database 11.2: *Oracle XML DB Developer's Guide*:

  `http://www.oracle.com/pls/topic/lookup?ctx=db112&id=ADXDB4006`

Workflow documents in the Oracle Data Miner repository are of type `XMLType`, an abstract data type that provides these storage models:

- **Object-relational storage** – `XMLType` data is stored as a set of objects.
- **Binary XML storage** – `XMLType` data is stored in a post-parse, binary format specifically designed for XML data.

Oracle Data Miner uses object-relational storage in earlier versions of the Database and binary XML storage in later versions.

Related Topics:

Storage Configuration for Oracle Data Miner
The storage format used by Oracle Data Miner depends on the version of the database:

Storage Configuration for Oracle Data Miner

The storage format used by Oracle Data Miner depends on the version of the database:

The Oracle Database versions and the corresponding storage format used by Oracle Data Miner are:

- With Oracle Database 11.2.0.1 - 11.2.0.3, Oracle Data Miner uses object-relational storage.

  Approximately 200MB - 700MB XML DB object-relational storage is required.

- With Oracle Database 11.2.0.4 and later, Oracle Data Miner uses binary XML storage.

  With binary storage, a tablespace allocation of 200MB can store approximately 1000 moderately complex workflows (about 35 nodes).

  To use binary storage, `ODMRSYS` must be created in a tablespace managed with Automatic Segment Space Management (ASSM).

  The following statement shows how to create an Oracle ASSM tablespace:

  ```
  CREATE TABLESPACE DMUSER_AUTO DATAFILE 'DMUSER_AUTO.dat' size 20m
       autoextend on next 32m maxsize UNLIMITED extent management local
       AUTOALLOCATE SEGMENT SPACE MANAGEMENT AUTO;
  ```

See Also:

Oracle Database Administrator's Guide

http://www.oracle.com/pls/topic/lookup?ctx=db112&id=OSTMG

Installing Oracle Database 11.2 or 12.1

To install Oracle Database, follow the installation instructions for your platform and all additional instructions.

Installation instructions and all additional instructions are specified in "Database Requirements for Oracle Data Miner".

Links to some Oracle Database Installation guides are listed as follows:

- **Linux**
  - Oracle Database 12.1: *Oracle Database Installation Guide for Linux*
  - Oracle Database 11.2: *Oracle Database Installation Guide for Linux*

    http://www.oracle.com/pls/topic/lookup?ctx=db112&id=LADBI
- **Oracle Solaris**
  - Oracle Database 12.1: *Oracle Database Installation Guide for Oracle Solaris*
  - Oracle Database 11.2: *Oracle Database Installation Guide for Oracle Solaris*

    http://www.oracle.com/pls/topic/lookup?ctx=db112&id=SSDBI
- **Microsoft Windows**

- Oracle Database 12.1: *Oracle Database Installation Guide for Microsoft Windows*
- Oracle Database 11.2: *Oracle Database Installation Guide for Microsoft Windows*

  `http://www.oracle.com/pls/topic/lookup?ctx=db112&id=NTDBI`

To install Oracle Database on other platforms, search the Oracle Help Center on `http://docs.oracle.com` for your platform-specific installation instructions.

3 Installing Oracle Data Miner

This chapter explains how to install SQL Developer and the Oracle Data Miner repository.

Oracle Data Miner Installation Overview

Oracle Data Miner installation refers to installation of the Oracle Data Miner repository in an Oracle Database. The repository serves as application manager and workflow storage manager for Oracle Data Miner.

To install Oracle Data Miner, perform these steps:

1. Install Oracle Database. If you already have a database, verify that it meets the requirements specified in Table 2-1.

2. Download SQL Developer.

3. Check *Oracle Data Miner Release Notes*

4. Install the Oracle Data Miner repository. You can use SQL Developer or you can run scripts to perform the installation.

> **See Also:**
>
> "About Data Miner Repository Installation" in *Oracle Data Miner User's Guide*

Related Topics:

Downloading SQL Developer
Oracle SQL Developer is available for download free of charge from the Oracle Technology Network.

Installing the Repository Using SQL Developer GUI
You can install the Oracle Data Miner repository using the SQL Developer graphical user interface.

Installing the Repository Using a Script
You can install the Oracle Data Miner repository by running the `installodmr` script.

Installing the Database to Support Oracle Data Miner

About Oracle Data Miner Sample Data

Oracle Data Miner contains sample data that includes tables and views.

The sample tables and views are:

- `MINING_DATA_BUILD_V, MINING_DATA_TEST_V, MINING_DATA_APPLU_V:` These are views based on tables in the `SH` schema. This data is used in Oracle Data Mining sample programs, as described in Oracle Data Mining Application Developer's Guide and Oracle Data Mining Administrator's Guide.

- `MINING_DATA_TEXT_BUILD_V, MINING_DATA_TEXT_TEST_V, MINING_DATA_TEXT_APPLU_V:` These are views based on tables in the `SH` schema. The views include an additional `COMMENTS` column that is used in text mining examples in OBEs and in Data Mining sample programs.

- `ODMR_CARS_DATA:` This is sample data about US automobiles, for experimenting with the Graph node.

- `INSUR_CUST_LVT_SAMPLE:` This is sample data used by the Oracle By Example (OBE) tutorials for Data Mining.

- `ODMR_SALES_JSON_DATA:` This is sample sales data for experimenting with the JSON query node in Oracle Database 12.1.0.2 and later.

Related Topics:

Oracle Data Mining Administrator's Guide (Database 11.2)

Downloading SQL Developer

Oracle SQL Developer is available for download free of charge from the Oracle Technology Network.

To install SQL Developer, simply download and unzip it on your system. SQL Developer does not include an installation program.

To download SQL Developer:

1. Go to the **Downloads** tab of the Oracle SQL Developer home page:

   `http://www.oracle.com/technetwork/developer-tools/sql-developer/downloads/index.html`

2. Select the documentation links to view the release notes, a list of new features, and the SQL Developer Documentation Library.

   Note:

   The documents in the Documentation Library are available for online viewing or for download in PDF, Mobi (for Kindle), or ePub (for iBook) format. You can bookmark the Documentation Library page for ease of access:

   `Documentation`

3. Select the installation instructions for your platform and follow the instructions to download and start SQL Developer.

   Note:

   SQL Developer requires the Java Development Kit (JDK) version 1.7 or later. If the JDK is not included in the SQL Developer software download bundle and you do not have it installed on your system, then you must download and install it separately.

   The SQL Developer installation instructions include a link to the JDK download page.

4. The first time you start SQL Developer, you must supply the path to the JDK.

Installing the Repository Using a Script

You can install the Oracle Data Miner repository by running the `installodmr` script.

Verify disk space availability. The Oracle Data Miner repository requires between 200 and 700 MB initially, depending on the tablespace settings.

Note:

For Database 11.2.0.4 or later, the default tablespace for the repository must have `auto` specified for segment space management.

To install the Oracle Data Miner repository:

1. Log in to the database as SYS.

2. Run the `installodmr` script.

   ```
   installodmr.sql default_tablespace temp_tablespace
   ```

   For example, if you have set the default search path as described in Setting the Path to Oracle Data Miner Scripts, then the following statement installs the repository with default tablespace `USERS` and temporary tablespace `TEMP`:

   ```
   @installodmr USERS TEMP
   ```

When the database is remote and the repository is using XML DB object-relational storage (Oracle Database 11.2.0.1 - 11.2.0.3), the installation script takes approximately ten minutes to run. When the database is remote and the repository is using binary storage (Oracle Database 11.2.0.4 and later), the installation completes in approximately three minutes.

Note:

After installing the repository, you must enable Oracle Data Miner access for at least one database user.

See Also:

- Storage Configuration for Oracle Data Miner for information about object-relational and binary storage for Oracle Data Miner.
- Granting or Dropping Access Rights to Oracle Data Miner Repository for more information related to enabling or disabling access to the repository.
- About Oracle Data Miner Administration Scriptsbefore running the installation script.

Loading the Sample Data Using a Script

After you install the repository using a script, you can run a second script to load the sample data that is used in Oracle Data Miner tutorials.

If you install the repository by using the SQL Developer GUI, then you can install the sample data by checking a check box.

The `instDemoData` script prepares demo data for an Oracle Data Miner user. The script grants access to the data described. If the `SH` schema is not present in the database, then the script prepares only the demo data that does not depend on `SH`.

To install the Oracle Data Miner sample data for a user:

1. Log in to the database as `SYS.`

2. Verify that the `SH` schema is present in the database.

3. Run the `instDemoData` script:

   ```
   instDemoData.sql user
   ```

For example, if you have set the default search path, then the following statement installs the sample data for the user `dmuser1`:

```
@instDemoData dmuser1
```

To drop the sample data for a user:

1. Log in to the database as SYS.
2. Run the `dropDemoData` script:

   ```
   dropDemoData.sql user
   ```

   For example, if you have set the default search path, then the following statement drops the sample data for the user `dmuser1`:

   ```
   @dropDemoData dmuser1
   ```

Related Topics:

Installing the Repository Using a Script

Setting the Path to Oracle Data Miner Scripts

About Oracle Data Miner Sample Data

Installing the Repository Using SQL Developer GUI

You can install the Oracle Data Miner repository using the SQL Developer graphical user interface.

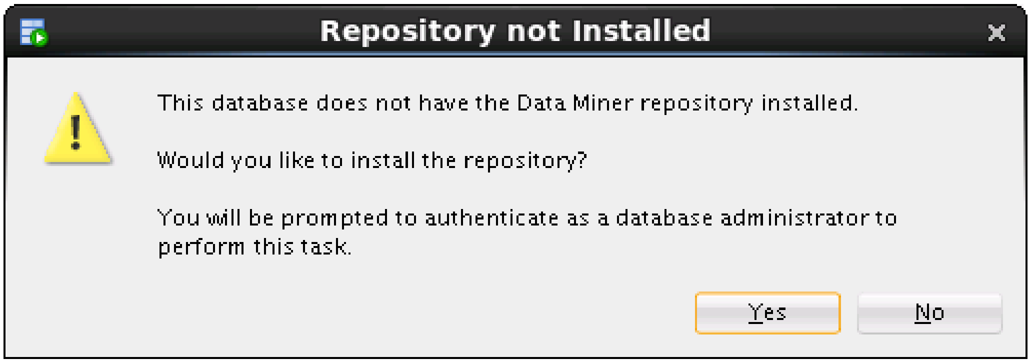
Before you install the repository, verify disk space availability. You must have 4 MB disk space for initial storage allocation. For additional storage, you must have an average of 1 MB disk space to handle 10 workflows of 20 nodes each.

To install the Oracle Data Miner repository from SQL Developer GUI:

1. In the **Connections** tab of SQL Developer, select an administrative connection to the target database, or create a new one.
2. Create an Oracle Data Miner user:
   a. Drill on the administrative connection.
   b. Right click **Other Users** and choose **Create User.**
   c. Grant the `CONNECT` role to the user, and for **Default Tablespace,** specify Unlimited Quota.
3. In the **Connections** tab, create a connection for the Oracle Data Miner user.
4. From the **View** menu, select **Data Miner**, and then **Data Miner Connections.**
5. The Data Miner **Connections** tab appears beneath the SQL Developer **Connections** tab.
6. Click the plus sign on the **Data Miner** tab to display the **Select Connection** dialog box. Choose the Data Miner user from the drop-down list.
7. The new connection appears on the **Data Miner** tab.

8. When you attempt to drill on the new connection, this dialog box is displayed:

Figure 3-1 Repository not Installed



Repository not Installed

This database does not have the Data Miner repository installed.

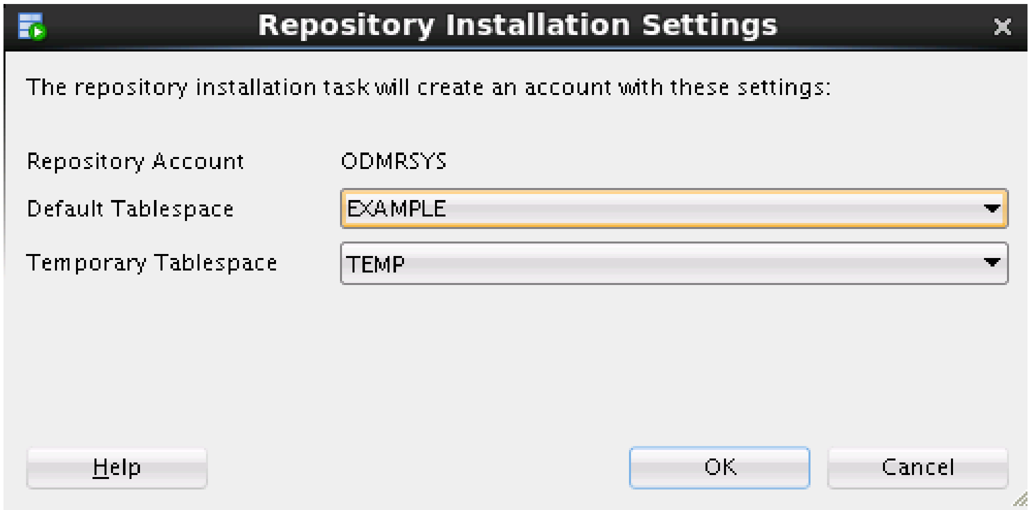
Would you like to install the repository?

You will be prompted to authenticate as a database administrator to perform this task.

9. Click **Yes** to install the repository.

10. After you provide the SYS password, information about the repository is displayed. For example:

Figure 3-2 Repository Installation Settings



Repository Installation Settings

The repository installation task will create an account with these settings:

Repository Account ODMRSYS

Default Tablespace EXAMPLE

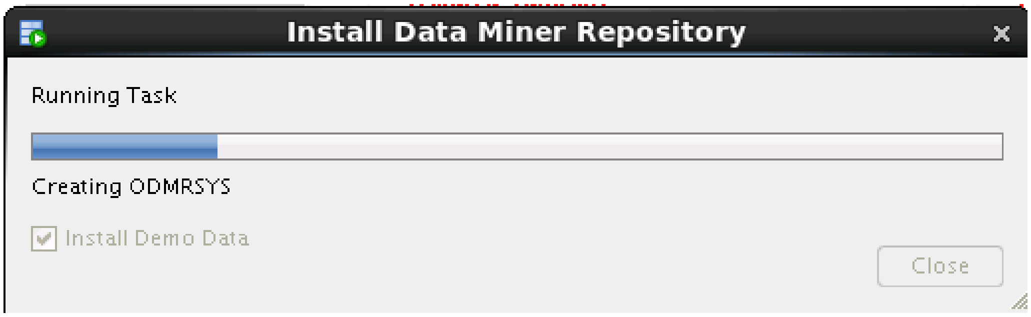
Temporary Tablespace TEMP

11. Click **OK.**

12. The Repository Installation Settings dialog box appears.

    Select the **Install Demo Data** check box to install the sample data in the schema of the user connection. If the SH schema is present in the database, then all sample data is installed. If SH is not installed, then only `ODMR_CARS_DATA`, `INSUR_CUST_LVT_SAMPLE`, `ODMR_SALES_JSON_DATA` `ODMR_MINING_DATA_TEXT`, `ODMR_SALES_DATA`, and `WIKISAMPLE` (Database 12.1 only) are installed.

Figure 3-3 Install Data Miner Repository



Running Task

Creating ODMRSYS

Note:

The repository installation automatically grants the database privileges required by Oracle Data Miner.

The privileges required by Oracle Data Miner are different from the privileges required for using the Oracle Data Mining APIs directly. For details, see "Controlling Access to Mining Models and Data" in *Oracle Data Mining Application Developer's Guide.*

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13. When the installation is complete, click **Close.**

Related Topics:

About Oracle Data Miner Sample Data
Oracle Data Miner contains sample data that includes tables and views.

Installing JSON Parser and Data Guide

JSON query processing is available in Oracle Database starting with version 12.1.0.2. If you have installed or migrated the repository using scripts, then you must complete a separate postinstallation step to enable JSON support in Oracle Data Miner. If you have installed or migrated the repository using the GUI, then this extra step is not required.

About the Scripts for Installing JSON Support
To install JSON parser and the schema generator for Oracle Data Miner, two scripts are available.

Requirements for Running the Scripts to Install JSON Parser
The scripts `loadjsonschemagen.sql` and `loadjsonschemagenWithSN.sql` install the JSON parser and schema generator for Oracle Data Miner.

Installing JSON Parser in a Remote Database
You can install JSON support in a remote database by running the `loadjsonschemagen` or `loadjsonschemagenWithSN` scripts.

Installing JSON Parser Locally on the Database Host
You can install JSON parser locally on a database host by using the scripts `loadjsonschemagen.sql`, `validateODMRSYS.sql`, `org.glassfish.javax.json.jar`, and `JSONSchemaGenerator.jar`.

About the Scripts for Installing JSON Support

To install JSON parser and the schema generator for Oracle Data Miner, two scripts are available.

The only difference between the two scripts in their arguments: one takes the Oracle SID, the other takes the Oracle Service Name. You can choose the script that best suits your database installation. If you are using a pluggable database, the Oracle Service Name is required.

- `loadjsonschemagen.sql` uses the Oracle SID.

  ```
  loadjsonschemagen.sql sys_user sys_password host port SID jar_path
  ```

- `loadjsonschemagenWithSN.sql` uses the Oracle Service Name.

  ```
  loadjsonschemagenWithSN.sql  sys_user sys_password host port service_name jar_path
  ```

For both scripts, specify the `SYS` user and password, the database host name and port number and the path to the jar files:

```
org.glassfish.javax.json.jar
```

```
JSONSchemagenerator.jar
```

Requirements for Running the Scripts to Install JSON Parser

The scripts `loadjsonschemagen.sql` and `loadjsonschemagenWithSN.sql` install the JSON parser and schema generator for Oracle Data Miner.

To run the scripts, ensure the following requirements:

- The *`jar_path`* argument must be a directory that is accessible to the current database system.
- The Oracle database command-line utilities `loadjava` and `dropjava` must be available on the system where the script is run.

Installing JSON Parser in a Remote Database

You can install JSON support in a remote database by running the `loadjsonschemagen` or `loadjsonschemagenWithSN` scripts.

1. Log in to the computer where SQL Developer is installed.
2. Navigate to the `scripts` directory:

   ```
   cd SQL_Developer_Home\sqldeveloper\dataminer\scripts
   ```

3. Start SQL*Plus as `SYS:`

   ```
   SQLPLUS sys / as sysdba
   ```

4. Run either the SID or Service Name version of the script:

   ```
   @loadjsonschemagen sys_user sys_password host port SID
   jar_path
   ```

   or

```
@loadjsonschemagenWithSN sys_user sys_password host port
service_name jar_path
```

where the value of `jar_path` is:

```
c:\SQL_Developer_home\sqldeveloper\extensions
\oracle.dmt.dataminer\lib
```

Installing JSON Parser Locally on the Database Host

You can install JSON parser locally on a database host by using the scripts `loadjsonschemagen.sql`, `validateODMRSYS.sql`, `org.glassfish.javax.json.jar`, and `JSONSchemaGenerator.jar.`

To install JSON parser locally on a database host:

1. Copy the scripts `loadjsonschemagen.sql` and validate `ODMRSYS.sql` from:

   ```
   \SQL_Developer_home\sqldeveloper\dataminer\scripts
   ```

   to the database host computer staging directory. For example, `/scratch`.

2. Copy `org.glassfish.javax.json.jar` and `JSONSchemaGenerator.jar` from:

   ```
   \SQL_Developer_home\sqldeveloper\extensions
   \oracle.dmt.dataminer\lib
   ```

   to the database host computer staging directory. For example, `/scratch.`

3. Go to the host computer staging directory. For example, `/scratch` and start SQL*Plus as `SYS:`

   ```
   SQLPLUS sys / as sysdba
   ```

4. Run either the SID or Service Name version of the script.

See Also:

"About the Scripts for Installing JSON Support" for more information about how to run the scripts for installing the JSON parser.

4

Managing Oracle Data Miner Users

This chapter explains how to manage Oracle Data Miner user accounts.

- About User Objects and Repository Objects
  An Oracle Data Miner installation consists of one repository and at least one user account. The user must have access to the repository and have the privileges required for data mining activities in the database, and appropriate access to data.

- About Proxy Users for Oracle Data Miner
  SQL Developer provides support for proxy users that have their own login credentials but share the same target database user account.

- Choosing an Access Model for Oracle Data Miner
  You can choose to limit Oracle Data Miner access to a single database user, or you can enable multiple database users with access. Either way, you can create proxy users so that groups of people can share one Data Miner user account in the database.

- Granting or Dropping Access Rights to Oracle Data Miner Repository
  You can grant access rights to the Oracle Data Miner repository using the GUI or by running a script. You can also revoke access rights by running a script.

About User Objects and Repository Objects

An Oracle Data Miner installation consists of one repository and at least one user account. The user must have access to the repository and have the privileges required for data mining activities in the database, and appropriate access to data.

Oracle Data Miner stores information in the schema of the Oracle Data Miner user and in the repository schema, `ODMRSYS`. Mining models and data that support workflows are stored in the user's schema. The metadata that defines the structure of projects and workflows is stored as XML documents in `ODMRSYS`.

- Controlling the Size of Users' Schemas
  You must control the size of users’ schema to ensure conservation of storage in the schema.

- Objects in Oracle Data Miner Users' Schema
  Workflows create objects, tables and views. Oracle Data Miner stores these objects in the user's schema.

- About Oracle Data Miner Internal Tables
  Internal tables in the user's schema store information that supports workflows and data mining activities.

Related Topics:

Oracle Data Miner Architecture
: Oracle Data Miner is an extension of Oracle SQL Developer, a graphical development environment for Oracle SQL.

About Oracle Data Miner Repository
: Oracle Data Miner requires the installation of a repository, the `ODMRSYS` schema, in the database server. Oracle Data Miner users must have the privileges that are required for accessing objects in `ODMRSYS`.

Controlling the Size of Users' Schemas

You must control the size of users' schema to ensure conservation of storage in the schema.

To conserve storage in users' schema:

- Delete workflows when they are no longer needed.
- Export workflows, and then delete them in the user's schema.
- Use a separate tablespace for `ODMRSYS` to isolate repository storage consumption from user tablespaces.

Related Topics:

Managing the Oracle Data Miner Repository

Objects in Oracle Data Miner Users' Schema

Workflows create objects, tables and views. Oracle Data Miner stores these objects in the user's schema.

In the user's schema:

- Models, tables, and views that are directly named by the user through the Data Miner node editors. These include mining models created by the Model node and tables created by the Create Table node.
- Tables and views that are created by Data Miner nodes to store and view generated results, but are not directly named by users through the Data Miner node editors. For example, the test results tables that are created during model build are internal. The user does not see the names of the tables, but the user can view the contents of the tables in the Test Results viewers.

