Oracle Utilities Advanced Spatial and Operational Analytics

Administration Guide

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Preface

This guide provides instructions for configuring and administering Oracle Utilities Advanced Spatial and Operational Analytics.

This preface contains these topics:

- **Audience**
- **Related Documents**
- **Conventions**

Audience

This Administration Guide is intended for anyone interested in the process of configuring and administering Oracle Utilities Advanced Spatial and Operational Analytics.

Related Documents

For more information, see these Oracle documents:

- *Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide*

For installation and configuration tasks relating to Oracle Business Intelligence Enterprise Edition, refer to the Oracle Business Intelligence Suite Enterprise Edition documentation.

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.

Convention	Meaning
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Chapter 1

Overview of Oracle Utilities Advanced Spatial and Operational Analytics Administration

Oracle Utilities Advanced Spatial and Operational Analytics is a set of star schemas, ETL programs, and graphic templates that allow you to build a business intelligence solution to meet your organization's analytic requirements. Before you can configure the application, you should form an understanding of the system's design principles. To do this, you should read the following chapters:

- **Chapter 2: Oracle Utilities Advanced Spatial and Operational Analytics Fundamentals.** This chapter describes how data warehousing theory has been implemented in Oracle Utilities Advanced Spatial Analytics.
- **Chapter 3: Extract, Transform, and Load Processes (ETL).** This chapter describes the extract-transform-load (ETL) methodology used to populate the data warehouse.

After you have finished reviewing these chapters, you will be able to compile the metadata necessary to configure your system. Once you've added this metadata, you'll be ready to extract the data from your system and load your data warehouse with historical data. You can the view this historical data using the standard dashboards provided with the product.

Chapter 2

Oracle Utilities Advanced Spatial and Operational Analytics Fundamentals

This section describes fundamental Oracle Utilities Advanced Spatial and Operational Analytics concepts such as data warehousing theory, and explains how they have been implemented in Oracle Utilities Business Intelligence. After understanding the concepts in this section, refer to the *Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide* for a recommended approach to designing and setting up Oracle Utilities Advanced Spatial and Operational Analytics.

This section includes the following topics:

- **The Data Warehouse**
- **Star Schemas**
- **Extraction, Transformation, and Loading (ETL)**

The Data Warehouse

The Oracle Utilities Business Intelligence data warehouse is a separate database from your operational database. The data warehouse is organized into a variety of star schemas that contain data extracted from applications. The following points describe the main features of the data warehouse:

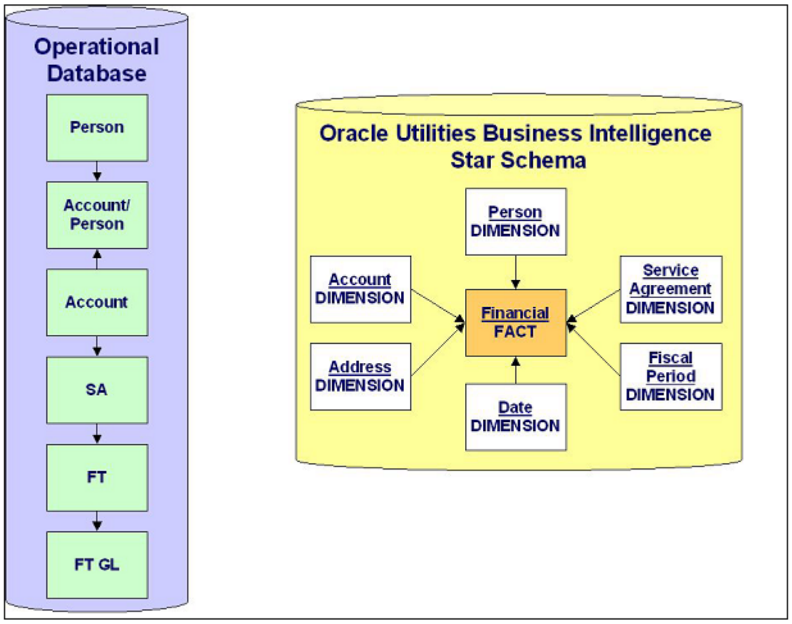
- Data structures are easily accessible by end users for their reporting needs.
- Large volumes of data can be retrieved quickly. This allows for the fast rendering of the graphics that show key performance indicators (KPIs).

You can add additional star schemas. Oracle Utilities Business Intelligence includes star schemas and graphics suited to data from various Oracle Utilities applications. But you can use the development tools to add additional star schemas and graphics.

Star Schemas

All data that is extracted from your production system and transferred to the data warehouse is held in star schemas. The term “star schema” refers to the shape of the tables that hold a given type of factual data from your production system.

Consider the following entity relationship diagrams (ERDs). The first shows the relational tables holding financial information in an operational database. The second shows the star schema that holds the equivalent data in a data warehouse.