About Oracle Data Miner Internal Tables

Internal tables in the user's schema store information that supports workflows and data mining activities.

The internal tables perform the following:

- The Data Mining engine creates tables with the `DM$` prefix in the database. These tables store information about mining models.
- Oracle Data Miner creates tables with the `ODMR$` prefix. These tables store information about workflows.

When you use SQL Developer schema navigator to view the objects owned by an Oracle Data Miner user, the internal tables and views are included in the display. You can create a filter in SQL Developer to hide the internal tables and views. When you use Oracle Data Miner interfaces to view users' schemas, the internal tables and views are automatically filtered out.

About Proxy Users for Oracle Data Miner

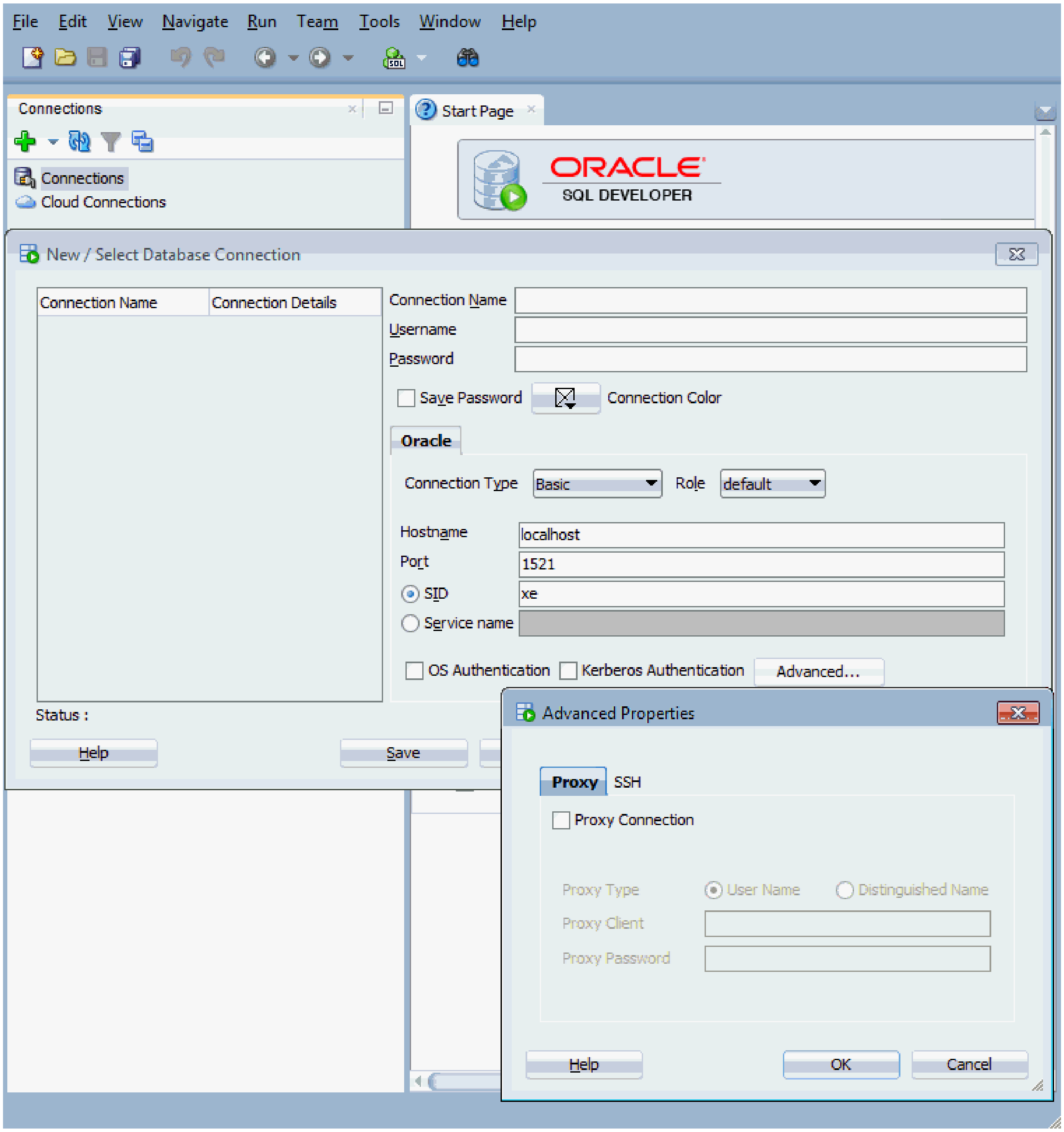
SQL Developer provides support for proxy users that have their own login credentials but share the same target database user account.

A SQL Developer connection typically provides database access to a single user that is defined in that database. SQL Developer has several connection types that support the creation of proxy users.

A *Connection* is a SQL Developer object that specifies the login credentials for a specific user in a specific database. A Data Miner connection is a SQL Developer connection that includes the privileges required by a Data Miner user. Oracle Data Miner connections are listed in the Navigator on the Data Miner Connections tab.

Oracle Data Miner supports proxy authentication for Basic and TNS connection types. Figure 4-1 shows the SQL Developer Advanced Properties dialog box, which allows the creation of a proxy user for an existing Basic connection.

Figure 4-1 Proxy User for a Basic Connection in SQL Developer



Connection Name	
Username	
Password	
□ Save Password	Connection Color
Connection Type	Basic
Role	default
Hostname	localhost
Port	1521
● SID	xe
○ Service name	
□ OS Authentication	□ Kerberos Authentication

□ Proxy Connection	
Proxy Type	● User Name ○ Distinguished Name
Proxy Client	
Proxy Password	

You can also use the SQL Developer LDAP service to create users that are functionally equivalent to proxy users. With LDAP, you create the individual (proxy) users and then associate them with an existing database user connection.

See Also:

- "Database Connections" in *Oracle SQL Developer User's Guide*
- "Connections with Proxy Authentication" in *Oracle SQL Developer User's Guide*
- Information on LDAP connections in *Oracle SQL Developer User's Guide*
- "About Proxy Authentication" in *Oracle Database Security Guide*

Choosing an Access Model for Oracle Data Miner

You can choose to limit Oracle Data Miner access to a single database user, or you can enable multiple database users with access. Either way, you can create proxy users so that groups of people can share one Data Miner user account in the database.

The access model that you choose depends on the number of users that you need to support, and whether the users need to collaborate in a shared environment or work independently in a private environment.

Single User Access
In Single User Access, there is one user schema. Either one person can use Oracle Data Miner or a group of people with proxy accounts can use Oracle Data Miner. Proxy users have access to the same models and database objects.

Multiple User Access
In Multiple User Access, there are multiple user schemas. A schema can support an individual user, or it can support a workgroup of proxy users.

Shared User Environment
Shared user environments facilitate collaboration. Oracle Data Miner uses locking mechanisms to coordinate access to workflows, when several proxy users share access to a single database account.

About the Document in Use Condition
The `Document in Use` message is generated when a user tries to edit a workflow while the workflow sessions are running in the database.

Single User Access

In Single User Access, there is one user schema. Either one person can use Oracle Data Miner or a group of people with proxy accounts can use Oracle Data Miner. Proxy users have access to the same models and database objects.

All users can create, modify, and drop database objects, and all users see the results of other users' work. Single user access ensures private workspaces but does not promote collaboration.

In the absence of proxies, a user functions autonomously within its own schema. The security mechanisms of Oracle Database prevent users from modifying objects that belong to another user's schema.

Multiple User Access

In Multiple User Access, there are multiple user schemas. A schema can support an individual user, or it can support a workgroup of proxy users.

You can set up some combination of individual and shared access. You can also use proxy authentication for all users, even for unshared users.

Shared User Environment

Shared user environments facilitate collaboration. Oracle Data Miner uses locking mechanisms to coordinate access to workflows, when several proxy users share access to a single database account.

Workflows are locked while they are executing or waiting to execute, or when they are being edited.

The name space for workflows is a project. When several users work in the same project, they should take care to name their workflows in a way that distinguishes them from the workflows of other users. For example, users could agree to prefix their workflow names with their initials.

The name namespace for database objects, such as mining models and tables, is unique within the shared schema. Oracle Data Miner follows naming conventions for database objects to ensure uniqueness. If a user overrides the system-generated name for a table that is referenced in another workflow, then a warning is generated.

About the Document in Use Condition

The `Document in Use` message is generated when a user tries to edit a workflow while the workflow sessions are running in the database.

If an Oracle Data Miner client disconnects from the network (for example, if a cable is disconnected or a laptop goes into deep sleep), then the locks on the workflows are not released. The disconnected session is still locked and running in the database. If another user tries to edit the workflow, the *Document in Use* message is generated.

You can attempt to reclaim the lock by clicking the lock on the tool bar. If you are unable to reclaim the lock, then you must stop the database session that is holding the locks. Refer to "Terminating sessions" in *Oracle Database Administrator's Guide* for instructions.

Granting or Dropping Access Rights to Oracle Data Miner Repository

You can grant access rights to the Oracle Data Miner repository using the GUI or by running a script. You can also revoke access rights by running a script.

Granting Access Rights Using the GUI
: When you install Oracle Data Miner repository using the Graphical User Interface (GUI), access rights to the repository are automatically granted to your user ID. If you logged in as a proxy or LDAP user, Oracle Data Miner automatically grants the access rights to the target user.

Granting Access Rights Using a Script
: You can grant access rights to the repository by executing the `usergrants` script and specifying a user name. The repository must be already installed before you run the script.

Dropping Access Rights Using a Script
You can drop access rights to the Oracle Data Miner repository by executing the `dropusergrants` script.

Granting Access to Data
You must have read access or the `SELECT` permission to data that is used for building mining models or for scoring.

Granting Access Rights Using the GUI

When you install Oracle Data Miner repository using the Graphical User Interface (GUI), access rights to the repository are automatically granted to your user ID. If you logged in as a proxy or LDAP user, Oracle Data Miner automatically grants the access rights to the target user.

When you select a connection for the first time to a database that already has the repository installed, you are prompted to confirm that you want to grant access rights and, optionally, install the sample data.

Related Topics:

About Oracle Data Miner Sample Data
Oracle Data Miner contains sample data that includes tables and views.

Installing the Repository Using SQL Developer GUI
You can install the Oracle Data Miner repository using the SQL Developer graphical user interface.

Granting Access Rights Using a Script

You can grant access rights to the repository by executing the `usergrants` script and specifying a user name. The repository must be already installed before you run the script.

```
usergrants.sql user_access
```

For example, the following statement grants Oracle Data Miner access to the user `dmuser1`:

```
@usergrants dmuser1
```

The user name that you specify must be a target user. Any proxy or LDAP users that authenticate based on this target user automatically acquire the permissions of the target user.

Dropping Access Rights Using a Script

You can drop access rights to the Oracle Data Miner repository by executing the `dropusergrants` script.

```
dropusergrants.sql user_access
```

For example, the following statement drops the access rights that were granted to `dmuser1.`

```
@dropusergrants dmuser1
```

As with the `usergrants` script, the user name that you specify must be a target user. Any proxy or LDAP users that authenticate based on this target user automatically acquire the permissions of the target user. When you drop the access rights for the target user, all proxy and LDAP users that are based on that target user automatically lose access to the repository.

Related Topics:

Dropping Access Rights Using a Script
: You can drop access rights to the Oracle Data Miner repository by executing the `dropusergrants` script.

Granting Access to Data

You must have read access or the `SELECT` permission to data that is used for building mining models or for scoring.

You must grant `SELECT` permission directly to a target user. Do not grant permission indirectly to a user role. The `SELECT` permission must be granted directly so that Oracle Data Miner can create views on behalf of the user. If Oracle Data Miner cannot create views, then the user may not be able to access the data.

5

Managing the Oracle Data Miner Repository

This chapter explains how to use scripts to manage the Oracle Data Miner repository.

About Oracle Data Miner Administration Scripts

Oracle Data Miner includes a set of Structured Query Language (SQL) scripts for installing and managing the repository.

The SQL scripts are installed with SQL Developer in the following directory:

`SQL_Developer_Home``\sqldeveloper\dataminer\scripts`

You can run the SQL scripts in SQL*Plus or in SQL Developer Worksheet. All the Oracle Data Miner scripts must be run as `SYS.`

Note:

Many of the Oracle Data Miner scripts are integrated with SQL Developer, enabling access to some administrative functions through the Data Graphical User Interface.

Setting the Path to Oracle Data Miner Scripts

You can set the path to Oracle Data Miner scripts using SQL*Plus or SQL Developer Websheet.

To set the default search path for scripts:

- **SQL*Plus**: Start SQL*Plus from the `scripts` directory.

  SQL_Developer_Home\sqldeveloper\dataminer\scripts

- **SQL Developer Worksheet**: Set the default search path to the `scripts` directory in the Worksheet properties.

  Also in SQL Developer Worksheet properties, you must change the maximum number of rows to print in a script to 500000.

Determining the Status and Version of the Repository

The version of the repository must be compatible with the version of the Oracle Data Miner client. If the client and server versions are not compatible, then the client cannot connect to the server.

The following query returns the repository version and status:

```
set echo on;
-- value of VERSION and REPOSITORY_STATUS
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name IN ('VERSION','REPOSITORY_STATUS', 'WF_VERSION');
PROPERTY_NAME             PROPERTY_STR_VALUE
------------------------------ ------------------------------
REPOSITORY_STATUS         LOADED
VERSION                   12.1.0.2.3
WF_VERSION                12.1.0.2.3
```

The Oracle Data Miner repository has two values for status: `NOT_LOADED` and `LOADED`.The status `NOT_LOADED`, usually indicates that the Repository is being upgraded to support a new version of SQL Developer or a new patch release. When the upgrade completes, then the status is `LOADED`.

Backing Up and Restoring the Repository

Before upgrading the Oracle Data Miner repository or performing a database upgrade, you should perform a full backup of Oracle Data Miner, including `ODMRSYS` and the Oracle Data Miner user schemas.

Oracle Data Miner also provides scripts for backing up the workflow metadata in `ODMRSYS` without including the user schemas.

Full Backup and Restore
: For Oracle Databases 11.2.0.4 and later, you can perform a full backup and restore of the Oracle Data Miner repository and user schema independently of a full database backup.

Workflow Only Backup
: Oracle Data Miner provides a script for backing up the workflow metadata in the repository without including the objects in the users' schemas that are generated by the workflows.

Workflow Only Restore

You can restore workflows from the backup table created by `createxmlworkflowsbackup2.`

Workflow Only Restore Examples

This topic provides examples on selective workflow restore and full workflow restore.

Related Topics:

About User Objects and Repository Objects

An Oracle Data Miner installation consists of one repository and at least one user account. The user must have access to the repository and have the privileges required for data mining activities in the database, and appropriate access to data.

Oracle Data Miner Architecture

Oracle Data Miner is an extension of Oracle SQL Developer, a graphical development environment for Oracle SQL.

Full Backup and Restore

For Oracle Databases 11.2.0.4 and later, you can perform a full backup and restore of the Oracle Data Miner repository and user schema independently of a full database backup.

In Oracle Databases 11.2.0.1 - 11.2.0.3, a full Oracle Data Miner backup is only possible as part of a full database backup.

Full Backup and Restore in Database 11.2.0.1 to 11.2.0.3

Full Backup and Restore in Database 11.2.0.4 and Later

In Oracle Database 11.2.0.4 and later, the XML storage in the Oracle Data Miner repository is binary. In these databases, you can use Oracle Data Pump to back up and restore `ODMRSYS` and the user schemas independently of a full backup and restore of the database.

Full Backup and Restore in Database 11.2.0.1 to 11.2.0.3

In Oracle Database 11.2.0.1, 11.2.0.2, and 11.2.0.3, the XML storage in the Oracle Data Miner repository is object-relational. In these databases, there is no mechanism for backing up and restoring the Oracle Data Miner repository and user schemas independently of a full backup and restore of the database.

To backup and restore the database, you can use Oracle Recovery Manager (Oracle RMAN). When restored from backup, the database will be exactly as it was before the backup. A partial restore is not supported.

See Also:

Oracle Database Backup and Recovery User's Guide for information about Oracle RMAN

Full Backup and Restore in Database 11.2.0.4 and Later

In Oracle Database 11.2.0.4 and later, the XML storage in the Oracle Data Miner repository is binary. In these databases, you can use Oracle Data Pump to back up and restore ODMRSYS and the user schemas independently of a full backup and restore of the database.

Using Oracle Data Pump, you can back up and restore individual schemas. Alternatively you can back up and restore Oracle Data Miner with Oracle RMAN.

See Also:

Oracle Database Utilities for information about Oracle Data Pump.

Workflow Only Backup

Oracle Data Miner provides a script for backing up the workflow metadata in the repository without including the objects in the users' schemas that are generated by the workflows.

The simplified backup strategy safeguards the workflow specifications and enables you to restore a workflow if you accidentally delete it. After the workflow is restored, you must re-run it to ensure that all the supporting objects are present in the user's schema. The `creatxmlworkflowsbackup2` script backs up all the workflows in ODMRSYS to a table called ODMR$WORKFLOWS_BACKUP in a separate backup account. Before you run the script, ensure that the backup schema exists and is available.

Syntax:

```
createxmlworkflowsbackup2.sql backup_account
```

Parameter:

backup_account is the name of the schema of the backup table, ODMR$WORKFLOWS_BACKUP.

This example backs up the workflows in a backup account called BACKUPACCT:

```
set serveroutput on
@createxmlworkflowsbackup2l BACKUPACCT
```

Note:

The `dropRepositoryAndUserObjects` script drops all the backup tables when it drops the repository. If you run the `dropRepositoryAndUserObjects` script to drop the repository, then all the workflow backups are lost.

Each time you run `createxmlworkflowsbackup2`, a full set of workflows is added to the backup table. The backup script maintains up to 30 distinct backups within the backup table. Older backups are automatically deleted. For example, if the backup was run each day, then a user has up to 30 days to request a restore of a workflow.

In the backup script, the DEFINE_MAX_VERSIONS specifies the number of backups that are preserved in the backup table. If you want to preserve more than 30 backups, then in the backup script `createxmlworkflowsbackup2`, change the value of DEFINE_MAX_VERSIONS to the desired number.

Related Topics:

Dropping the Repository
The dropRepositoryAndUserObjects script drops the Oracle Data Miner repository and related objects in the users' schemas.

Workflow Only Restore

You can restore workflows from the backup table created by createxmlworkflowsbackup2.

To restore the workflows from the backup table created by createxmlworkflowsbackup2, run the restorexmlworkflowfrombackup2 script.

restorexmlworkflowfrombackup2.sql restore workflows from the backup table to the Oracle Data Miner repository. Use it as follows:

Syntax:

```
restorexmlworkflowfrombackup2.sql [option] [backup_account] [workflow_definition]
```

Parameters:

option is an optional parameter that can have one of the following values:

- ADD_ONLY — Restore workflows that do not already exist in the repository, creating missing projects if necessary. (Default)
- DROP_AND_ADD — Drop all existing workflows and projects in the repository, then restore all workflows from backup, creating missing projects if necessary.
- OVERRIDE_ONLY — Only restore workflows that already exist in the repository.
- OVERRIDE_AND_ADD — Applies both the OVERRIDE_ONLY and ADD_ONLY options.

backup_account is optional unless *workflow_definition* is specified, in which case it is required. If no backup account is specified, then workflows are restored from the backup table in the repository. If the backup tables does not exist, then an exception is raised.

workflow_definition is an optional parameter that identifies a table or view that specifies which workflows to restore from backup. The table or view must contain these four columns: USER_NAME, PROJECT_NAME, WORKFLOW_NAME, and VERSION. Each row in the table identifies a workflow to restore. If the VERSION number is null, then the latest version number is used for the restore. When no workflow definition is provided, then the latest backup version is the default

Example:

This example drops all the workflows in the repository and restores the workflows from the backup table in BACKUPACCT.

```
set serverput on
@restorexmlworkflowfrombackup2 DROP_AND_ADD BACKUPACCT
```

Related Topics:

Workflow Only Backup
: Oracle Data Miner provides a script for backing up the workflow metadata in the repository without including the objects in the users' schemas that are generated by the workflows.

Workflow Only Restore Examples

This topic provides examples on selective workflow restore and full workflow restore.

Example 5-1 Selective Workflow Restore

Let us assume the user SCOTT had accidentally deleted all his workflows last week. You can use the ADD_ONLY option to restore his workflows. You will have to query the backup table to determine which version of backups contain his missing workflows. I f the version is 12, then the following script example, run as SYS will reload only those workflows.

```
@restorexmlworkflowfrombackup2.sql ADD_ONLY BACKUPACCT BACKUPACCT.WORKFLOW_V
```

The WORKFLOW_V view, shown as follows, selects all the workflows present for the user SCOTT from a specified version backup number.

```
CREATE VIEW BACKUPACCT.WORKFLOW_V AS
       SELECT user_name, project_name, workflow_name, version
       FROM backupacct.odmr$workflows_backup
       WHERE user_name='SCOTT' AND version = 12;
```

Example 5-2 Full Workflow Restore

Let us assume that there was some critical repository failure that requires a full reload of all workflows from the latest backup. You can use the DROP_AND_ADD option to insure that all the old workflows are dropped and all the workflows on the backup are reloaded. In this case, the backup table is located in another account separate from the ODMRSYS account. The latest backup version will be used for the recovery, so no workflow definition parameter is required.

```
@restorexmlworkflowfrombackup2.sql DROP_AND_ADD BACKUPACCT
```

Migrating the Repository

This section contains topics related to repository migration.

Topics include:

Scripts to Migrate the Repository
: Starting with SQL Developer 4.0, Oracle Data Miner migration scripts are available for specific upgrade paths.

Upgrading ODMRSYS
: The migrateodmr script upgrades ODMRSYS to the latest version that is supported in the database.

Upgrading New ODMRSYS Tablespace From Object-Relational to Binary
: The upgradeRepoWithNewTableSpace script upgrades the specified tablespace from object-relational to binary XML storage and migrates the workflow data in ODMRSYS to the newt tablespace. The new tablespace must be an Oracle Automatic Segment Space Management (Oracle ASSM) tablespace.

Upgrading ODMRSYS From Object-Relational to Binary
: The upgradeRepoFromORtoBinary script migrates the ODMRSYS workflow data from object-relational XML storage to binary XML storage. The upgraded ODMRSYS tablespace is an Oracle Automatic Segment Space Management (ASSM) tablespace.

Upgrading ODMRSYS
: The migratebinaryodmr script upgrades the workflow data in an ODMRSYS schema that uses binary XML storage. The ODMRSYS tablespace is an Oracle Automatic Segment Space Management (ASSM) tablespace.

Scripts to Migrate the Repository

Starting with SQL Developer 4.0, Oracle Data Miner migration scripts are available for specific upgrade paths.

Table 5-1 Oracle Data Miner Upgrade Scripts

SQL Developer Version	Database Version	Script	Description
Any version	11.2.0.1 - 11.2.0.3	`migrateodmr.sql`	Upgrades ODMRSYS.
3.2.2 or earlier	11.2.0.4 and later, where the default ODMRSYS tablespace is not ASSM-based	`upgradeRepoWithNewTableSpace.sql`	ASSM tablespace required as input parameter. This will be used to migrate the workflow data from XML object storage to XML binary storage.
3.2.2 or earlier	11.2.0.4 and later, where the default ODMRSYS tablespace is ASSM-based	`upgradeRepoFromORtoBinary.sql`	Workflow data will be migrated from XML object storage to XML binary storage.
4.0 and later	11.2.0.4 and later	`migratebinaryodmr.sql`	Relevant for future releases, when XML conversion from object storage to binary storage will no longer needed
4.0 and later	11.2.0.3 or earlier originally, and then the database was upgraded to 11.2.0.4 or later	`upgradeRepoWithNewTableSpace.sql` or `upgradeRepoFromORtoBinary.sql`	Since the database can be upgraded independently of the Oracle Data Miner repository, this has to be taken into account. The choice of scripts will depend on whether ODMRSYS tablespace is ASSM or not.

Upgrading ODMRSYS

The migrateodmr script upgrades ODMRSYS to the latest version that is supported in the database.

If any sessions that have the ODMRUSER role are currently running, then the session object locks block the upgrade. You can use the session_disconnect parameter to disconnect any active sessions, thus enabling the upgrade process to proceed.

Syntax:

```
migrateodmr.sql session_disconnect
```

Parameters:

session_disconnect can have one of the following values:

R — Report active sessions. Do not disconnect them.

D — Disconnect active sessions. Do not report them.

DR or RD — Disconnect and report active sessions.

Example:

This example upgrades ODMRSYS, disconnecting and reporting any active ODMRUSER sessions.

```
@migrateodmr DR
```

Upgrading New ODMRSYS Tablespace From Object-Relational to Binary

The upgradeRepoWithNewTableSpace script upgrades the specified tablespace from object-relational to binary XML storage and migrates the workflow data in ODMRSYS to the newt tablespace. The new tablespace must be an Oracle Automatic Segment Space Management (Oracle ASSM) tablespace.

If any sessions that have the ODMRUSER role are currently running, then the session object locks block the upgrade. You can use the session_disconnect parameter to disconnect any active sessions, thus enabling the upgrade process to proceed.

Syntax:

```
upgradeRepoWithNewTableSpace.sql ASSMtablespace session_disconnect
```

Parameters:

ASSMtablespace is the name of an ASSM tablespace.

session_disconnect can have one of the following values:

R — Report active sessions. Do not disconnect them.

D — Disconnect active sessions. Do not report them.

DR or RD — Disconnect and report active sessions.

Example:

This example migrates object-relational XML data in ODMRSYS to the new ASSM tablespace, my_ASSM_space, that uses binary XML storage. If any ODMRUSER sessions are active, they are disconnected and reported.

```
@upgradeRepoWithNewTableSpace my_ASSM_space DR
```

See Also:

Oracle Database Administrator's Guide

Upgrading ODMRSYS From Object-Relational to Binary

The `upgradeRepoFromORtoBinary` script migrates the `ODMRSYS` workflow data from object-relational XML storage to binary XML storage. The upgraded `ODMRSYS` tablespace is an Oracle Automatic Segment Space Management (ASSM) tablespace.

If any sessions that have the `ODMRUSER` role are currently running, then the session object locks block the upgrade.You can use the `session_disconnect` parameter to disconnect any active sessions, thus enabling the upgrade process to proceed.

Syntax:

```
@upgradeRepoFromORtoBinary.sql session_disconnect
```

Parameters:

`session_disconnect` can have one of the following values:

`R` — Report active sessions. Do not disconnect them.

`D` — Disconnect active sessions. Do not report them.

`DR` or `RD` — Disconnect and report active sessions.

Example:

This example upgrades `ODMRSYS` from object-relational XML storage to binary XML storage. The upgraded tablespace is ASSM-based. If any `ODMRUSER` sessions are active, they are disconnected and reported.

```
@upgradeRepoFromORtoBinary DR
```

See Also:

Oracle Automatic Storage Management Administrator's Guide

Upgrading ODMRSYS

The `migratebinaryodmr` script upgrades the workflow data in an `ODMRSYS` schema that uses binary XML storage. The `ODMRSYS` tablespace is an Oracle Automatic Segment Space Management (ASSM) tablespace.

If any sessions that have the `ODMRUSER` role are currently running, then the session object locks block the upgrade.You can use the `session_disconnect` parameter to disconnect any active sessions, thus enabling the upgrade process to proceed.

Syntax:

```
@migratebinaryodmr.sql session_disconnect
```

Parameters:

`session_disconnect` can have one of the following values:

`R` — Report active sessions. Do not disconnect them.

`D` — Disconnect active sessions. Do not report them.

`DR` or `RD` — Disconnect and report active sessions.

Example:

This example upgrades the binary XML workflow data in ODMRSYS, disconnecting and reporting any active ODMRUSER sessions.

```
@migratebinaryodmr DR
```

Dropping the Repository

The dropRepositoryAndUserObjects script drops the Oracle Data Miner repository and related objects in the users' schemas.

If any sessions that have the ODMRUSER role are currently running, then the session object locks block the upgrade. You can use the session_disconnect parameter to disconnect any active sessions, thus enabling the upgrade process to proceed.

Syntax:

```
dropRepositoryAndUserObjects.sql session_disconnect
```

Parameters:

session_disconnect can have one of the following values:

R — Report active sessions. Do not disconnect them.

D — Disconnect active sessions. Do not report them.

DR or RD — Disconnect and report active sessions.

Example:

This example drops the ODMRSYS, schema and related objects in the Oracle Data Miner users' schemas, disconnecting and reporting any active ODMRUSER sessions.

```
@dropRepositoryAndUserObjects DR
```

Related Topics:

About User Objects and Repository Objects
An Oracle Data Miner installation consists of one repository and at least one user account. The user must have access to the repository and have the privileges required for data mining activities in the database, and appropriate access to data.

Oracle Data Miner Architecture
Oracle Data Miner is an extension of Oracle SQL Developer, a graphical development environment for Oracle SQL.

Workflow Only Backup
Oracle Data Miner provides a script for backing up the workflow metadata in the repository without including the objects in the users' schemas that are generated by the workflows.

6

Managing System Resources for Oracle Data Miner

This chapter provides information to help you optimize your system to support Oracle Data Miner.

Oracle Data Miner Resource Management Overview

You can effectively manage system resources for Oracle Data Miner by using features of Oracle Database and the options provided in Oracle Data Miner repository.

You can effectively manage system resources for Oracle Data Miner in the following ways:

- To manage Oracle Data Miner sessions, develop an appropriate resource plan using Oracle Database Resource Manager.
- To manage workflow execution, change the Oracle Data Miner default job class used for Oracle Scheduler to a job class with an appropriate resource plan.
- To manage the model build process, change the Oracle Data Miner default maximum number of concurrent model builds.
- To manage parallel query processing, change the Oracle Data Miner default parallel query setting to prevent users from specifying parallel processing for individual nodes and workflows.

Allocating Resources to Oracle Data Miner User Sessions

You can use Database Resource Manager to create resource plans that allocate system resources for groups of sessions based on session attributes.

Oracle Database Resource Manager allocates CPU time, configures parallel query processing, limits the number of sessions, and controls other aspects of system behavior that would otherwise be controlled by the operating system. In a database where multiple applications run concurrently and compete for system resources, you can use Oracle Database Resource Manager to distribute the workloads and optimize overall performance. For example, you could balance the demands of ETL, OLAP, data mining, and reporting workloads running simultaneously in the database.

Oracle Data Miner workflows can potentially make extensive demands on system resources, especially when transformations and large data sets are involved. In a database that must accommodate the demands of multiple applications, you can create a resource plan to limit the impact of Oracle Data Miner sessions on other applications and prevent other applications from compromising the performance of Oracle Data Miner.

Example 6-1 illustrates the creation of a simple resource plan for Oracle Data Miner. The resource plan, called `SIMPLE_RESOURCE_PLAN`, creates two consumer groups: `DATA_MINER_GROUP` and `OTHER_GROUPS`. The plan allocates 50% of CPU resource to `DATA_MINER_GROUP` and the rest to `OTHER_GROUPS`. The `DATA_MINER_GROUP` is mapped to the `DMUSER` account; other users are mapped to the `OTHER_GROUPS` group.

See Also:

"Managing Resources With Oracle Resource Manager" in *Oracle Database Administrator's Guide*

Example 6-1 Simple Resource Plan for Oracle Data Miner Sessions

```
CONNECT sys as sysdba;
Enter password: password
-- creating a pending area is the first step in defining
-- consumer groups and resource plans
EXEC dbms_resource_manager.create_pending_area();
-- delete old plan (optional)
EXEC dbms_resource_manager.delete_plan_cascade(
               plan => 'SIMPLE_RESOURCE_PLAN');
-- create a custom consumer group for data miner workload
EXEC dbms_resource_manager.create_consumer_group(
               consumer_group => 'DATA_MINER_GROUP',
               comment => 'Sessions for data miner operations');
```

```
-- map DMUSER account to the consumer group
EXEC dbms_resource_manager.set_consumer_group_mapping(
               attribute => dbms_resource_manager.oracle_user,
               value => 'DMUSER',
               consumer_group => 'DATA_MINER_GROUP');
-- create a custom resource plan
EXEC dbms_resource_manager.create_plan(
               plan => 'SIMPLE_RESOURCE_PLAN',
               comment => 'Resource plan for database operations');
-- specifies how much CPU and parallelism
-- should be allocated to the consumer group
EXEC dbms_resource_manager.create_plan_directive(
               plan => 'SIMPLE_RESOURCE_PLAN',
               group_or_subplan => 'DATA_MINER_GROUP',
               comment => 'Percentage of CPU for DATA_MINER_GROUP',
               mgmt_p1 => 50,
               utilization_limit => 55,
               parallel_degree_limit_p1 => 8,
               parallel_server_limit => 4);
-- specifies how much CPU should be allocated to the required OTHER_GROUPS
EXEC dbms_resource_manager.create_plan_directive(
                plan => 'SIMPLE_RESOURCE_PLAN',
                group_or_subplan => 'OTHER_GROUPS',
                comment => 'Percentage of CPU for OTHER_GROUPS',
                mgmt_p1 => 50);
-- persist plan to the database
EXEC dbms_resource_manager.submit_pending_area();
-- Now that the resource plan is defined, enable it by setting
-- the resource_manager_plan parameter with the resource plan name
ALTER SYSTEM SET resource_manager_plan = 'SIMPLE_RESOURCE_PLAN';
-- DBA can also enable a resource plan for the period of time corresponding
-- to a job scheduler Window (via the dbms_scheduler.create_window procedure)
```

Managing Model Builds

The process of building mining models can consume significant system resources. You have the option to control the impact of model builds on overall system resources, by increasing or decreasing the value of MAX_NUM_THREADS repository property.

MAX_NUM_THREADS specifies the maximum number of mining model builds that can execute concurrently across all workflows in an Oracle Data Miner session. MAX_NUM_THREADS has no effect on model builds that are triggered individually and do not belong to a workflow.

For example, if one workflow is attempting to build 25 models while another workflow is attempting to build 15 models and MAX_NUM_THREADS is 10, then 10 model build operations occur simultaneously and the 30 remaining model builds are queued. The delayed build processes complete with a warning message that explains the reason for the delay. Two additional properties, THREAD_WAIT_TIME and MAX_THREAD_WAIT control the queuing of model builds. See Table 6-1 for details.

Example 6-2 shows how to increase the maximum number of concurrent model builds from 10 (the default) to 15.

This script produces the following log:

```
-- value of MAX_NUM_THREADS before update
SELECT property_name, property_num_value
    FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    WHERE property_name = 'MAX_NUM_THREADS';
PROPERTY_NAME PROPERTY_NUM_VALUE
------------------------------ ---------------------
```

```
MAX_NUM_THREADS 10
-- update MAX_NUM_THREADS
UPDATE ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    SET property_num_value = 15
    WHERE property_name = 'MAX_NUM_THREADS';
1 rows updated
-- commit change
commit
committed
-- value of MAX_NUM_THREADS after update
SELECT property_name, property_num_value
    FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    WHERE property_name = 'MAX_NUM_THREADS';
PROPERTY_NAME PROPERTY_NUM_VALUE
------------------------------ ----------------------
MAX_NUM_THREADS 15
```

Example 6-2   Changing the Number of Concurrent Model Builds

```
set echo on;
-- value of MAX_NUM_THREADS before update
SELECT property_name, property_num_value
    FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    WHERE property_name = 'MAX_NUM_THREADS';
-- update MAX_NUM_THREADS
UPDATE ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    SET property_num_value = 15
    WHERE property_name = 'MAX_NUM_THREADS';
-- commit change
COMMIT;
-- value of MAX_NUM_THREADS after update
SELECT property_name, property_num_value
    FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
    WHERE property_name = 'MAX_NUM_THREADS';
```

Managing Workflow Execution

Oracle Data Miner submits workflows to Oracle Database Scheduler for execution as Scheduler Jobs. Oracle Scheduler supports a variety of features that control how system resources are allocated. You can configure Oracle Scheduler to effectively manage a large pool of run requests.

Oracle Data Miner uses the default Scheduler job class, `DEFAULT_JOB_CLASS` as its own default. In a resource plan, jobs that run as `DEFAULT_JOB_CLASS` are not assigned to any consumer group; access to system resources is not restricted for jobs that have the default class. You can change the job class to a class that is based on a consumer group by setting the Oracle Data Miner repository property `WORKFLOW_JOB_CLASS`.

Example 6-3 shows you could create a `MINING_CLASS` job class based on a consumer group `HEAVY_LOAD_RESOURCE_GROUP`, which was previously created to allocate high CPU for heavy workload jobs. When you update `WORKFLOW_JOB_CLASS`, the workflow will run with access to system resources that are restricted to this consumer group.The resource plan for the assigned `HEAVY_LOAD_RESOURCE_GROUP` group must be active when the workflow is run. You can set up Scheduler windows to activate specific resource plans at specific time periods.

See Also:

- *Oracle Database Administrator's Guide* for information about administering Oracle Scheduler
- *Oracle Database PL/SQL Packages and Types Reference* for information about DBMS_SCHEDULER

Example 6-3 Changing the Scheduler Job Class for Oracle Data Miner Workflows

```
connect sys as sysdba;
Enter password: password
EXEC DBMS_SCHEDULER.CREATE_JOB_CLASS(
              job_class_name => 'MINING_CLASS',
              resource_consumer_group => 'HEAVY_LOAD_RESOURCE_GROUP');
GRANT EXECUTE ON MINING_CLASS to DMUSER;
-- update WORKFLOW_JOB_CLASS
UPDATE ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   SET property_str_value = 'MINING_CLASS'
   WHERE property_name = 'WORKFLOW_JOB_CLASS';
-- commit change
commit;
-- verify value of WORKFLOW_JOB_CLASS after update
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name = 'WORKFLOW_JOB_CLASS';
```

Managing Parallel Processing

Oracle Data Miner workflows and views, and most Data Mining algorithms, can take advantage of parallel processing of queries when it is enabled in the database. Parameters in `INIT.ORA` control the behavior of parallel processing. By default parallelism is disabled `(PARALLEL_DEGREE_POLICY=MANUAL).`

Parallel processing of queries can be system-determined, or it can be set to Degree of Parallelism. When parallel processing is system-determined, the database dynamically determines Degree of Parallelism values for all SQL statements.

The parallel feature of Oracle Database is designed to use maximum resources assuming the operation will finish faster if you use more resources. In a multiuser environment, increasing the use of parallelism can rapidly deplete system resources, reducing resources for other users to execute parallel statements concurrently.

Oracle Data Miner workflows support a parallel query feature, which allows users to manually enable parallel processing for specific nodes or entire workflows. You can disable this feature by setting the Oracle Data Miner repository property `PARALLEL_QUERY_ON_ALLOWED` to `FALSE`. By default, this property is set to `TRUE`. Example 6-4 shows how to disable the parallel query processing feature of Oracle Data Miner.

The Oracle Data Miner model build process can generate many parallel sessions if your database configuration allows for it. To limit the impact on the overall system, you should implement an appropriate resource plan and, if necessary, prevent users from setting parallel query within their Data Miner sessions.

See Also:

Oracle Database VLDB and Partitioning Guide for an introduction to parallel processing

Example 6-4 Disabling the Parallel Query Feature for Oracle Data Miner Workflows and Nodes

```
connect sys as sysdba;
Enter password: password
-- value of PARALLEL_QUERY_ON_ALLOWED before update
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';
-- update PARALLEL_QUERY_ON_ALLOWED
UPDATE ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   SET property_str_value = 'FALSE'
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';
-- commit change
COMMIT;
-- verify value of PARALLEL_QUERY_ON_ALLOWED after update
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';

connect sys as sysdba;
Enter password: password
-- value of PARALLEL_QUERY_ON_ALLOWED before update
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';
-- update PARALLEL_QUERY_ON_ALLOWED
UPDATE ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   SET property_str_value = 'FALSE'
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';
-- commit change
COMMIT;
-- verify value of PARALLEL_QUERY_ON_ALLOWED after update
SELECT property_name, property_str_value
   FROM ODMRSYS.ODMR$REPOSITORY_PROPERTIES
   WHERE property_name = 'PARALLEL_QUERY_ON_ALLOWED';
```

Summary of Oracle Data Miner Repository Properties for System Management

A summary of the system management properties is available in the Oracle Data Miner repository.

Table 6-1 provides a summary of the system management properties available in the Oracle Data Miner repository.

Table 6-1 Oracle Data Miner Repository Properties for System Management

Property	Type	Description
PARALLEL_QUERY_ON_ALLOWED	Boolean	Indicates whether users can specify parallel query for nodes or workflows. Values are TRUE or FALSE. Default is TRUE.

Table 6-1 (Cont.) Oracle Data Miner Repository Properties for System Management

Property	Type	Description
`MAX_NUM_THREADS`	Integer	Maximum number of concurrent model builds. Default is 10.
`THREAD_WAIT_TIME`	Integer	When `MAX_NUM_THREADS` is reached, any outstanding model build processes are queued until the parallel model build count is less than `MAX_NUM_THREADS`. The `THREAD_WAIT_TIME` setting determines how long to wait before checking the parallel model build count. The default wait time is 5 seconds.
`MAX_THREAD_WAIT`	Integer	The timeout interval in seconds for a model build process that has been queued. When a timeout occurs, the build process exits with an error message stating that the process lock wait timeout interval has been exceeded. When the value is `NULL`, no timeout occurs. Default is `NULL`
`WORKFLOW_JOB_CLASS`	Varchar	Oracle Scheduler job class for workflows. Default is `DEFAULT_JOB_CLASS`.

7

Generating and Deploying SQL Scripts

SQL Script Generation is a feature that is available in Oracle Data Miner. This chapter provides and overview and a use case to illustrate this feature.

Overview of the SQL Script Generation Feature

Oracle Data Miner 4.1 provides the SQL script generation feature, using which you can generate SQL scripts for one or all nodes in a workflow. You can then integrate the SQL scripts into another application.

In this way, Oracle Data Miner provides the scope to integrate data mining with another end user application. This feature is explained in details supported by a use case.

Related Topics:

Overview of the SQL Script Generation Use Case
The SQL script generation feature is explained with the help of a use case, that uses a sample workflow `codegen_workflow` and a demo database table `INSUR_CUST_LTV_SAMPLE.`

Overview of the SQL Script Generation Use Case

The SQL script generation feature is explained with the help of a use case, that uses a sample workflow `codegen_workflow` and a demo database table `INSUR_CUST_LTV_SAMPLE.`

The use case demonstrates how to:

- Import, run, and deploy the workflow `codegen_workflow`
- Generate SQL script from the workflow `codegen_workflow`
- Schedule SQL scripts to run on the database using:
  - Oracle SQL Developer
  - Oracle Enterprise Manager
- Deploy the generated SQL scripts on a Target or Production Database

Premise of the SQL Script Generation Use Case
The SQL Script Generation use case described in this section is based on the following premises:

About the Sample Workflow
The sample workflow `codegen_workflow,` demonstrates data modelling and data scoring.

Performing Prerequisite Tasks
Before deploying a workflow, there are certain tasks which must be performed.

Importing and Running a Workflow
You can import a predefined workflow into a project.

Related Topics:

Location of Demo Workflow Files
The workflow file `codegen_workflow.xml` which contains the predefined workflow is available in the SQL Developer installation location at: *`sqldeveloper_home`*`\dataminer\demos\workflows.`

Premise of the SQL Script Generation Use Case

The SQL Script Generation use case described in this section is based on the following premises:

- The Data Analysts define the workflow for model building and scoring.
- The Data Analysts use the new script generation feature to hand over a set of SQL scripts to the Application Developer for deployment.
- The Application Developers deploy the scripts to the target or production database, where they can schedule the scripts to run periodically. This allows the model to be built with fresh customer data every time the scripts are run.
- Demo Database: The use case uses a demo database table `INSUR_CUST_LTV_SAMPLE,` which can be installed to a users account.
- Predefined workflow: The use case explains the procedure with the help of the predefined workflow `codegen_workflow.`

See Also:

- About the Sample Workflow
- Performing Prerequisite Tasks
- Location of Demo Workflow Files
- Loading the Sample Data Using a Script

Location of Demo Workflow Files

The workflow file codegen_workflow.xml which contains the predefined workflow is available in the SQL Developer installation location at: *sqldeveloper_home*\dataminer\demos\workflows.