The tables in a star schema are divided into two categories: facts and dimensions. Every star schema has a single fact table at the center of the star and one or more dimensions.

- **Fact tables** contain individual rows for every occurrence of a fact in the production system. Fact tables contain columns called measures. These columns that are aggregated to calculate key performance indicators (KPIs).
- **Dimension tables** are used to “slice” the facts in different ways. For example, the star schema above would allow users to slice the financial fact by the attributes on the 6 dimensions linked to it.

Some people refer to star schemas as “data cubes” due to their multi-dimensional nature. But cubes imply there are only three dimensions and most star schemas support many more than three dimensions. The picture above implies that the Financial fact has six dimensions. In reality it has more.

In the diagrams, notice that the operational data structure has very “deep” relations (it has many levels of one-to-many relationships). Contrast this to the depth of a star schema, which is only one-level deep. This is no accident. Star schemas are meant to be simple in structure to allow simple access paths.

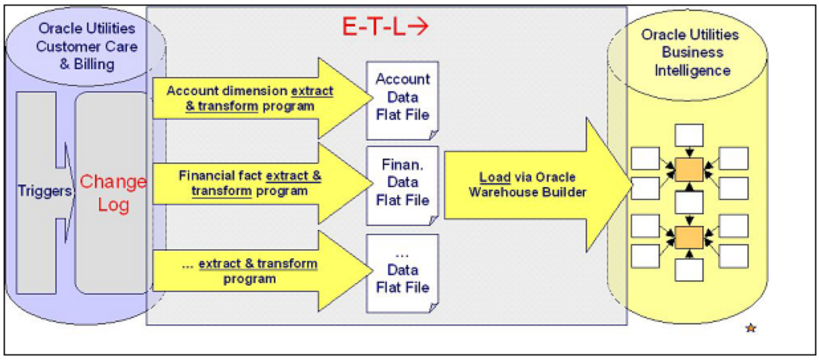
A separate star schema is maintained for every fact held in a data warehouse. A fact is a record of an event that occurs in your operational system. For example, one fact might exist to record every bill and payment, whereas a different fact might exist to record every purchase order.

Extraction, Transformation, and Loading (ETL)

The star schemas in a data warehouse are populated by a series of programs that do the following:

- Extract data from one or more operational system source systems
- Transform the data to suit the data warehouse
- Load the data into the warehouse’s star schemas

Collectively, these programs are referred to by the acronym ETL. ETL programs are supplied for every fact and dimension in Oracle Utilities Business Intelligence. The following diagram provides an overview of these programs and how they are executed:


Oracle Utilities Customer Care & Billing
Triggers
Change Log
E-T-L→
Account dimension extract & transform program
Financial fact extract & transform program
... extract & transform program
Account Data Flat File
Finan. Data Flat File
... Data Flat File
Load via Oracle Warehouse Builder
Oracle Utilities Business Intelligence

Extract Programs

The extract programs execute in the operational database as they are extracting operational data. Oracle Utilities Business Intelligence (OUBI) uses flat files as the only source to load data into the data warehouse. The flat files are generated through an extraction process in the edge applications. Every fact and dimension in the data warehouse schema has a corresponding extract batch process. These batch processes extract data from the source system and transfer it to flat files. Along with each data flat file containing the extracted data, a single-record control file containing the batch information about the extractor program is also generated. The data and the control flat files, in turn, are loaded into the Oracle Utilities Business Intelligence data warehouse.

Transform Programs

Since extract programs perform some transformation activities, while the load programs perform others, there are no programs dedicated to the transformation effort.

Load Programs

The flat files produced by the extract programs serve as input to the load programs. The load programs use this data to populate the star schemas in the data warehouse.

While any data warehouse product can be used to build the star schemas, Oracle Utilities Business Intelligence uses Oracle Warehouse Builder to perform this task. Oracle Utilities Business Intelligence is supplied with all of the metadata necessary to transform the extracted data and load the data warehouse. See Oracle Warehouse Builder for more information.

Materialized Views

Fact tables typically contain many rows. In order for the queries to perform efficiently, the facts must be summarized.

While OLAP (online analytic processing) servers are designed to perform this task, you can also use “materialized views” to hold your summarized analytic data. Materialized views are SQL statements whose results are saved on the database. Whenever the database receives an SQL statement that is the same, or similar, to a materialized view, it retrieves the data from the materialized view rather than by performing the joins against the base tables. If you do not create materialized views to summarize your analytic data, the database must summarize the facts on the fly, and this may have an adverse impact on performance. In other words, materialized views allow your end users to have good response times.

Standard materialized views are provided in the Oracle Warehouse Builder metadata, and refresh process flows are provided that can be used to update materialized views after data is loaded into a fact table.

The amount of time it takes to create materialized views depends on the number of rows in your facts. However, the benefit can be large because whenever users need to access this data, the summarization of large volumes of data is unnecessary, so response times will be faster.