Location of Demo Workflow Files

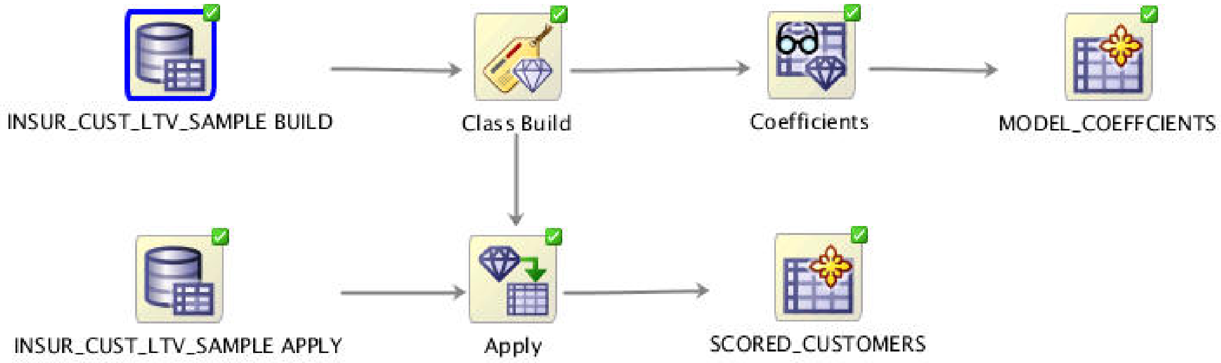
The workflow file codegen_workflow.xml which contains the predefined workflow is available in the SQL Developer installation location at: *sqldeveloper_home*\dataminer\demos\workflows.

About the Sample Workflow

The sample workflow codegen_workflow, demonstrates data modelling and data scoring.

The sample workflow in this use case codegen_workflow, comprises two distinct processes contained within a single lineage: Modeling (top) and Scoring (bottom) as shown in Figure 7-1. Both the processes use the demo data INSUR_CUST_LTV_SAMPLE as the input data source.

Figure 7-1 The Sample Workflow - codegen_workflow



- Modelling: The modeling process builds a Classification Support Vector Machine (SVM) model. It predicts whether the customer will buy insurance or not. The model coefficients are persisted to a database table for viewing. This table may provide a basis for application integration.
- Scoring: The scoring process makes predictions for the customer data using the Support Vector Machine (SVM) model created by the modeling lineage. The

prediction result is persisted to a database view for viewing. The view provides the following:

- Predictions of the current input data. For example, if the input table is refreshed with new data, this view will automatically capture the predictions of the new data.
- Basis for application integration.

Related Topics:

Premise of the SQL Script Generation Use Case
The SQL Script Generation use case described in this section is based on the following premises:

Performing Prerequisite Tasks
Before deploying a workflow, there are certain tasks which must be performed.

Location of Demo Workflow Files
The workflow file `codegen_workflow.xml` which contains the predefined workflow is available in the SQL Developer installation location at: *`sqldeveloper_home`*`\dataminer\demos\workflows`.

Performing Prerequisite Tasks

Before deploying a workflow, there are certain tasks which must be performed.

The prerequisite tasks are:

1. Install Oracle Data Miner 4.1 on your system.
2. Create an Oracle Data Miner user account.

   Here is an example of a sample statement to create a Data Mining user account. This statement must be issued by a privileged user.

   ```
   grant create session, create table, create view,
   create mining model, create procedure,
   unlimited tablespace
   to <username>;
   ```
3. Load the database table.
4. Import and run the workflow.

See Also:

- Installing Oracle Data Miner for the procedure to install Oracle Data Miner 4.1.
- Oracle By Example Tutorials for the procedures to create a Data Miner user account, and a SQL Developer connection for the Data Miner user account, at: `http://www.oracle.com/webfolder/technetwork/tutorials/obe/db/12c/r1/dm/ODM12c-SetUp.html`
- "Importing and Running a Workflow" for the procedure to import and run the workflow.
- "Location of Demo Workflow Files" to import the demo workflow `codegen_workflow.`
- "Loading the Sample Data Using a Script" for more information about how to load a database table.

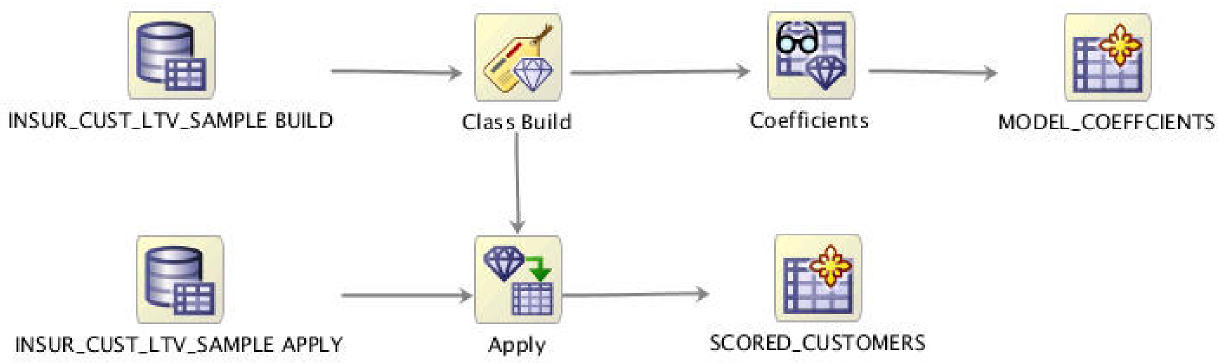
Importing and Running a Workflow

You can import a predefined workflow into a project.

To import the predefined `workflow_codegen.xml:`

1. In SQL Developer 4.1, go to the **Data Miner** tab and expand the connection.
2. Right-click the connection and click **New Project.**
3. Right-click the project that you just created and select **Import Workflow.**
4. In the **Import Workflow** dialog box, browse to the location where you have downloaded and saved the sample workflow file `codegen_workflow.xml.` Select the `codegen_workflow.xml` and click **OK.** The imported workflow codegen_workflow is now displayed in the Oracle Data Miner UI, as shown in Figure 7-2.

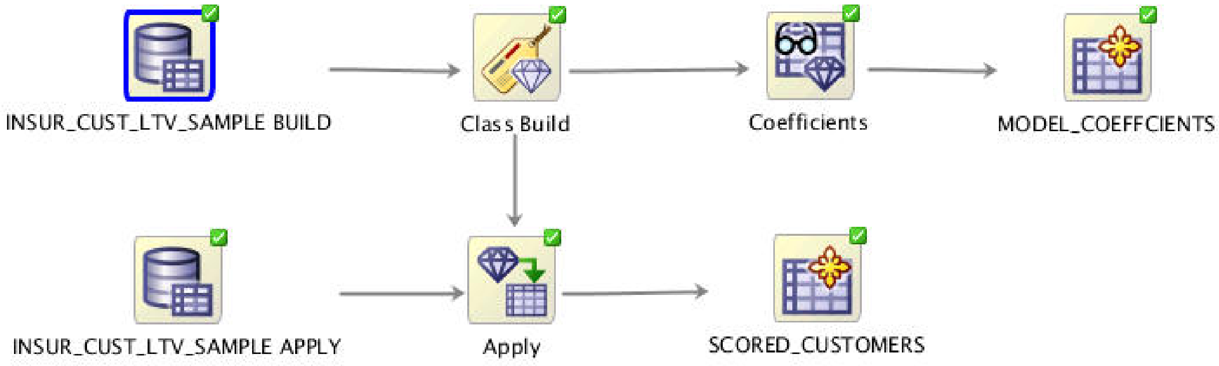
Figure 7-2 The codegen_workflow after import



5. Right-click the INSUR_CUST_LTV_SAMPLE_BUILD node, and click **Force Run.**
6. In the **Force Run** submenu, select the option **Selected Node and Children.** This runs all the nodes in the codegen_workflow. Once the workflow is run

successfully, all the nodes in the workflow are depicted with the green check mark, as shown in Figure 7-3.

Figure 7-3 The codegen_workflow after run



This completes the task of importing and running the workflow.

Related Topics:

Generating SQL Script Files from the Workflow
: You must run the workflow before generating the SQL script from it.

Scheduling Workflow Script Files
: All the generated SQL script files must be deployed to the target or production database where they are accessible by the database instance. The SQL script files must be stored together in the same directory.

Deploying SQL Scripts on the Target Database
: Deploying the SQL scripts involves running the master script file from the base directory.

Location of Demo Workflow Files
: The workflow file `codegen_workflow.xml` which contains the predefined workflow is available in the SQL Developer installation location at: *`sqldeveloper_home`*`\dataminer\demos\workflows`.

Generating SQL Script Files from the Workflow

You must run the workflow before generating the SQL script from it.

To generate the SQL script files from a workflow:

1. Right-click any node and select **Deploy.** For this use case, right-click the INSUR_CUST_LTV_SAMPLE BUILD node, and select **Selected node and connected node** option under **Deploy.**

Note:

For this use case, the predefined workflow `codegen_workflow` is used.

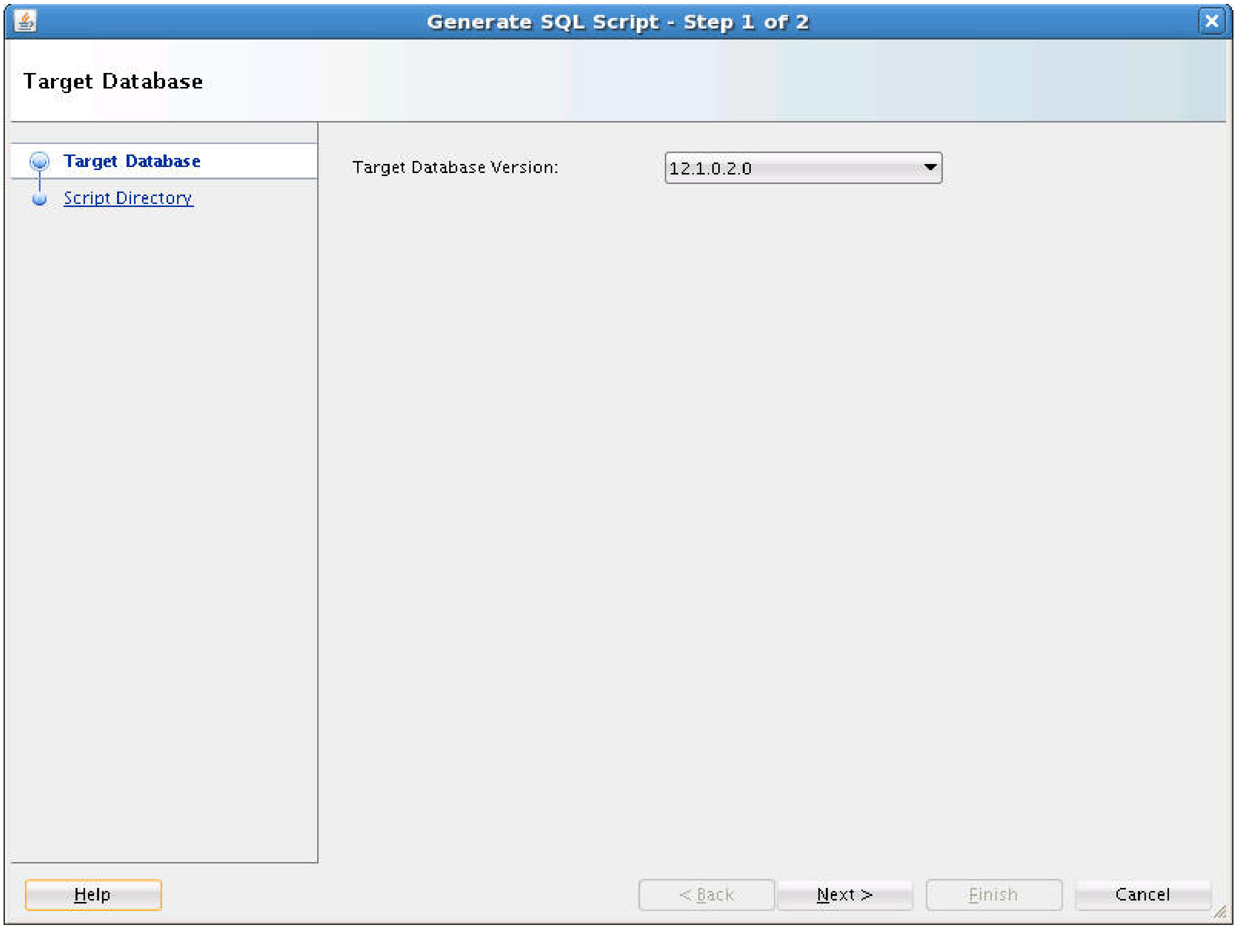
The script deployment options are:

- **Selected Node and dependent nodes:** This option generates the SQL script for the selected node and all its parent nodes. For example, as shown in Figure 7-3, if the Apply Node is selected, then a script will be generated for these nodes:
  - INSUR_CUST_LTV_SAMPLE BUILD
  - Class Build
  - INSUR_CUST_LTV_SAMPLE APPLY
  - Apply
- **Selected node, dependent nodes and children nodes:** This option generates script for the selected node and all its parents and children nodes. For example, in Figure 7-3, if the Apply Node is selected, then a script will be generated for these nodes:
  - INSUR_CUST_LTV_SAMPLE BUILD
  - Class Build
  - INSUR_CUST_LTV_SAMPLE APPLY
  - Apply
  - SCORED_CUSTOMERS
- **Selected nodes and connected nodes:** This option generates scripts for the selected node and all the nodes that are connected to the selected node. In this example, as shown in Figure 7-3, if the Apply Node is selected, then a script will be generated for all the nodes that are connected to the Apply node in the workflow.

> **Note:**
>
> To generate a script for the entire workflow, you can select all the nodes in the workflow (by clicking all the nodes while pressing Ctrl key simultaneously) and select any of the above three deployment options.

2. After selecting a Deploy options, the **Generate SQL Script - Step 1 of 2** wizard opens, as shown in Figure 7-4.

Figure 7-4   Generate SQL Script - Step 1 of 2 Wizard

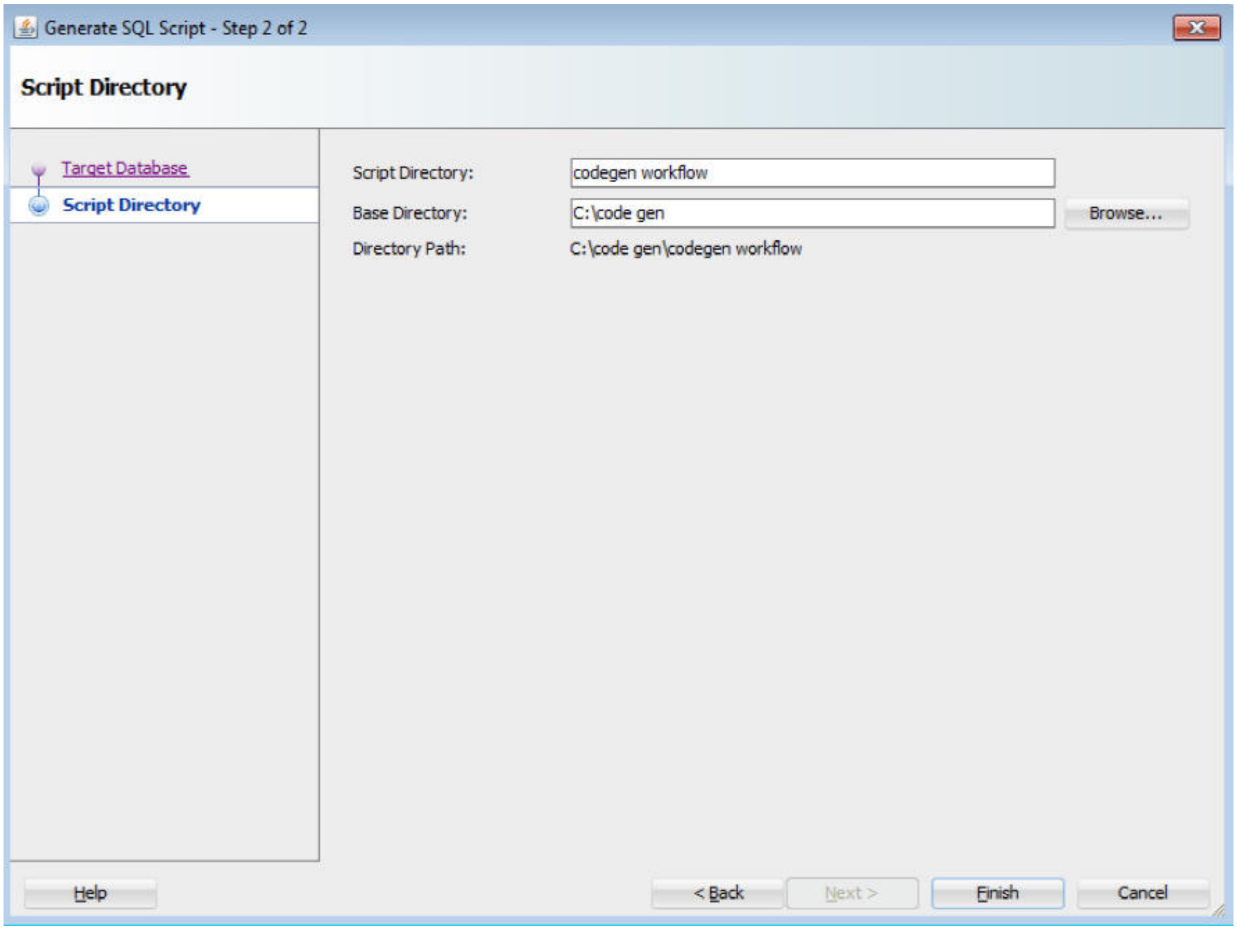


Target Database Version: 12.1.0.2.0

3. In the **Target Database Version** field, select the database version. Ensure that the generated script is compatible with the version of the database that you select here. This is the database where the SQL script will run.

4. Click **Next.** The **Generate SQL Script - Step 2 of 2** window opens, as shown in Figure 7-5.

Figure 7-5 Generate SQL Scripts - Step 2 of 2 Wizard



Script Directory: codegen workflow

Base Directory: C:\code gen

Directory Path: C:\code gen\codegen workflow

5. In the Step 2 of the **Generate Script Wizard,** provide the following information:

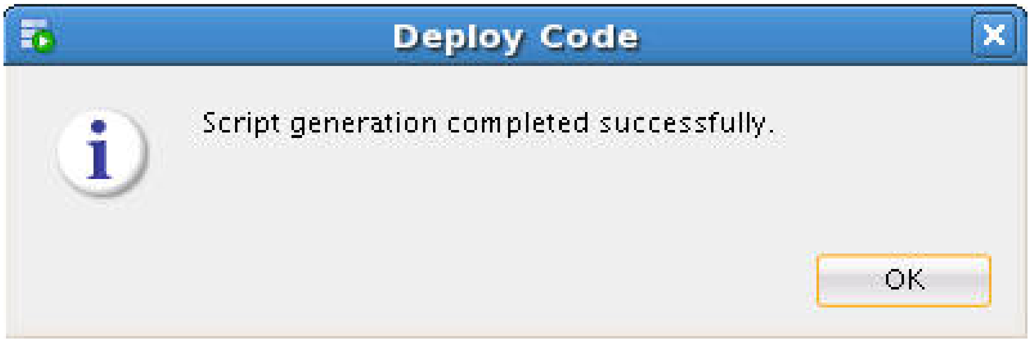
   - **Script Directory:** This is the name of the directory where the generated scripts are stored.

   - **Base Directory:** Click **Browse** to navigate to another location and create the directory for the scripts.

   - **Directory Path:** Displays the path of the script directory.

6. Click **Finish.** This triggers the script generation process. Once the scripts are generated successfully, the following message is displayed, as shown in Figure 7-6. Click **OK.**

Figure 7-6 Deploy Code Dialog Box



Script generation completed successfully.

You can check the list of generated scripts in the script directory that you defined in step 5.

List of Generated SQL Script Files
: The Structured Query Language (SQL) script files that are generated from the `codegen_workflow,` perform jobs that are related object cleanups, and other node specific operations.

Variable Definitions in Script Files
: SQL scripts generated for the nodes have variable definitions that provide object names for the public objects created by the scripts. The master script invokes all the underlying node level scripts in proper order. Therefore, all variable definitions must be defined in the master script.

Control Tables
: When the master script *`workflow name`*`_Run.sql` is run, the Control Table is created first by using the name specified in the control table name variable.

List of Generated SQL Script Files

The Structured Query Language (SQL) script files that are generated from the `codegen_workflow,` perform jobs that are related object cleanups, and other node specific operations.

Table 7-1 lists the SQL script files that are generated from the `codegen_workflow,` along with their descriptions:

Table 7-1 List of Generated Script Files and their Description

Script File Type	Script File Name	Examples of Script Files Generated from the codegen_workflow	Description
Master Script	`*workflow name*_Run.sql`	`codegen_workflow_Run.sql`	Invokes all the required node level scripts in the correct order. It performs the following tasks: • Validates compatibility of the version of the script file with the Data Miner Repository version. • Creates a workflow master table that contains entries for all the underlying objects created by the workflow script.
Cleanup Script	`*workflow name*_Drop.sql`	`codegen_workflow_Drop.sql`	Drops all objects created by the master script. It drops the following: • Hidden objects, such as tables generated for Explore Data nodes. • Public objects such as model names created by the Build nodes. • Tables created by the Create Table node.
Workflow Image	`*workflow name*.png`	`codegen_workflow.png`	This is an image of the workflow at the time of script generation.
Node Script	`*node name*.sql`	• `Apply.sql` • `Class Build.sql` • `Coefficients.sql` • `INSUR_CUST_LTV_SAMPLE APPLY.sql` • `INSUR_CUST_LTV_SAMPLE BUILD.sql` • `MODEL_COEFFICIENTS.sql` • `SCORED_CUSTOMERS.sql`	Performs node specific operations, such as Model creation in Build nodes. One node script is generated for each node that participates in the script generation.

Variable Definitions in Script Files

SQL scripts generated for the nodes have variable definitions that provide object names for the public objects created by the scripts. The master script invokes all the underlying node level scripts in proper order. Therefore, all variable definitions must be defined in the master script.

The following variables are supported:

- Variables that allow you to change the name of the objects that are input to the node level scripts, such as tables or views, and models. By default, these names are the original table or view names, and model names.
- Variables that allow you to change the name of the Control table. By default, the name of the Control table is the workflow name.
- Variables that indicate if named objects should be deleted first before they are generated by the script.

Control Tables

When the master script `workflow name_Run.sql` is run, the Control Table is created first by using the name specified in the control table name variable.

The Control Table performs the following:

- Registers generated objects, such as views, models, text specifications and so on
- Allows input objects to be looked up by the logical nodes in the workflow, and registers their output objects
- Determines the objects that need to be dropped by the cleanup script
- Provides internal name of objects that are not readily accessible through the workflows. For example, users can find the model test result tables by viewing the Control Table.
- By using different control file names along with different output variable names, you can use the generated script to concurrently generate and manage different results. This may be useful if the input data sources continue different sets of data that you want to mine independently. In this use case, the application would be responsible for saving the name of the Control Table so that it can be utilized when rerunning or dropping the generated results.

Structure of the Control Table
The Control Table is created first by using the name specified in the control table name variable when the master script *workflow name_Run.sql* is run

Columns in the Control Table
The columns in the Control Table contains information related to nodes and models.

Related Topics:

Querying the Control Table
After running the SQL scripts, you can query the Control Table to examine the generated objects.

Structure of the Control Table

The Control Table is created first by using the name specified in the control table name variable when the master script *workflow name_Run.sql* is run

The structure of the Control Table is as follows:

```
CREATE TABLE "&WORKFLOW_OUTPUT"
```

```
(
NODE_ID VARCHAR2(30) NOT NULL,
NODE_NAME VARCHAR2(30) NOT NULL,
NODE_TYPE VARCHAR2(30) NOT NULL,
MODEL_ID VARCHAR2(30),
MODEL_NAME VARCHAR2(65),
MODEL_TYPE VARCHAR2(35),
OUTPUT_NAME VARCHAR2(30) NOT NULL,
OUTPUT_TYPE VARCHAR2(30) NOT NULL,
ADDITIONAL_INFO VARCHAR2(65),
CREATION_TIME TIMESTAMP(6) NOT NULL,
COMMENTS VARCHAR2(4000 CHAR)
)
```

See Also:

Table 7-2 for more information about the columns in the Control Table, their description and examples.

Columns in the Control Table

The columns in the Control Table contains information related to nodes and models.

Table 7-2 lists the columns in the Control Table along with their description and examples.

Table 7-2 Columns in the Control Table and their Description

Column Name	Description	Examples
NODE_ID	This is the ID of the node that constitutes a part of the workflow. It uniquely identifies the node.	10001, 10002
NODE_NAME	This is the name of the node that constitutes a part of the workflow.	Class Build, MINING_DATA_BUILD_V
NODE_TYPE	This is the category of node.	Data Source node, Class Build node and so on.
MODEL_ID	This is the ID of the workflow model. It uniquely identifies each model referenced within a workflow.	10101, 10102
MODEL_NAME	This is the name of the model.	CLAS_GLM_1_6

Table 7-2 (Cont.) Columns in the Control Table and their Description

Column Name	Description	Examples
MODEL_TYPE	Model type is the algorithm type used by the model.	Generalized Linear Model, Support Vector Machines and so on
OUTPUT_NAME	This is the name of the output. These are internally generated names unless the names are under the control of the user.	Table/View Name, Model Name, Text object names such as: ODMR $15_37_21_839599RMAFRXI - table name "DMUSER"."CLAS_GLM_1_6" - fully qualified model name
OUTPUT_TYPE	It qualifies the type of output object.	Table, view, model
ADDITIONAL_INFO	This is the information that qualifies the purpose of the object about the script execution.	Target class for test lift result
CREATION_TIME	This is the time of object creation.	11-DEC-12 03.37.25.935193000 PM (format determined by locale)
COMMENTS	Comment to qualify the role of the object about the script execution.	Output Data (displayed for nodes like Data Source) Data Usage (displayed for the view passed into model build) Weights Setting (displayed for a weights table passed into model build) Build Setting (displayed for a build settings table passed into model build) Model (displayed for a Model object)

Scheduling Workflow Script Files

All the generated SQL script files must be deployed to the target or production database where they are accessible by the database instance. The SQL script files must be stored together in the same directory.

This section shows how to use SQL Developer and Oracle Enterprise Manager to schedule the master script to run.

Prerequisites for Scheduling Workflow Script Files

Before scheduling workflow script files, certain tasks related to Oracle Database, SQL script files, Oracle Data Miner repository and Oracle Data Miner user account must be performed.

Schedule SQL Scripts Using SQL Developer
Oracle SQL Developer provides the graphical user interface to define Scheduler Jobs.

Scheduling SQL Scripts using Oracle Enterprise Manager
Oracle Enterprise Manager allows Database Administrators to define jobs. The job definition defines the master script invocation as a script file using a full file path.

Prerequisites for Scheduling Workflow Script Files

Before scheduling workflow script files, certain tasks related to Oracle Database, SQL script files, Oracle Data Miner repository and Oracle Data Miner user account must be performed.

The prerequisites to schedule the SQL script files are:

- Oracle Database: An instance of Oracle Database is required to schedule the generated SQL script files.
- SQL script files: All the generated SQL script files should be deployed to the target or production database host, where they are accessible by the database instance. All the scripts files should be stored together in the same directory.
- Oracle Data Miner Repository: The Data Miner Repository is required to run the scripts because some node scripts use the services provided by the Repository at runtime. Some examples of services provided by the Repository are statistic calculation for Explorer node, text processing for Build Text node and so on.
- Oracle Data Miner user account: The user account is required to run the script files because it has the necessary grants to the services provided by the Repository.
- Complete directory path in the master script file: Add the complete directory path to each node script invocation in the master script. This is required so that the individual node script files can be called by the master script during runtime.

  Adding Complete Directory Path in the Master Script
  You can add the complete directory path in the master script `codegen_workflow_Run.sql` by editing the master script file.

  Creating Credentials for Database Host and Database
  A credential is an Oracle Scheduler object that has a user name and password pair stored in a dedicated database object.

Adding Complete Directory Path in the Master Script

You can add the complete directory path in the master script `codegen_workflow_Run.sql` by editing the master script file.

To add the complete directory path in the master script:

1. Open the master script `codegen_workflow_Run.sql,` and locate the following lines:

```
-- Workflow run
@@"INSUR_CUST_LTV_SAMPLE BUILD.sql";
@@"INSUR_CUST_LTV_SAMPLE APPLY.sql";
@@"Class Build.sql"; @@"Coefficients.sql";
```

```
@@"MODEL_COEFFCIENTS.sql";
@@"Apply.sql";
@@"SCORED_CUSTOMERS.sql";
```

2. Edit the master script file to add the complete directory path, where the scripts will be stored in the target or production database host computer. In this example, it is assumed that the script files will be deployed to `home/workspace` directory. For example:

```
-- Workflow run
@@"/home/workspace/INSUR_CUST_LTV_SAMPLE BUILD.sql";
@@"/home/workspace/INSUR_CUST_LTV_SAMPLE APPLY.sql";
@@"/home/workspace/Class Build.sql";
@@"/home/workspace/Coefficients.sql";
@@"/home/workspace/MODEL_COEFFCIENTS.sql";
@@"/home/workspace/Apply.sql";
@@"/home/workspace/SCORED_CUSTOMERS.sql";
```

3. Save and close the master script file.

Creating Credentials for Database Host and Database

A credential is an Oracle Scheduler object that has a user name and password pair stored in a dedicated database object.

You must create two credentials for:

- Host credential: A SQLPlus script job uses a host credential to authenticate itself with a database instance or the operating system so that the SQLPlus executable can run.
- Connection credential: This credential contains a database credential, which connects SQLPlus to the database before running the script.

To create the credentials:

1. In the **Connections** tab, expand the connection in which your user account is created.
2. Expand **Scheduler** under that connection.
3. Under **Scheduler,** right-click **Credentials** and click **New Credentials.** The **Create Credentials** dialog box opens.
4. First, create the host credential to log in to the host on which the job is running. Provide the following information:
   a. **Name**
   b. Select **Enabled.**
   c. **Description**
   d. **User Name**

   e. **Password**

5. Click **Apply.**
6. Next, create the connection credential for the Database connection. Repeat the same procedure as described in step 1 through step 5.

This completes the task of creating credentials for the database host and connection.

Schedule SQL Scripts Using SQL Developer

Oracle SQL Developer provides the graphical user interface to define Scheduler Jobs.

Scheduling Structured Query Language (SQL) scripts using SQL Developer involves the following:

Creating Credentials for Database Host and Database
: A credential is an Oracle Scheduler object that has a user name and password pair stored in a dedicated database object.

Defining Scheduler Job using Job Wizard
: The Job wizard allows you to create a job schedule, using which you can define a workflow job

Creating Credentials for Database Host and Database

A credential is an Oracle Scheduler object that has a user name and password pair stored in a dedicated database object.

You must create two credentials for:

- Host credential: A SQLPlus script job uses a host credential to authenticate itself with a database instance or the operating system so that the SQLPlus executable can run.
- Connection credential: This credential contains a database credential, which connects SQLPlus to the database before running the script.

To create the credentials:

1. In the **Connections** tab, expand the connection in which your user account is created.
2. Expand **Scheduler** under that connection.
3. Under **Scheduler,** right-click **Credentials** and click **New Credentials.** The **Create Credentials** dialog box opens.
4. First, create the host credential to log in to the host on which the job is running. Provide the following information:

   a. **Name**

   b. Select **Enabled.**

   c. **Description**

   d. **User Name**

   e. **Password**

5. Click **Apply.**
6. Next, create the connection credential for the Database connection. Repeat the same procedure as described in step 1 through step 5.

This completes the task of creating credentials for the database host and connection.

Defining Scheduler Job using Job Wizard

The Job wizard allows you to create a job schedule, using which you can define a workflow job

To define job schedules:

1. In the SQL Developer **Connections** tab, expand the connection in which your user account is created.
2. Expand **Scheduler** under that connection.
3. Under **Scheduler,** right-click **Jobs** and click **New Job (Wizard).** The **Create Job** dialog box opens.
4. In the **Create Job Wizard - Step 1 of 6** dialog box, define the Job Details with the following information:
   a. **Job Name:**
   b. Select **Enabled.**
   c. **Description:**
   d. **Job Class:**
   e. **Type of Job:** Select **Script.**
   f. **Script Type:** Select **SQLPlus.**
   g. **When to Execute Job:** Select **Repeat Interval.**
   h. In the **Repeat Interval** dialog box, set the repeat interval, start date, time and click **OK.**
   i. Click **Next.**
5. In the **Create Job Wizard - Step 2 of 6** dialog box, define the following:
   a. Select the option **Local** from the drop-down list.
   b. **Select Credential:** Select the host credential that you created in Creating Credentials for Database Host and Database from the drop-down list.
   c. **Connect Credential Name:** Select the connection credential that you created in Creating Credentials for Database Host and Database from the drop-down list.
   d. Click **Next.**
6. In the **Create Job Wizard - Step 4 of 6** dialog box, you can set up email notification based on the job status.
   a. In the **Select Events** section, select the job events for which you want to send email notifications.

   b. In the **Recipients** field, enter the email address. For each message, you can specify recipient email addresses and the sender (optional).

   c. Click **Next.**

7. In the **Create Job Wizard - Step 5 of 6** dialog box, click **Next.** For this use case, this step is skipped.

8. In the **Create Job Wizard - Step 6 of 6** dialog box, click **Finish.** This completes the creation of the job schedule.

After creating the job, you can monitor it in SQL Developer.

Scheduling SQL Scripts using Oracle Enterprise Manager

Oracle Enterprise Manager allows Database Administrators to define jobs. The job definition defines the master script invocation as a script file using a full file path.

You can decide whether the job should be run on a schedule or on demand. You can also monitor the running of the job in the application.

To schedule jobs in Oracle Enterprise Manager:

1. Log in to the Oracle Enterprise Manager using your Oracle Database account.

2. In the **Job Activity** section, click **Jobs.** The Job Creation page opens.

3. In the **Create Job** drop-down list, select **SQL Script** and click **Go.** This opens the Create Job page where you can define the new job.

4. In the **General** tab, enter the following details:

   a. **Name**

   b. **Description**

   c. **Target Database:** Provide the target database where the job will run.

5. In the **Parameters** tab, provide the full path name of the cleanup script and master script in the **SQL Script** section.

6. In the **Credentials** tab, provide the credentials for the following:

   - **Database Host Credential**

   - **Database Credentials**

7. In the **Schedule** tab, define the schedule of the job.

8. In the **Access** tab, you can set up email notifications based on the job status.

9. Click **Submit** to create the job.

Related Topics:

Creating Credentials for Database Host and Database
A credential is an Oracle Scheduler object that has a user name and password pair stored in a dedicated database object.

Deploying SQL Scripts on the Target Database

Deploying the SQL scripts involves running the master script file from the base directory.

To deploy SQL scripts, run the following master script file:

```
> @" C: base directory\workflow name_Run.sql"
```

> @" C: <base directory>\workflow name_Run.sql"

For example, run the following master script codegen_workflow_Run.sql in SQLPlus from the base directory:

```
>@" C:\code gen\codegen workflow\codegen_workflow_Run.sql"
```

If you must run the master script file subsequently, run the cleanup script codegen_workflow_Drop.sql first to delete previously generated objects, and then run the following master script:

```
>@" C:\code gen\codegen workflow\codegen_workflow_Drop.sql"
```

```
>@" C:\code gen\codegen workflow\codegen_workflow_Run.sql"
```

Querying the Control Table
After running the SQL scripts, you can query the Control Table to examine the generated objects.

Querying the Control Table

After running the SQL scripts, you can query the Control Table to examine the generated objects.

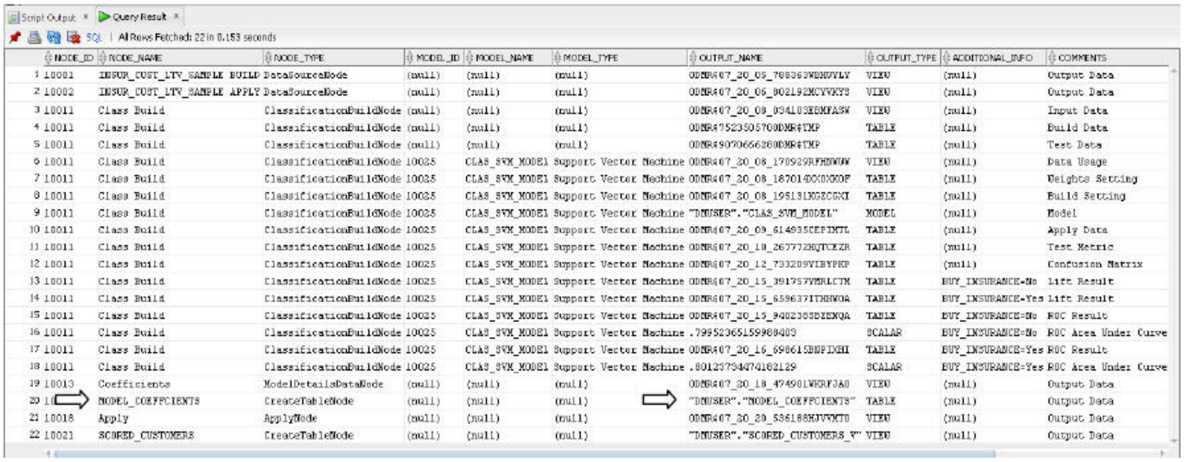
To query the Control Table, run the following command in SQLPlus:

```
>select * from workflow_name
```

For example, query the Control Table for codegen_workflow to examine the generated objects, as follows:

```
>select * from "codegen_workflow"
```

Figure 7-7 An Output Table - Result of the Query



All Rows Fetched: 22 in 0.153 seconds

	NODE_ID	NODE_NAME	NODE_TYPE	MODEL_ID	MODEL_NAME	MODEL_TYPE	OUTPUT_NAME	OUTPUT_TYPE	ADDITIONAL_INFO	COMMENTS
1	10001	INSUR_CUST_LTV_SAMPLE BUILD	DataSourceNode	(null)	(null)	(null)	ODMR$07_20_05_788363WBHUVLY	VIEW	(null)	Output Data
2	10002	INSUR_CUST_LTV_SAMPLE APPLY	DataSourceNode	(null)	(null)	(null)	ODMR$07_20_06_802192MCYVKYS	VIEW	(null)	Output Data
3	10011	Class Build	ClassificationBuildNode	(null)	(null)	(null)	ODMR$07_20_08_034103EBMFASW	VIEW	(null)	Input Data
4	10011	Class Build	ClassificationBuildNode	(null)	(null)	(null)	ODMR$7523505700DMR$TMP	TABLE	(null)	Build Data
5	10011	Class Build	ClassificationBuildNode	(null)	(null)	(null)	ODMR$9070666280DMR$TMP	TABLE	(null)	Test Data
6	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_08_170929RFHBWUW	VIEW	(null)	Data Usage
7	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_08_187014DXOXKOF	TABLE	(null)	Weights Setting
8	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_08_195131KGZCGXI	TABLE	(null)	Build Setting
9	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	"DMUSER"."CLAS_SVM_MODEL"	MODEL	(null)	Model
10	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_09_614935CEPIMTL	TABLE	(null)	Apply Data
11	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_10_267772HQTCEZR	TABLE	(null)	Test Metric
12	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_12_733209VIBYPKP	TABLE	(null)	Confusion Matrix
13	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_15_391757VMRLCTM	TABLE	BUY_INSURANCE=No	Lift Result
14	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_15_659637ITHHWOA	TABLE	BUY_INSURANCE=Yes	Lift Result
15	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_15_9402365BZENQA	TABLE	BUY_INSURANCE=No	ROC Result
16	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	.79952365159988403	SCALAR	BUY_INSURANCE=No	ROC Area Under Curve
17	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	ODMR$07_20_16_698615BNPIXHI	TABLE	BUY_INSURANCE=Yes	ROC Result
18	10011	Class Build	ClassificationBuildNode	10025	CLAS_SVM_MODEL1	Support Vector Machine	.80123734474182129	SCALAR	BUY_INSURANCE=Yes	ROC Area Under Curve
19	10013	Coefficients	ModelDetailsDataNode	(null)	(null)	(null)	ODMR$07_20_18_474901WKRFJA0	VIEW	(null)	Output Data
20	10	MODEL_COEFFCIENTS	CreateTableNode	(null)	(null)	(null)	"DMUSER"."MODEL_COEFFCIENTS"	TABLE	(null)	Output Data
21	10018	Apply	ApplyNode	(null)	(null)	(null)	ODMR$07_20_20_536188HJVVMT0	VIEW	(null)	Output Data
22	10021	SCORED_CUSTOMERS	CreateTableNode	(null)	(null)	(null)	"DMUSER"."SCORED_CUSTOMERS_V"	VIEW	(null)	Output Data

In this example, the Create Table node MODEL_COEFFICIENTS, produced an output table MODEL_COEFFCIENTS that persisted the coefficient data extracted from the generated SVM model.

Related Topics:

Control Tables
: When the master script `*workflow name*_Run.sql` is run, the Control Table is created first by using the name specified in the control table name variable.

Structure of Control Table
: The Control Table is created first by using the name specified in the control table name variable when the master script *workflow name_Run.sql* is run

8

Using PL/SQL API to Manage Workflows

This chapter explains how to manage workflows using the PL/SQL APIs.

About PL/SQL APIs

Oracle Data Miner 4.1 ships with a set of repository PL/SQL APIs that enable applications to manage Oracle Data Miner projects and workflow directly.

The project PL/SQL APIs is in the ODMR_PROJECT package, and the workflow PL/SQL APIs is in the ODMR_WORKFLOW package. Both the packages are defined in the ODMRSYS schema in the Oracle Data Miner repository.

The PL/SQL APIs enable you to:

- Manage Data Miner projects and workflows
- Schedule workflows
- Run workflows
- Query project and workflow information
- Monitor workflow execution status
- Query generated results

PL/SQL APIs

You can use the PL/SQL APIs to manage projects and workflows.

Use the PL/SQL APIs to perform the following tasks:

PROJECT_CREATE
: The function `PROJECT_CREATE` creates a project using the project name that you provide. The function returns a project ID. If the project already exists, the function raises an exception.

PROJECT_RENAME
: The `PROJECT_RENAME` procedure renames an existing project. If a project with the new name already exists, then the procedure raises an exception.

PROJECT_DELETE
: The procedure `PROJECT_DELETE` enables you to delete one or more projects along with the workflows contained in it. If any workflow is running or is opened by Oracle Data Miner, then the procedure raises an exception.

WF_RUN
: The function `WF_RUN` that runs a workflow contains signatures that accepts names, project IDs, workflow and specific nodes to run.

WF_STOP
: The procedure `WF_STOP` enables you to stop or cancel a workflow that is scheduled to run. If the workflow is not already running or scheduled, then the procedure raises an exception.

WF_RENAME
: The procedure `WF_RENAME` renames an existing workflow.

WF_DELETE
: The procedure `WF_DELETE` deletes a workflow along with all the generated objects such as tables, views, models, test results, and so on. If the workflow is either already running or opened by the Oracle Data Miner, then it raises an exception.

WF_IMPORT
: The `WF_IMPORT` function imports a workflow (exported by the Oracle Data Miner) to the specified project. Since the workflow is backward compatible, you can import an older version of a workflow to a newer Oracle Data Miner Repository.

WF_EXPORT
: The `WF_EXPORT` function exports a specified workflow. If the workflow is either already running or opened by the Oracle Data Miner, then it raises an exception. Alternatively, you can query the ODMR_USER_PROJECT_WORKFLOW for workflows to export.

PROJECT_CREATE

The function `PROJECT_CREATE` creates a project using the project name that you provide. The function returns a project ID. If the project already exists, the function raises an exception.

Function:

```
FUNCTION PROJECT_CREATE(p_project_name IN VARCHAR2,
p_comment IN VARCHAR2 DEFAULT NULL) RETURN NUMBER
```

Table 8-1 lists the parameters that are used in the `PROJECT_CREATE` function.

Table 8-1 List of Parameters for PROJECT_CREATE Function

Parameter	Description
p_project_name	Assign a name to the project that is created.
p_comment	Specify any comment that is to be applied to the project.

PROJECT_RENAME

The `PROJECT_RENAME` procedure renames an existing project. If a project with the new name already exists, then the procedure raises an exception.

Procedure:

```
PROCEDURE PROJECT_RENAME(p_project_id IN NUMBER, p_project_name IN VARCHAR2)
```

Table 8-2 lists the parameters that are used in the `PROJECT_RENAME` procedure.

Table 8-2 List of Parameters for PROJECT_RENAME Procedure

Parameters	Description
p_project_id	Specify the project ID of the project to rename.
p_project_name	Specify the new name for the project.

PROJECT_DELETE

The procedure `PROJECT_DELETE` enables you to delete one or more projects along with the workflows contained in it. If any workflow is running or is opened by Oracle Data Miner, then the procedure raises an exception.

Procedure to delete a project:

```
PROCEDURE PROJECT_DELETE(p_project_id IN NUMBER)
```

Procedure to delete multiple projects:

```
PROCEDURE PROJECT_DELETE(p_project_ids IN ODMR_OBJECT_IDS)
```

Table 8-3 lists the parameters that are used in the `PROJECT_DELETE` procedure.

Table 8-3 List of Parameters for PROJECT_DELETE procedure

Parameters	Description
p_project_id	Specify the project ID of the project to delete.
p_project_ids	Specify the project IDs of the projects to delete.

WF_RUN

The function `WF_RUN` that runs a workflow contains signatures that accepts names, project IDs, workflow and specific nodes to run.

The project ID, workflow ID, and node IDs can be queried using the `ODMR_USER_WORKFLOW_NODES` view.

WF_RUN Parameters

You can execute the WF_RUN function using different parameter combinations:

- `WF_RUN` with project name, workflow name and node name
- `WF_RUN` with project ID, workflow ID and node IDs
- `WF_RUN` with project name, workflow name, node name and time interval
- `WF_RUN` with project ID, workflow ID, node ID and time interval

The `RERUN_WORKFLOW` RUN mode runs all nodes in a workflow regardless of how these nodes are connected. If a workflow contains two or more separate lineage of nodes, all lineages will be run, but the order of lineage execution is not deterministic. That is, the user cannot set the order for the lineage to run.

Table 8-4 lists the parameters that are used in the `WF_RUN` function.

Table 8-4 List of Parameters in the WF_RUN function

Parameters	Description
`P_PROJECT_NAME`	Specify the project name that the workflow was created in.
`P_PROJECT_ID`	Specify the project ID that the workflow was created in.
`P_WORKFLOW_NAME`	Specify the workflow name to run.
`P_WORKFLOW_ID`	Specify the workflow ID to run.
`P_NODE_NAMES`	Specify the node names in the workflow to run.
`P_NODE_IDS`	Specify the node IDs in the workflow to run.

Table 8-4 (Cont.) List of Parameters in the WF_RUN function

Parameters	Description
P_RUN_MODE	• VALIDATE_ONLY: Validates parent nodes of the specified nodes. • RUN_NODE_ONLY: Runs the specified nodes. If the nodes have already run, they will not run again. If parent nodes have not run, then they will be run, otherwise they will be ignored. • RERUN_NODE_ONLY: Resets the status of the specified nodes to READY state. Then these nodes are run again. • RERUN_NODE_CHILDREN: Resets the status of the specified nodes and their children nodes to READY state. Then these nodes are run again. • RERUN_NODE_PARENTS: Resets the status of the specified nodes and their parent nodes to READY state. Then these nodes are run again. • RERUN_WORKFLOW: Resets the status of all nodes to READY state. Then the nodes are run (complete workflow run). Note: p_node_names is ignored.
P_MAX_NUM_THREADS	Specify the maximum number of parallel model builds across all workflows. Specify NULL for system determined. Use this parameter only if your system has plenty of resources, otherwise set this value to NULL to use the default value.
P_SCHEDULE	Specify existing schedule object defined in the Scheduler. If no value is specified for P_SCHEDULE, then the workflow is scheduled to run as soon as possible.
P_START_DATE	Specify the date and time on which this workflow is scheduled to start for the first time. If P_START_DATE and P_REPEAT_INTERVAL are set to NULL, then the workflow is scheduled to run as soon as possible.
P_REPEAT_INTERVAL	Specify how often the workflow repeats. You can specify the repeat interval by using the calendar or PL/SQL expressions. The expression specified is evaluated to determine the next time the workflow should run. If P_REPEAT_INTERVAL is not specified, then the workflow runs only once at the specified start date.
P_END_DATE	Specify the date and time after which the workflow expires and is no longer run. If no value for P_END_DATE is specified, then the job repeats indefinitely.
P_JOB_CLASS	Specify existing job class to run the workflow. If no value for P_JOB_CLASS is specified, then the default job class is used.

WF_RUN with Project Name, Workflow Name, and Node Name

The WF_RUN function with the project name, workflow name and node name parameters:

```
FUNCTION WF_RUN(P_PROJECT_NAME IN VARCHAR2,
                                P_WORKFLOW_NAME IN VARCHAR2,
                                P_NODE_NAMES IN ODMR_OBJECT_NAMES,
                                P_RUN_MODE IN VARCHAR2 DEFAULT 'RUN_NODE_ONLY',
                                P_MAX_NUM_THREADS IN NUMBER DEFAULT NULL,
                                P_SCHEDULE IN VARCHAR2 DEFAULT NULL,
                                P_JOB_CLASS IN VARCHAR2 DEFAULT NULL
RETURN VARCHAR2
```

WF_RUN with Project Name, Workflow Name Node Name and Time Interval

The WF_RUN function with the name parameters and start date and end date:

```
FUNCTION WF_RUN(P_PROJECT_NAME IN VARCHAR2,
                   P_WORKFLOW_NAME IN VARCHAR2,
                   P_NODE_NAMES IN ODMR_OBJECT_NAMES,
                   P_RUN_MODE IN VARCHAR2 DEFAULT 'RUN_NODE_ONLY',
                   P_MAX_NUM_THREADS IN NUMBER DEFAULT NULL,
                   P_START_DATE IN TIMESTAMP WITH TIME ZONE DEFAULT NULL,
                   P_REPEAT_INTERVAL IN VARCHAR2 DEFAULT NULL,
                   P_END_DATE IN TIMESTAMP WITH TIME ZONE DEFAULT NULL,
                   P_JOB_CLASS IN VARCHAR2 DEFAULT NULL)
RETURN VARCHAR2
```

WF_RUN with Project ID, Workflow ID, Node ID and Time Interval

The WF_RUN function with the IDs and start date and end date parameters:

```
FUNCTION WF_RUN(P_PROJECT_ID IN NUMBER,
                P_WORKFLOW_ID IN NUMBER,
                P_NODE_IDS IN ODMR_OBJECT_IDS,
                P_RUN_MODE IN VARCHAR2 DEFAULT 'RUN_NODE_ONLY',
                P_MAX_NUM_THREADS IN NUMBER DEFAULT NULL,
                P_START_DATE IN TIMESTAMP WITH TIME ZONE DEFAULT NULL,
                P_REPEAT_INTERVAL IN VARCHAR2 DEFAULT NULL,
                P_END_DATE IN TIMESTAMP WITH TIME ZONE DEFAULT NULL,
                P_JOB_CLASS IN VARCHAR2 DEFAULT NULL)
RETURN VARCHAR2
```

WF_RUN with Project ID, Workflow ID and Node IDs

The WF_RUN function with the project ID, workflow ID and node ID parameters:

```
FUNCTION WF_RUN(P_PROJECT_ID IN NUMBER,
                                 P_WORKFLOW_ID IN NUMBER,
                                 P_NODE_IDS IN ODMR_OBJECT_IDS,
                                 P_RUN_MODE IN VARCHAR2 DEFAULT 'RUN_NODE_ONLY',
                                 P_MAX_NUM_THREADS IN NUMBER DEFAULT NULL,
                                 P_SCHEDULE IN VARCHAR2 DEFAULT NULL,
                                 P_JOB_CLASS IN VARCHAR2 DEFAULT NULL)
RETURN VARCHAR
```

WF_STOP

The procedure WF_STOP enables you to stop or cancel a workflow that is scheduled to run. If the workflow is not already running or scheduled, then the procedure raises an exception.

The procedure is:

```
PROCEDURE WF_STOP(p_workflowId IN NUMBER)
```

Table 8-5 lists the parameters that are used in the WF_STOP procedure.

Table 8-5 List of Parameters for WF_STOP Procedure

Parameter	Description
p_workflow_id	Specify the workflow ID of the workflow to cancel.

WF_RENAME

The procedure `WF_RENAME` renames an existing workflow.

The procedure raises an exception under the following conditions:

- If a workflow with the new name already exists
- If the workflow is either already running or opened by Oracle Data Miner

The procedure to rename the workflow:

```
PROCEDURE WF_RENAME(p_workflowId IN NUMBER,
                                  p_workflow_name IN VARCHAR2,
                                  p_mode IN CHAR DEFAULT 'R')
```

Table 8-6 lists the parameters that are used in the `WF_RENAME` procedure.

Table 8-6 List of Parameters for WF_RENAME Procedure

Parameters	Description
p_workflow_id	Specify the workflow ID to rename.
p_workflow_name	Specify the new workflow name.
p_mode	This parameter is for internal use only.

WF_DELETE

The procedure `WF_DELETE` deletes a workflow along with all the generated objects such as tables, views, models, test results, and so on. If the workflow is either already running or opened by the Oracle Data Miner, then it raises an exception.

Procedure:

```
PROCEDURE WF_DELETE(p_workflowId IN NUMBER)
```

Table 8-7 lists the parameters that are used in the `WF_DELETE` procedure.

Table 8-7 List of Parameters for WF_DELETE Procedure

Parameter	Description
p_workflow_id	Specify the ID of the workflow that is to be deleted.

WF_IMPORT

The `WF_IMPORT` function imports a workflow (exported by the Oracle Data Miner) to the specified project. Since the workflow is backward compatible, you can import an older version of a workflow to a newer Oracle Data Miner Repository.

During import, the function detects if the workflow has any object name conflicts with the existing workflows in the repository. The p_force parameter determines whether to terminate the import or not.

Exceptions are raised under the following conditions:

- If the project does not exist
- If the workflow metadata is invalid or incompatible with the current repository
- If a workflow with the same name already exists

Function:

```
FUNCTION WF_IMPORT(p_project_id IN NUMBER,
                       p_workflow_name IN VARCHAR2,
                       p_workflow_data IN XMLType,
                       p_comment IN VARCHAR2,
                       p_force IN BOOLEAN DEFAULT FALSE) RETURN NUMBER;
```

Table 8-8 lists the parameters that are used in the WF_IMPORT function.

Table 8-8 List of Parameters for WF_IMPORT Function

Parameters	Description
p_project_id	Specify the ID of the project in to which the workflow will be imported.
p_workflow_name	Specify the workflow to import.
p_workflow_data	Specify the workflow meta data. This workflow should be previously exported by the Oracle Data Miner and the workflow version should not be newer than what the Repository supports.
p_comment	Specify the comment to be applied to the workflow.
p_force	Determines whether to force import if the workflow has object name conflicts with existing workflows in the repository. The applicable values are: • If p_force = FALSE, then it raises an exception with a list of conflicting object names. • If p_force = TRUE, then it proceeds with the import of the workflow.

WF_EXPORT

The WF_EXPORT function exports a specified workflow. If the workflow is either already running or opened by the Oracle Data Miner, then it raises an exception. Alternatively, you can query the ODMR_USER_PROJECT_WORKFLOW for workflows to export.

Function:

```
FUNCTION WF_EXPORT(p_workflow_id IN NUMBER) RETURN XMLType;
```

Table 8-9 lists the parameters that are used in the WF_EXPORT function.

Table 8-9 List of Parameters for WF_EXPORT Function

Parameters	Description
p_workflow_id	Specify the ID of the workflow to export.

See Also:

ODMR_USER_PROJECT_WORKFLOW repository view.

Repository Views

In the Repository View, you can query information related to workflows and projects, and also monitor the status.

The Repository Views enable you to:

- Query workflow and project information
- Monitor workflow execution status
- Query generated results

The following repository APIs or views are available:

ODMR_USER_PROJECT_WORKFLOW
You can query all workflows that belong to a specific project or all projects by using the `ODMR_USER_PROJECT_WORKFLOW` repository view. This view provides information about the workflow, such as status, creation time, update time, and so on.

ODMR_USER_WORKFLOW_ALL
You can query individual workflow node status after the workflow is complete by using the `ODMR_USER_WORKFLOW_ALL` repository view.

ODMR_USER_WORKFLOW_LOG
You can query the logs of workflow run by using the `ODMR_USER_WORKFLOW_LOG` repository view.

ODMR_USER_WORKFLOW_NODES
You can query information about the individual nodes, such as node name, node status, node ID and so on, that are part of a workflow, by using the `ODMR_USER_WORKFLOW_NODES` repository view.

ODMR_USER_WORKFLOW_MODELS
You can query mining models that belong to a specific Build or Model node of a workflow by using the `ODMR_USER_WORKFLOW_MODELS` repository view.

ODMR_USER_WF_CLAS_TEST_RESULTS
By using the `ODMR_USER_WF_CLAS_TEST_RESULTS` repository view, you can query the generated classification results for a specific mining model in the last workflow run.

ODMR_USER_WF_REGR_TEST_RESULTS

You can query the generated regression results for a specific mining model in the last workflow run by using the `ODMR_USER_WF_REGR_TEST_RESULTS` repository view.

ODMR_USER_WF_TEST_RESULTS

You can query the combined results of the `ODMR_USER_WF_CLAS_TEST_RESULTS` and `ODMR_USER_WF_REGR_TEST_RESULTS` by using the `ODMR_USER_WF_TEST_RESULTS` repository view.

ODMR_USER_PROJECT_WORKFLOW

You can query all workflows that belong to a specific project or all projects by using the `ODMR_USER_PROJECT_WORKFLOW` repository view. This view provides information about the workflow, such as status, creation time, update time, and so on.

Table 8-10 provides more information about this view.

Table 8-10 ODMR_USER_PROJECT_WORKFLOW Repository View

Column	Data Type	Description
PROJECT_ID	NUMBER	This is the ID of the project in which the workflow was created in.
PROJECT_NAME	VARCHAR2 (30 CHAR)	This is the name of the project in which the workflow was created in.
PJ_CREATION_TIME	TIMESTAMP (6)	This is the project creation time.
PJ_LAST_UPDATED_TIME	TIMESTAMP (6)	Project last modified time stamp.
PJ_COMMENTS	VARCHAR2 (4000 CHAR)	These are comments related to the project, if any.
WORKFLOW_ID	NUMBER	This is the workflow ID.
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
WORKFLOW_DATA	XMLTYPE	This is the workflow metadata in XML format.
CHAIN_NAME	VARCHAR (30 CHAR)	This is for internal use only.

Table 8-10 (Cont.) ODMR_USER_PROJECT_WORKFLOW Repository View

Column	Data Type	Description
STATUS	VARCHAR (30 CHAR)	• INACTIVE: Indicates that the workflow is idle. • ACTIVE: Indicates that the workflow is running. • QUEUED: Indicates that the workflow is in queue to run. • STOPPING: Indicates that the workflow is being stopped. • STOPPED: Indicates that the running workflow has stopped. • SCHEDULED: Indicates that the workflow is scheduled to run.
WF_CREATION_TIME	TIMESTAMP (6)	This is the workflow creation time stamp.
WF_LAST_UPDATED_TIME	TIMESTAMP (6)	This is the workflow last modified time stamp.
WF_COMMENTS	VARCHAR2 (4000 CHAR)	These are comments related to the workflow, if any.

ODMR_USER_WORKFLOW_ALL

You can query individual workflow node status after the workflow is complete by using the `ODMR_USER_WORKFLOW_ALL` repository view.

For example, you can query the nodes that failed along with the associated error details, in the last workflow run. Table 8-11 provides more information about this view.

Table 8-11 ODMR_USER-WORKFLOW_ALL Repository View

Column	Data Type	Description
WORKFLOW_ID	NUMBER	This is the ID of the workflow.
WF_JOB_NAME	VARCHAR2 (261)	This is the Scheduler Job that runs the workflow.
LOG_DATE	TIMESTAMP (6) WITH TIME ZONE	This is the log entry time stamp.
LOG_ID	NUMBER	This is the log entry ID.
NODE_ID	VARCHAR2 (261)	This is the workflow node ID.
SUBNODE_ID	VARCHAR2 (261)	This is the workflow sub node. For example, a Model node in a Build node.

Table 8-11 (Cont.) ODMR_USER-WORKFLOW_ALL Repository View

Column	Data Type	Description
NODE_STATUS	VARCHAR2 (11)	• RUNNING: Indicates that the node is running. • SUCCEEDED: Indicates that the node run has completed successfully. • FAILED: Indicates that the node has failed to complete. • NOT_STARTED: Indicates that the node is waiting to run. • SCHEDULED: Indicates that the node is scheduled to run. • PAUSED: Indicates that the node is paused. This is an exception. • STOPPED: Indicates that the node run has stopped. • STALLED: Indicates that the node has stalled. This is an exception.
SUBNODE_STATUS	VARCHAR2 (30)	Same as Node status
NODE_START_TIME	TIMESTAMP (6) WITH TIME ZONE	This is the workflow node start time stamp.
NODE_RUN_TIME	INTERVAL DAY (9) TO SECOND (6)	This is the node run time.
ERROR_CODE	NUMBER	This is the error code returned by the node.
LOG_MESSAGE	VARCHAR2 (4000 CHAR)	This is the log message generated by the node.

ODMR_USER_WORKFLOW_LOG

You can query the logs of workflow run by using the `ODMR_USER_WORKFLOW_LOG` repository view.

Oracle Data Miner uses this view to extract and display the workflow event log. Table 8-12 provides more information about this view.

Table 8-12 ODMR_USER_WORKFLOW_LOG Repository Views

Column	Data Type	Description
LOG_ID	NUMBER	This is the log entry ID.
JOB_NAME	VARCHAR2 (30 CHAR)	This is the Scheduler Job that runs the workflow.
PROJ_NAME	VARCHAR2 (30 CHAR)	This is the project in which the workflow was created in.
PRO_ID	NUMBER	This is the project ID in which the workflow was created in.

Table 8-12 (Cont.) ODMR_USER_WORKFLOW_LOG Repository Views

Column	Data Type	Description
WF_NAME	VARCHAR2 (30 CHAR)	This is the workflow name.
WF_ID	NUMBER	This is the workflow ID.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the node in the workflow.
NODE_ID	VARCHAR2 (30)	This is the node ID.
SUBNODE_NAME	VARCHAR2 (30 CHAR)	This is the workflow sub node name. For example, Model name in a Build node.
SUBNODE_ID	VARCHAR2 (30)	This is the workflow sub node ID. for example, the Model ID in a Build Node.
LOG_TIMESTAMP	TIMESTAMP (6) WITH TIME ZONE	This is the log entry time stamp.
LOG_DURATION	INTERVAL DAY (3) TO SECOND (0)	This is the log entry duration in days and seconds.
LOG_TYPE	VARCHAR2 (30 CHAR)	WARN: Indicates warning. ERR: Indicates error. INFO: Indicates informational content.
LOG_SUBTYPE	VARCHAR2(30 CHAR)	START: Indicates start of a task. END: Indicates end of a task.
LOG_MESSAGE	NVARCHAR2 (2000)	This is the log message generated by the node.
LOG_MESSAGE_DETAILS	VARCHAR2 (4000 CHAR)	This is the log message details generated by the node.

Table 8-12 (Cont.) ODMR_USER_WORKFLOW_LOG Repository Views

Column	Data Type	Description
LOG_TASK	VARCHAR2 (30 CHAR)	When a node is running, it performs one or more of the following tasks: • PROJECT • WORKFLOW • NODE • SUBNODE • VALIDATE • SAMPLE • CACHE • STATISTICS • FEATURES • DATAPREP • BUILD • TEST • APPLY • TRANSFORM • TEXT • BUILDTEXT • APPLYTEXT • OUTPUT • CLEANUP • CREATE EXPLORE STATISTICS • CREATE HISTOGRAM • CREATE SAMPLE DATA • CREATE HISTOGRAM SAMPLE • CREATE DATA GUIDE • CREATE PROJECT • DELETE PROJECT • RENAME PROJECT • SET COMMENT • CREATE WORKFLOW • RUN WORKFLOW • RENAME WORKFLOW • DELETE WORKFLOW • IMPORT WORKFLOW • EXPORT WORKFLOW

ODMR_USER_WORKFLOW_NODES

You can query information about the individual nodes, such as node name, node status, node ID and so on, that are part of a workflow, by using the `ODMR_USER_WORKFLOW_NODES` repository view.

Table 8-13 provides more information about this view.

Table 8-13 ODMR_USER_WORKFLOW_NODES Repository Views

Column	Data Types	Description
PROJECT_ID	NUMBER	This is the ID of the project in which the workflow was created in.
PROJECT_NAME	VARCHAR2 (30 CHAR)	This is the name of the project in which the workflow was created in.
WORKFLOW_ID	NUMBER	This is the ID of the workflow.
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
NODE_TYPE	VARCHAR2 (30 CHAR)	This is the node type.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the node.
NODE_ID	NUMBER	This is the ID of the node.
NODE_STATUS	VARCHAR2 (10 CHAR)	• INVALID: Indicates that the node is not valid, and it cannot be run. • WARNING: Indicates that the node has run but with warning. • READY: Indicates that the node is ready to run. • FAILURE: Indicates that the node run has failed. • COMPLETE: Indicates that the node run has completed successfully.

ODMR_USER_WORKFLOW_MODELS

You can query mining models that belong to a specific Build or Model node of a workflow by using the `ODMR_USER_WORKFLOW_MODELS` repository view.

Table 8-14 provides more information about this view.

Table 8-14 ODMR_USER_WORKFLOW_MODELS Repository Views

Column	Data Types	Description
PROJECT_ID	NUMBER	This is the project ID in which the workflow was created in.
PROJECT_NAME	VARCHAR2 (30 CHAR)	This is the name of the project in which the workflow was created in.
WORKFLOW_ID	NUMBER	This is the ID of the workflow.

Table 8-14 (Cont.) ODMR_USER_WORKFLOW_MODELS Repository Views

Column	Data Types	Description
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
NODE_TYPE	VARCHAR2 (30 CHAR)	This is the node type.
NODE_ID	NUMBER	This is the workflow node ID.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow node.
NODE_STATUS	VARCHAR2 (30 CHAR)	• INVALID: Indicates that the node is not valid, and cannot be run. • WARNING: Indicates that the node has run but with warning. • READY: Indicates that the node is ready to run. • FAILURE: Indicates that the node run has failed. • COMPLETE: Indicates that the node run has completed successfully.
MODEL_TYPE	VARCHAR2 (30 CHAR)	This is the model type. For example, Naive Bayes Model.
MODEL_ID	NUMBER	This is the ID of the model.
MODEL_NAME	VARCHAR2 (30 CHAR)	This is the name of the model.
MODEL_STATUS	VARCHAR2 (30 CHAR)	Same as node status.
MODEL_CREATIONDATE	VARCHAR2 (30 CHAR)	This is the date when the model is created.

ODMR_USER_WF_CLAS_TEST_RESULTS

By using the `ODMR_USER_WF_CLAS_TEST_RESULTS` repository view, you can query the generated classification results for a specific mining model in the last workflow run.

Table 8-15 provides more information about this .

Table 8-15 ODMR_USER_WF_CLAS_TEST_RESULTS

Column	Data Type	Description
PROJECT_ID	NUMBER	This is the ID of the project in which the workflow was created in.

Table 8-15 (Cont.) ODMR_USER_WF_CLAS_TEST_RESULTS

Column	Data Type	Description
PROJECT_NAME	VARCHAR2 (30 CHAR)	This is the name of the project in which the workflow was created in.
WORKFLOW_ID	NUMBER	This is the ID of the workflow.
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
NODE_TYPE	VARCHAR2 (30 CHAR)	This is the node type.
NODE_ID	NUMBER	This is the ID of the node.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the node.
NODE_STATUS	VARCHAR2 (10 CHAR)	• INVALID: Indicates that the node is not ready to be run. • WARNING: Indicates that the node has run completely, but with warning. • READY: Indicates that the node is ready to be run. • FAILURE: Indicates that the node run has failed. • COMPLETE: Indicates that the node has run successfully.
MODEL_ID	NUMBER	This is the ID of the model.
MODEL_NAME	VARCHAR2 (30 CHAR)	This is the name of the model.
MODEL_STATUS	VARCHAR2 (10 CHAR)	• WARNING: Indicates that the model has run, but with warning. • READY: Indicates that the model is ready to be run. • FAILURE: Indicates that the model run has failed. • COMPLETE: Indicates that the model run has completed successfully.
MODEL_CREATIONDATE	VARCHAR2 (30 CHAR)	This is the creation time of the model.

Table 8-15 (Cont.) ODMR_USER_WF_CLAS_TEST_RESULTS

Column	Data Type	Description
TEST_METRICS	VARCHAR2 (128 CHAR)	The test metric result table that contains Predictive Confidence, accuracy, and so on.
CONFUSION_MATRIX	VARCHAR2 (128 CHAR)	The Confusion Matrix result table.
LIFTS	DM_NESTED_CATEGORICALS	The table of DM_NESTED_CATEGORICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains lift result table
ROCS	DM_NESTED_CATEGORICALS	The table of DM_NESTED_CATEGORICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains ROC result table
ROC_AREA	DM_NESTED_NUMERICALS	The table of DM_NESTED_NUMERICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains ROC area under curve value

ODMR_USER_WF_REGR_TEST_RESULTS

You can query the generated regression results for a specific mining model in the last workflow run by using the `ODMR_USER_WF_REGR_TEST_RESULTS` repository view.

Table 8-16 provides more information about this view.

Table 8-16 ODMR_USER_WF_REGR_TEST_RESULTS Repository Views

Column	Data Type	Description
PROJECT_ID	NUMBER	This is the ID of the project under which the workflow is created.
PROJECT_NAME	VARCHAR2 (30 CHAR)	This is the name of the project under which the workflow is created.
WORKFLOW_ID	NUMBER	This is the workflow ID.

Table 8-16 (Cont.) ODMR_USER_WF_REGR_TEST_RESULTS Repository Views

Column	Data Type	Description
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
NODE_TYPE	VARCHAR2 (30 CHAR)	This is the type of the node. For example, Build node, Model node, and so on.
NODE_ID	NUMBER	This is the ID of the node.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the node.
NODE_STATUS	VARCHAR2 (10 CHAR)	• INVALID: Indicates that the node is not ready to be run. • WARNING: Indicates that the node has run completely, but with warning. • READY: Indicates that the node is ready to be run. • FAILURE: Indicates that the node run has failed. • COMPLETE: Indicates that the node has run successfully.
MODEL_ID	NUMBER	This is the ID of the model.
MODEL_NAME	VARCHAR2 (30 CHAR)	This is the name of the model.
MODEL_STATUS	VARCHAR2 (10 CHAR)	• WARNING: Indicates that the model has run, but with warning. • READY: Indicates that the model is ready to be run. • FAILURE: Indicates that the model run has failed. • COMPLETE: Indicates that the model run has completed successfully.
MODEL_CREATION_DATE	VARCHAR2 (30 CHAR)	This is the creation date of the model.
TEST_METRICS	VARCHAR2 (128 CHAR)	This is the test metrics result table that contains Predictive Confidence, Root Mean Square error, and so on.

Table 8-16 (Cont.) ODMR_USER_WF_REGR_TEST_RESULTS Repository Views

Column	Data Type	Description
RESIDUAL_PLOT	VARCHAR2 (128 CHAR)	This is the test Residual Plot table.

ODMR_USER_WF_TEST_RESULTS

You can query the combined results of the `ODMR_USER_WF_CLAS_TEST_RESULTS` and `ODMR_USER_WF_REGR_TEST_RESULTS` by using the `ODMR_USER_WF_TEST_RESULTS` repository view.

Table 8-17 provides more information about this view.

Table 8-17 ODMR_USER_WF_TEST_RESULTS Repository Views

Column	Data Type	Description
PROJECT_ID	NUMBER	The project ID of the project under which the workflow is created.
PROJECT_NAME	VARCHAR2 (30 CHAR)	The name of the project under which the workflow is created.
WORKFLOW_ID	NUMBER	This is the workflow ID.
WORKFLOW_NAME	VARCHAR2 (30 CHAR)	This is the name of the workflow.
NODE_TYPE	VARCHAR2 (30 CHAR)	This is the type of the node. For example, Build node, Model node and so on.
NODE_ID	NUMBER	This is the ID of the node.
NODE_NAME	VARCHAR2 (30 CHAR)	This is the name of the node.
NODE_STATUS	VARCHAR2 (10 CHAR)	• INVALID: Indicates that the node is not ready to be run. • WARNING: Indicates that the node has run completely, but with warning. • READY: Indicates that the node is ready to be run. • FAILURE: Indicates that the node run has failed. • COMPLETE: Indicates that the node has run successfully.

Table 8-17 (Cont.) ODMR_USER_WF_TEST_RESULTS Repository Views

Column	Data Type	Description
MODEL_ID	NUMBER	This is the ID of the model.
MODEL_NAME	VARCHAR2 (30 CHAR)	This is the name of the model.
MODEL_STATUS	VARCHAR2 (10 CHAR)	• WARNING: Indicates that the model has run, but with warning. • READY: Indicates that the model is ready to be run. • FAILURE: Indicates that the model run has failed. • COMPLETE: Indicates that the model run has completed successfully.
MODEL_CREATION_DATE	VARCHAR2 (30 CHAR)	This is the creation date of the model.
TEST_METRICS	VARCHAR2 (128 CHAR)	This is the test metrics result table that contains Predictive Confidence, Root Mean Square error and so on.
CONFUSION_MATRIX	VARCHAR2 (128 CHAR)	This is the test Confusion Matrix result table.
LIFTS	DM_NESTED_CATEGORICALS	Table of DM_NESTED_CATEGORICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains lift result table
ROCS	DM_NESTED_CATEGORICALS	Table of DM_NESTED_CATEGORICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains ROC result table
ROC_AREA	DM_NESTED_NUMERICALS	Table of DM_NESTED_NUMERICAL, where: • ATTRIBUTE_NAME contains target class • VALUE contains ROC area under curve value

Table 8-17 (Cont.) ODMR_USER_WF_TEST_RESULTS Repository Views

Column	Data Type	Description
RESIDUAL_PLOT	VARCHAR2 (128 CHAR)	This is the test Residual Plot table.

PL/SQL APIs Use Cases

The PL/SQL API use cases demonstrate how to run the PL/SQL APIs to schedule and run a Build workflow and an Apply workflow.

The use cases are:

Premise of the PL/SQL Use Cases
The PL/SQL API use case is built on two predefined workflows, which are available in the SQL Developer installation location.

Use case to Schedule and Run Apply Workflows
This use case demonstrates how to run a lineage of the APPLY workflow, which is scheduled to run the `WF_RUN_API.`

Use Case to Schedule and Run a Build Workflow
This use case demonstrates how to run the `WF_RUN_API` in a lineage of a workflow, poll the status and print node failure from the event log.

Premise of the PL/SQL Use Cases

The PL/SQL API use case is built on two predefined workflows, which are available in the SQL Developer installation location.

Predefined Workflows

The two predefined workflow files are:

- `apply_workflow.xml`: Uses the Model node to reference the model built by the build_workflow. Then it uses it for scoring.
- `build_workflow.xml`: Builds a Server Vector Machine Classification model, and then stores the model details or coefficients to a table.

Location of the Demonstration Files

The workflow files `apply_workflow.xml` and `build_workflow.xml` which contain the predefined workflows are available in the SQL Developer installation location at: *`sqldeveloper home`*`\dataminer\demos\workflows.`

Use case to Schedule and Run Apply Workflows

This use case demonstrates how to run a lineage of the APPLY workflow, which is scheduled to run the `WF_RUN_API.`

To run the lineage, specify the INSUR_CUST_LTV_SAMPLE APPLY node and use the RERUN_NODE_CHILDREN run mode. The use case, as demonstrated in the example, does the following:

- Schedules the APPLY workflow to run daily from mid night of 12/31/2014 to 12/31/2015 in EST zone

- Executes the `WF_RUN API`
- Polls the status of the workflow from the `ODMR_USER_PROJECT_WORKFLOW` view
- Prints the failed nodes

Example 8-1 Schedule and Run the Apply Workflow, Poll Status and Print Node Failures

```
CONNECT DMUSER/DMUSER
SET SERVEROUTPUT ON
DECLARE
    v_jobId VARCHAR2(30) := NULL;
    v_status VARCHAR2(30) := NULL;
    v_projectName VARCHAR2(30) := 'Project';
    v_workflow_name VARCHAR2(30) := 'apply_workflow';
    v_node VARCHAR2(30) := 'INSUR_CUST_LTV_SAMPLE APPLY';
    v_run_mode VARCHAR2(30) := ODMRSYS.ODMR_WORKFLOW.RERUN_NODE_CHILDREN;
    v_failure NUMBER := 0;
    v_nodes ODMRSYS.ODMR_OBJECT_NAMES := ODMRSYS.ODMR_OBJECT_NAMES();
BEGIN
    v_nodes.extend();
    v_nodes(v_nodes.count) := v_node;
    v_jobId := ODMRSYS.ODMR_WORKFLOW.WF_RUN(p_project_name => v_projectName,
                       p_workflow_name => v_workflow_name,
                       p_node_names => v_nodes,
                       p_run_mode => v_run_mode,
                       p_start_date => '31-DEC-14 12.00.00 AM AMERICA/NEW_YORK',
                       p_repeat_interval => 'FREQ= DAILY',
                       p_end_date => '31-DEC-15 12.00.00 AM AMERICA/NEW_YORK'));
    DBMS_OUTPUT.PUT_LINE('Job: '||v_jobId);
    -- wait for workflow to run to completion
    LOOP
      SELECT STATUS INTO v_status FROM ODMR_USER_PROJECT_WORKFLOW
      WHERE WORKFLOW_NAME = v_workflow_name;
      IF (v_status IN ('SCHEDULED', 'ACTIVE')) THEN
         DBMS_LOCK.SLEEP(10); -- wait for 10 secs
      ELSE
        EXIT; -- workflow run completes
      END IF;
    END LOOP;
    -- print all failed nodes (see example above)
  EXCEPTION WHEN OTHERS THEN
     DBMS_OUTPUT.PUT_LINE('Error: '||SUBSTR(DBMS_UTILITY.FORMAT_ERROR_STACK(), 1,
4000));
END;
```

Querying Scoring Result
: You can query the scoring result after the workflow run completes successfully.

Related Topics:

WF_RUN
: You can execute the WF_RUN function using different parameter combinations:

Premise of the PL/SQL Use Cases
: The PL/SQL API use case is built on two predefined workflows, which are available in the SQL Developer installation location.

Querying Scoring Result

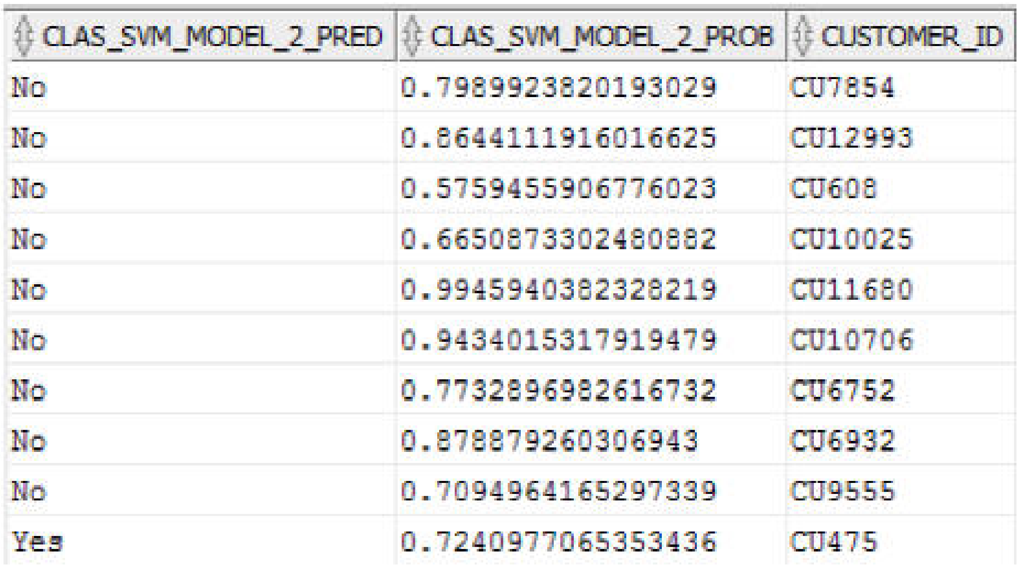
You can query the scoring result after the workflow run completes successfully.

To query the scoring results:

```
SELECT * FROM SCORED_CUSTOMERS_TBL
```

The output of the query is displayed in a table, as shown in Figure 8-1.

Figure 8-1 Query Output for Scoring Results



CLAS_SVM_MODEL_2_PRED	CLAS_SVM_MODEL_2_PROB	CUSTOMER_ID
No	0.7989923820193029	CU7854
No	0.864411916016625	CU12993
No	0.5759455906776023	CU608
No	0.6650873302480882	CU10025
No	0.9945940382328219	CU11680
No	0.9434015317919479	CU10706
No	0.7732896982616732	CU6752
No	0.87887926030694З	CU6932
No	0.7094964165297339	CU9555
Yes	0.7240977065353436	CU475

Use Case to Schedule and Run a Build Workflow

This use case demonstrates how to run the `WF_RUN_API` in a lineage of a workflow, poll the status and print node failure from the event log.

You can run the `WF_RUN_API` in a lineage of a workflow, using the run modes `RERUN_NODE_ONLY` or `RERUN_NODE_PARENTS.`

The methods to run the `WF_RUN_API` using the two run modes generate the same result, where all the four nodes in the lineage are run. The methods are:

- Select all nodes in the lineage and use the `RERUN_NODE_ONLY` run mode.
- Select the `MODEL_COEFFICIENTS` node and use the `RERUN_NODE_PARENTS` run mode.

The use case, as demonstrated in the example, does the following:

- Schedules the workflow to run monthly on the last day of the month (BYMONTHDAY=-1) starting at mid night from 12/31/2014 to 12/31/2015 in EST zone.
- Executes the WF_RUN API. In this use case, the API WF_RUN with Project Name, Workflow Name Node Name and Time Interval schedules the workflow to run.
- Polls the status of the workflow from the ODMR_USER_PROJECT_WORKFLOW view to determine whether the workflow run is complete.

- Prints out any node failure from the event log along with error message.

Example 8-2 Schedule and Run a Workflow, Poll Status and Print Node Failures

```
CONNECT DMUSER/DMUSER
SET SERVEROUTPUT ON
DECLARE
   v_jobId VARCHAR2(30) := NULL;
   v_status VARCHAR2(30) := NULL;
   v_projectName VARCHAR2(30) := 'Project';
   v_workflow_name VARCHAR2(30) := 'build_workflow';
   v_node VARCHAR2(30) := 'MODEL_COEFFCIENTS';
   v_run_mode VARCHAR2(30) := ODMRSYS.ODMR_WORKFLOW.RERUN_NODE_PARENTS;
   v_failure NUMBER := 0;
   v_nodes ODMRSYS.ODMR_OBJECT_NAMES := ODMRSYS.ODMR_OBJECT_NAMES();
BEGIN
   v_nodes.extend();
   v_nodes(v_nodes.count) := v_node;
   v_jobId := ODMRSYS.ODMR_WORKFLOW.WF_RUN(p_project_name => v_projectName,
           p_workflow_name => v_workflow_name,
           p_node_names => v_nodes,
           p_run_mode => v_run_mode,
           p_start_date => '31-DEC-14 12.00.00 AM AMERICA/NEW_YORK',
           p_repeat_interval => 'FREQ=MONTHLY;BYMONTHDAY=-1',
           p_end_date => '31-DEC-15 12.00.00 AM AMERICA/NEW_YORK');
   DBMS_OUTPUT.PUT_LINE('Job: '||v_jobId);
   -- wait for workflow to run to completion
LOOP
   SELECT STATUS INTO v_status FROM ODMR_USER_PROJECT_WORKFLOW
   WHERE WORKFLOW_NAME = v_workflow_name;
   IF (v_status IN ('SCHEDULED', 'ACTIVE')) THEN
      DBMS_LOCK.SLEEP(10); -- wait for 10 secs
   ELSE
      EXIT; -- workflow run completes
   END IF;
END LOOP;
-- print all failed nodes from the event log
FOR wf_log IN (
   SELECT node_id, node_name, subnode_id, subnode_name, log_message, log_message_
details
   FROM ODMR_USER_WORKFLOW_LOG
   WHERE job_name=v_jobId and log_type='ERR' and log_message IS NOT NULL)
LOOP
   DBMS_OUTPUT.PUT_LINE('Node Id: '||wf_log.node_id||', '||'Node Name: '||
wf_log.node_name);
   IF (wf_log.subnode_id IS NOT NULL) THEN
      DBMS_OUTPUT.PUT_LINE(
         'Subnode Id: '||wf_log.subnode_id||', '||'Subnode Name: '||
wf_log.subnode_name);
   END IF;
   DBMS_OUTPUT.PUT_LINE('Message: '||wf_log.log_message);
   v_failure := v_failure + 1;
 END LOOP;
IF (v_failure = 0) THEN
   DBMS_OUTPUT.PUT_LINE('Workflow Status: SUCCEEDED');
 ELSE
   DBMS_OUTPUT.PUT_LINE('Workflow Status: FAILURE');
 END IF;
EXCEPTION WHEN OTHERS THEN
   DBMS_OUTPUT.PUT_LINE('Error: '||SUBSTR(DBMS_UTILITY.FORMAT_ERROR_STACK(), 1,
4000));
END;
```

Querying the MODEL_COEFFICIENT Table
: You can fetch data from the MODEL_COEFFICIENTS table by running a query.

Querying Named Objects
: After the workflow run completes successfully, you can query all named objects generated by the workflow, such as table or view in the Create Table node, models in the Build nodes, and so on.

Querying Test Results
: You can query test results for Confusion Matrix and Test Metrics from `ODMR_USER_WF_CLAS_TEST_RESULTS` and `ODMR_USER_WF_REGR_TEST_RESULTS` repository views.

Related Topics:

WF_RUN
: You can execute the WF_RUN function using different parameter combinations:

Querying the MODEL_COEFFICIENT Table

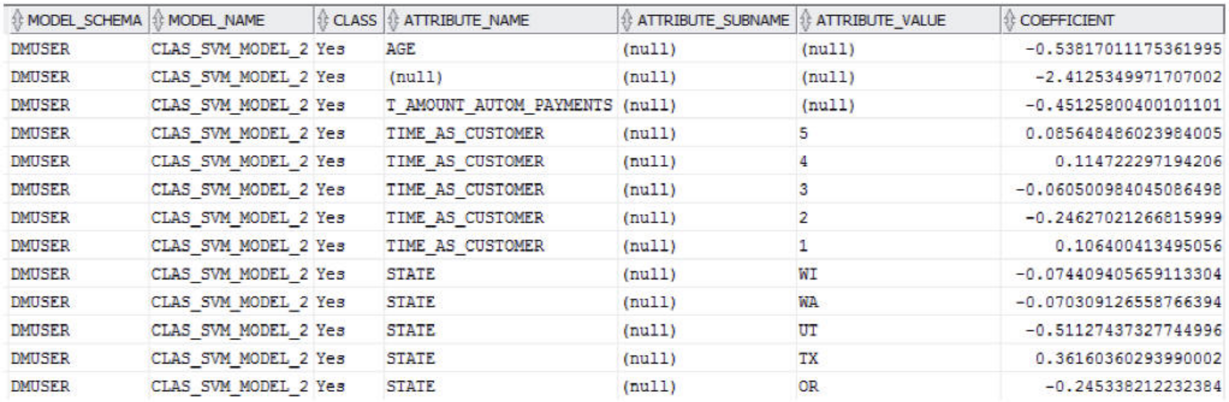
You can fetch data from the MODEL_COEFFICIENTS table by running a query.

To query data from the MODEL_COEFFICIENTS table, run the following query:

```
SELECT * FROM MODEL_COEFFCIENTS
```

The output of this query is displayed in a table, as shown in Figure 8-2.

Figure 8-2 Query Output for MODEL_COEFFICIENT Table



MODEL_SCHEMA	MODEL_NAME	CLASS	ATTRIBUTE_NAME	ATTRIBUTE_SUBNAME	ATTRIBUTE_VALUE	COEFFICIENT
DMUSER	CLAS_SVM_MODEL_2	Yes	AGE	(null)	(null)	-0.53817011175361995
DMUSER	CLAS_SVM_MODEL_2	Yes	(null)	(null)	(null)	-2.4125349971707002
DMUSER	CLAS_SVM_MODEL_2	Yes	T_AMOUNT_AUTOM_PAYMENTS	(null)	(null)	-0.45125800400101101
DMUSER	CLAS_SVM_MODEL_2	Yes	TIME_AS_CUSTOMER	(null)	5	0.085648486023984005
DMUSER	CLAS_SVM_MODEL_2	Yes	TIME_AS_CUSTOMER	(null)	4	0.114722297194206
DMUSER	CLAS_SVM_MODEL_2	Yes	TIME_AS_CUSTOMER	(null)	3	-0.060500984045086498
DMUSER	CLAS_SVM_MODEL_2	Yes	TIME_AS_CUSTOMER	(null)	2	-0.24627021266815999
DMUSER	CLAS_SVM_MODEL_2	Yes	TIME_AS_CUSTOMER	(null)	1	0.106400413495056
DMUSER	CLAS_SVM_MODEL_2	Yes	STATE	(null)	WI	-0.074409405659113304
DMUSER	CLAS_SVM_MODEL_2	Yes	STATE	(null)	WA	-0.070309126558766394
DMUSER	CLAS_SVM_MODEL_2	Yes	STATE	(null)	UT	-0.51127437327744996
DMUSER	CLAS_SVM_MODEL_2	Yes	STATE	(null)	TX	0.36160360293990002
DMUSER	CLAS_SVM_MODEL_2	Yes	STATE	(null)	OR	-0.245338212232384

Querying Named Objects

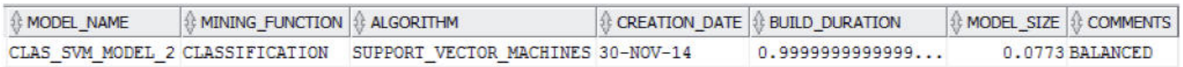
After the workflow run completes successfully, you can query all named objects generated by the workflow, such as table or view in the Create Table node, models in the Build nodes, and so on.

The following query returns the model CLAS_SVM_MODEL_2 information.

```
SELECT * FROM USER_MINING_MODELS WHERE MODEL_NAME = 'CLAS_SVM_MODEL_2
```

The query result is displayed in Figure 8-3.

Figure 8-3 Query Output for Named Objects



MODEL_NAME	MINING_FUNCTION	ALGORITHM	CREATION_DATE	BUILD_DURATION	MODEL_SIZE	COMMENTS
CLAS_SVM_MODEL_2	CLASSIFICATION	SUPPORT_VECTOR_MACHINES	30-NOV-14	0.9999999999999...	0.0773	BALANCED

Querying Test Results

You can query test results for Confusion Matrix and Test Metrics from `ODMR_USER_WF_CLAS_TEST_RESULTS` and `ODMR_USER_WF_REGR_TEST_RESULTS` repository views.

You can query the test results from:

- ODMR_USER_WF_CLAS_TEST_RESULTS Repository View
- ODMR_USER_WF_REGR_TEST_RESULTS Repository View

This section contains examples to query the following:

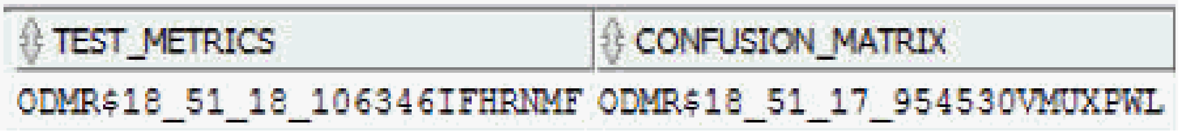
- Query Test Metrics and Confusion Matrix results: Example 8-3
- Query Test Metrics: Example 8-4
- Query Confusion Matrix: Example 8-5
- Query Lift Table results: Example 8-6

Example 8-3 Querying Test Metrics and Confusion Matrix Results

```
SELECT TEST_METRICS, CONFUSION_MATRIX FROM ODMR_USER_WF_CLAS_TEST_RESULTS WHERE
WORKFLOW_NAME = 'build_workflow' AND NODE_NAME = 'Class Build'
```

The output of this query is shown in the figure below. The query fetches the Test Metrics and Confusion Matrix from the `ODMR_USER_WF_CLAS_TEST_RESULTS.`

Figure 8-4 Query Output for Test Metrics and Confusion Matrix



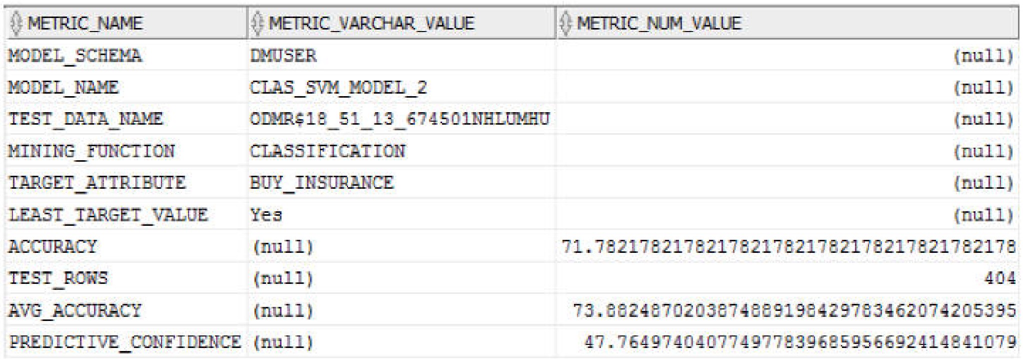
TEST_METRICS	CONFUSION_MATRIX
ODMR$18_51_18_106346IFHRNMF	ODMR$18_51_17_954530VMUXPWL

Example 8-4 Querying TEST_METRICS

```
SELECT * FROM ODMR$18_51_18_106346IFHRNMF
```

The output of this query is shown in the screenshot below. It queries the Test Metrics ODMR$18_51_18_106346IFHRNMF. It fetches the Metric name, the metric VARCHAR value and the metric NUM value.

Figure 8-5 Query Output for TEST METRICS



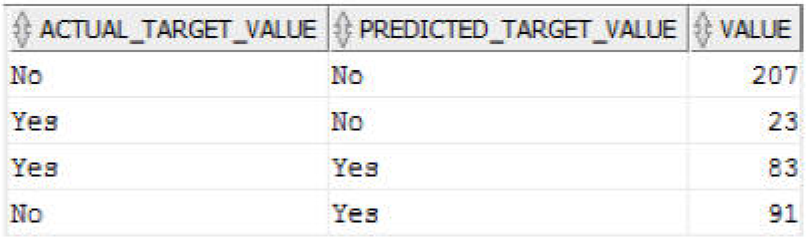
METRIC_NAME	METRIC_VARCHAR_VALUE	METRIC_NUM_VALUE
MODEL_SCHEMA	DMUSER	(null)
MODEL_NAME	CLAS_SVM_MODEL_2	(null)
TEST_DATA_NAME	ODMR$18_51_13_674501NHLUMHU	(null)
MINING_FUNCTION	CLASSIFICATION	(null)
TARGET_ATTRIBUTE	BUY_INSURANCE	(null)
LEAST_TARGET_VALUE	Yes	(null)
ACCURACY	(null)	71.782178217821782178217821782178217821782178
TEST_ROWS	(null)	404
AVG_ACCURACY	(null)	73.8824870203874889198429783462074205395
PREDICTIVE_CONFIDENCE	(null)	47.764974040774977839685956692414841079

Example 8-5 Querying CONFUSION_MATRIX

```
SELECT * FROM ODMR$18_51_17_954530VMUXPWL
```

The output of this query is shown in the screenshot below. It queries the Confusion Matrix ODMR$18_51_17_954530VMUXPWL. It fetches the actual target name, and the predicted target value.

Figure 8-6 Query Output for CONFUSION_MATRIX



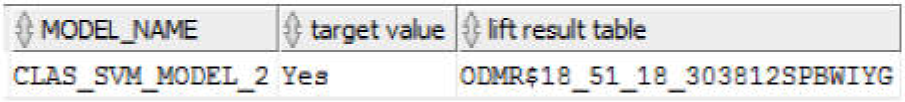
ACTUAL_TARGET_VALUE	PREDICTED_TARGET_VALUE	VALUE
No	No	207
Yes	No	23
Yes	Yes	83
No	Yes	91

Example 8-6 Querying Lift Result Table from CLAS_SVM_MODEL_2

```
SELECT
MODEL_NAME, a.ATTRIBUTE_NAME "target value", a.VALUE "lift result table"
FROM
ODMR_USER_WF_CLAS_TEST_RESULTS, TABLE(LIFTS) a
WHERE
WORKFLOW_NAME = 'build_workflow' AND NODE_NAME = 'Class Build' AND
ATTRIBUTE_NAME='Yes'
```

The output of this query is shown in the screenshot below. It queries the Lift Result table from the CLAS_SVM_MODEL_2.

Figure 8-7 Query Output for Lift Result Table from CLAS_SVM_MODEL_2



MODEL_NAME	target value	lift result table
CLAS_SVM_MODEL_2	Yes	ODMR$18_51_18_303812SPBWIYG

A

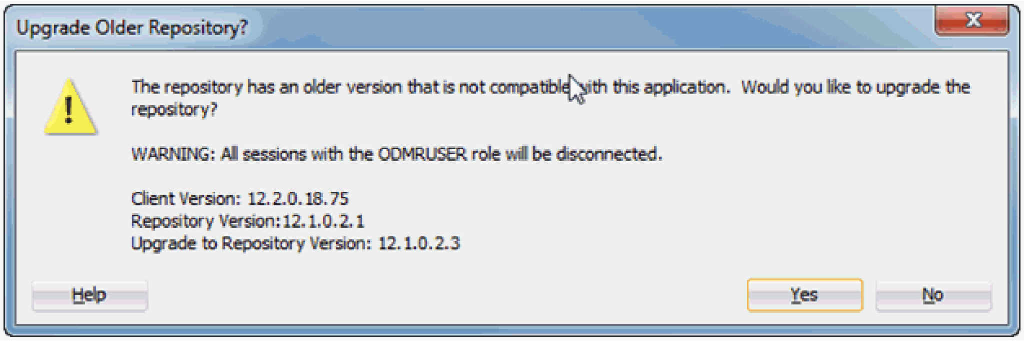
Oracle Data Miner Releases

The Oracle Data Miner client must be compatible with the Oracle Data Miner repository in Oracle Database.

When the versions are incompatible, Oracle Data Miner displays an error message that provides information to assist you in upgrading either the client or the repository.

For example, if a newer client attempts to connect to an older repository, then the error shown in Figure A-1 is displayed.

Figure A-1 Older Oracle Data Miner Repository Error



Upgrade Older Repository?

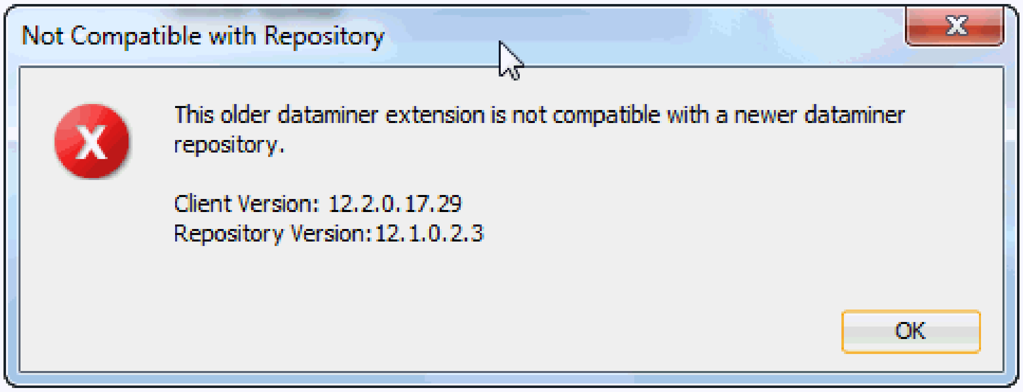
The repository has an older version that is not compatible with this application. Would you like to upgrade the repository?

WARNING: All sessions with the ODMRUSER role will be disconnected.

Client Version: 12.2.0.18.75
Repository Version:12.1.0.2.1
Upgrade to Repository Version: 12.1.0.2.3

If an older client attempts to connect to a new repository, then the error shown in Figure A-2 is displayed.

Figure A-2 Newer Oracle Data Miner Repository Error



Not Compatible with Repository

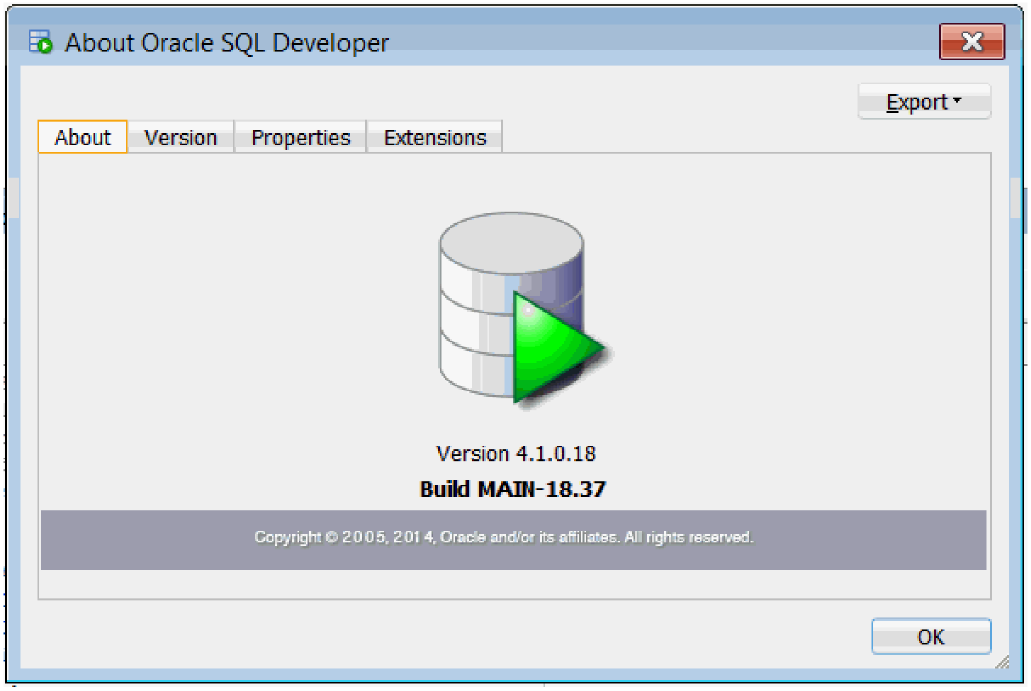
This older dataminer extension is not compatible with a newer dataminer repository.

Client Version: 12.2.0.17.29
Repository Version:12.1.0.2.3

When you evaluate how to address the errors shown in Figure A-1 and Figure A-2, you must take several version numbers into account. The version number combinations that are supported in each release are listed in Table A-1. The version numbers shown in the columns of the table are described as follows:

- **SQL Developer** — This is the information that is displayed when you select the SQL Developer Help menu, then the **About** tab.

Figure A-3 About Oracle SQL Developer



Version 4.1.0.18

Build MAIN-18.37

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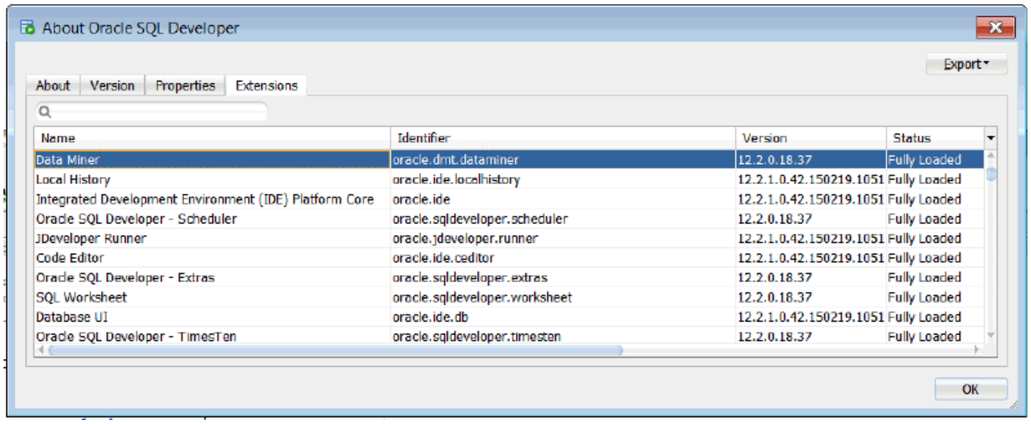
- **Oracle Data Miner Extension** — This is the Oracle Data Miner version that is displayed when you select the SQL Developer Help menu, then the **Extensions** tab.

Figure A-4 About Oracle SQL Developer — Extensions tab



Name	Identifier	Version	Status
Data Miner	oracle.dmt.dataminer	12.2.0.18.37	Fully Loaded
Local History	oracle.ide.localhistory	12.2.1.0.42.150219.1051	Fully Loaded
Integrated Development Environment (IDE) Platform Core	oracle.ide	12.2.1.0.42.150219.1051	Fully Loaded
Oracle SQL Developer - Scheduler	oracle.sqldeveloper.scheduler	12.2.0.18.37	Fully Loaded
JDeveloper Runner	oracle.jdeveloper.runner	12.2.1.0.42.150219.1051	Fully Loaded
Code Editor	oracle.ide.ceditor	12.2.1.0.42.150219.1051	Fully Loaded
Oracle SQL Developer - Extras	oracle.sqldeveloper.extras	12.2.0.18.37	Fully Loaded
SQL Worksheet	oracle.sqldeveloper.worksheet	12.2.0.18.37	Fully Loaded
Database UI	oracle.ide.db	12.2.1.0.42.150219.1051	Fully Loaded
Oracle SQL Developer - TimesTen	oracle.sqldeveloper.timesten	12.2.0.18.37	Fully Loaded

- **Oracle Data Miner Repository Version** — You can find the repository version by running the query shown in Determining the Status and Version of the Repository.

- **Oracle Data Miner XML Schema Version** — This is the version of the XML schema used by the Oracle Data Miner workflows in the repository. This number is shown when you export or import workflows.

Note:

The **Oracle SQL Developer** version and the **Oracle Data Miner Extension** version uniquely identify the client. The **Oracle Data Miner Repository Version** uniquely identifies the repository.

Table A-1 SQL Developer Oracle Data Miner Extension and Oracle Data Miner Repository Compatibility

SQL Developer	Data Miner Extension	Data Miner Repository Version	Data Miner XML Schema Version	Release Type (Full or Path)	Limitations
SQL Developer 3.0 EA4 3.0.03 Build MAIN-03.97	11.2.0.1.9.96	11.2.0.1.9	11.2.0.1.9	EA4 (only EA release to include Data Miner)	Does not work on 11.2.0.3 and later
SQL Developer 3.0 RTM 3.0.04 Build MAIN-04.34	11.2.0.1.10.109	11.2.0.1.10	11.2.0.1.9	RTM (released 03/30/11)	Does not work on 11.2.0.3 or later
SQL Developer 3.0	11.2.0.2.04.38	11.2.0.1.12	112.0.1.9	Patch (Dev internal only)	Does not work on 11.2.0.3 or later
SQL Developer 3.0	11.2.0.2.04.39	11.2.0.1.13	11.2.0.1.9	Patch (internal)	Does not work on 11.2.0.3 or later
SQL Developer 3.0	11.2.0.2.04.40	11.2.0.1.13	11.2.0.1.9	Patch (external) link to patch	Does not work on 11.2.0.3 or later
SQL Developer 3.1 EA1	11.2.1.1.xx.xx	11.2.1.1.1	11.2.1.1.1	EA1 candidate (not released)	None
SQL Developer 3.1 EA1 3.1.05 Build MAIN-05.97	11.2.1.1.05.97	11.2.1.1.2	11.2.1.1.1	EA1 (released 10/10/11)	None
SQL Developer 3.1	11.2.1.1.06.44	11.2.1.1.3	11.2.1.1.1	EA2 (released 11/15/11)	None
SQL Developer 3.1	11.2.1.06.82	11.2.1.1.4	11.2.1.1.1	EA3 (released 12/21/11)	None
SQL Developer 3.1 RTM 3.1.07 Build MAIN-07.42	11.2.1.1.07.42	11.2.1.1.5	11.2.1.1.1	RTM (released 02/07/12)	None
SQL Developer 3.2 RTM Version 3.2.09 Build MAIN-09-18	11.2.1.1.09.18	11.2.1.1.6	11.2.1.1.1	RTM (released 08/20/12)	None

Table A-1 (Cont.) SQL Developer Oracle Data Miner Extension and Oracle Data Miner Repository Compatibility

SQL Developer	Data Miner Extension	Data Miner Repository Version	Data Miner XML Schema Version	Release Type (Full or Path)	Limitations
SQL Developer 3.2.1 RTM Version 3.2.10.09 Build MAIN-09-57	11.2.1.1.09.57	11.2.1.1.6	11.2.1.1.1	RTM (released 09/24/12). For Data Miner, there no were changes made between 3.2 and 3.2.1.	None
SQL Developer 3.2.2 RTM Version 3.2.20.09 Build MAIN-09.87	11.2.1.1.09.87	11.2.1.6	11.2.1.1.1	RTM (released 11/01/12). For Data Miner, there were no changes made between 3.2 and 3.2.2.	None
SQL Developer 4.0 EA1 (was 3.3) Version 4.0.0.12 Build MAIN-12.27	11.2.2.1.12.27	11.2.2.1.1	11.2.2.1.1	EA1 (released 07/11/13)	None
SQL Developer 4.0 EA2 Version 4.0.0.12 Build MAIN-12.84	12.2.0.12.84	12.1.0.1.1	12.1.0.1.1	EA2 (released 09/13/13)	None
SQL Developer 4.0 EA3 Version 4.0.0.13 Build MAIN-13.30	12.2.0.13.30	12.1.0.1.2	12.1.0.1.2	EA3 (released 11/05/13)	Migration from prior versions is broken. Workaround documented in OTN posting.
SQL Developer 4.0 RTM Version 4.0.0.13 Build MAIN-13.80	12.2.0.13.80	12.1.0.1.3	12.1.0.1.3	RTM (12/12/13)	None
SQL Developer 4.0.1 RTM Version 4.0.1.14 Build MAIN14.48	12.2.0.14.48	12.1.0.1.4	12.1.0.1.4	RTM (02/25/14)	Data Miner fixes and some minor enhancements

Table A-1 (Cont.) SQL Developer Oracle Data Miner Extension and Oracle Data Miner Repository Compatibility

SQL Developer	Data Miner Extension	Data Miner Repository Version	Data Miner XML Schema Version	Release Type (Full or Path)	Limitations
SQL Developer 4.0.2 Version 4.0.2.15.21 Build 15.21	12.2.0.15.21	12.1.0.1.5	12.1.0.1.4	RTM (05/06/14)	Only critical Data Miner fixes were back ported. There was a change to PL/SQL code, so the repository version is changed. The XMLschema was not changed, so the XML workflow version is unchanged. This will allow users to import workflows between 4.0.1 and 4.0.2 with no issues.
SQL Developer 4.0.3 Version 4.0.3.16 Build MAIN-16.84	12.2.0.16.84	12.1.0.1.5	12.1.0.1.4	RTM (09/16/14)	Changes have been made to Data Miner in the 4.0.3 release, but they do not require a server-side change, so the repository and workflow version numbers remain the same.
SQL Developer 4.1 EA1 Version 4.1.0.17 Build MAIN-17.29	12.2.0.17.29	12.1.0.2.1	12.1.0.2.1	EA1 (12/09/14)	None
SQL Developer 4.1 EA2 Version 4.1.0.18 Build MAIN-18.37	12.2.0.18.37	12.1.0.2.2	12.1.0.2.2	EA2 (03/09/15)	None
SQL Developer 4.1 RTM Version 4.1.0.19 Build MAIN-19.07	12.2.0.19.07	12.1.0.2.3	12.1.0.2.3	RTM (05/04/15)	Not allowed to be installed on Oracle Database 12.2.

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