Note that materialized views only have to be generated after the data in the warehouse has changed, as when new operational data has been loaded through ETL. The existing process flows refresh the materialized view in incremental mode, so only new data will be added to the materialized views after a load.

If the associated materialized views do not get rebuilt after loading the data warehouse with new facts data, the associated materialized views will become stale. The database will not use stale views and will have no choice but to summarize the facts on the fly if a query is received that requires this data. As a result, response times will be slower.

Chapter 3

Extract, Transform, and Load Processes (ETL)

This section describes the Extract, Transform, and Load process used in Oracle Utilities business intelligence including the following topics:

- **Data Extraction and Transformation**
- **Oracle Warehouse Builder**
- **Running and Monitoring Extract Loads**
- **Materialized Views**
- **Parallelism and Partitioning**
- **Purging Audit Records**

Data Extraction and Transformation

Data is extracted from the edge applications and transformed in the format required by BI. Data Extraction consists of set of two operations:

Identifying the data that has to be extracted

Program to extract and transform the identified data

There are different mechanism used in Oracle Utilities Business Intelligence to identify the changed data and are extracted into flat files. This section describes how the changed data is identified and extracted by different edge applications including the following topics:

- **Data Extraction in CCB and WAM**
- **Data Extraction in NMS**
- **Data Extraction in MDM and MWM**

Data Extraction in CCB and WAM

This section describes the data extraction methods used for Oracle Utilities Customer Care and Billing and Oracle Utilities Work and Asset Management.

Change Detect Mechanism

Every production database table used to populate the data-warehouse must be monitored for changes so that these changes can be reflected in the data-warehouse. Triggers insert a row into the Change Log when the source tables change. The topics in this section describe the Change Log and the triggers that populate it. This is only applicable to Oracle Utilities Customer Care and Billing and Oracle Utilities Work and Asset Management.

Fields on the Change Log

Because the sole job of triggers is to populate the change log, understanding the fields of the change log table is essential to understanding the triggers. The following primary fields are on the change log:

- **Change Log ID:** This is a random prime key of the change log and is generated by the trigger.
- **Batch Code:** This is the code for the extract process that will process this change.
- **Batch Number:** This is the current run number for the extract process.
- **Change Date and Time:** The date and time of the change.
- **Change Type:** This indicates if a row in the table was inserted, updated, or deleted.
- **Table Name:** The name of the table that was changed.
- **Prime Key 1 – 5:** The prime key of the object that was affected. The change log accommodates prime keys with up to five parts. The prime key stored on the change log is not the prime key of the record that was changed but the prime key of the object. For example, if the phone number of a person was changed, these prime key fields would contain the prime key of the person object, not the prime key of the phone number record. When any field on an object is changed, the entire object must be re-extracted.

Typical Structure of Triggers

Because all triggers populate the change log, they are similar in the following ways:

- They determine if a row needs to be inserted into the change log Not all table changes need to be reflected in the data warehouse, and so, not all changes need to be noted in the change log. For example, if an unfrozen financial transaction is created, a change log record does not need to be inserted if the data warehouse only tracks frozen financial transactions.
- They generate a prime key for the change log.
- They know the codes for the appropriate extract processes that will handle the table change.
- They retrieve the current run numbers for the extract processes.
- They determine the prime key of the main object.

Rows In the Change Log

A record in the change log is processed by only one extract process. If multiple extract processes are needed to handle a single change in a source table (for example, if a new object requires the addition of multiple facts or dimensions) then multiple rows must be inserted into the change log. This can be accomplished with one trigger inserting multiple rows into the change log or with multiple triggers on the same table, each trigger inserting one row.

Extracting and Transforming Data

Both CCB and WAM use batch controls with an underlying extract program to generate the flat files based on the change log tables populated by the triggers.

Two Modes of Execution

Most extract programs support two modes of execution (you control the mode by a parameter supplied to the extract process):

Extract everything mode or Initial Extract.. This mode extracts every row on the operational table. You would use this mode to instantiate the data-warehouse. For example, if you run the extract accounts program in "extract everything mode", every account will be extracted.

Extract recent changes mode or Incremental Extract. This mode only extracts data that was added or changed since the last time the extract was executed. For example, if you run the extract accounts program in "extract recent changes mode", every account that was added or changed since the last execution will be extracted.

Basic Parameters Supplied To Extract Processes

All extract processes are submitted in their source system (e.g., programs that extract data from Oracle Utilities Customer Care & Billing are submitted in Oracle Utilities Customer Care & Billing). The following points describe the hard parameters that are supplied to these processes for Oracle Utilities Customer Care and Billing.

- **Batch code.** Batch code is the unique identifier of the extract process. The batch code for each extract process is identified in the description of the various facts and dimensions. Refer to the appropriate fact and dimension chapter for the details in Oracle Utilities Data Mapping Guides
- **Batch thread number.** Thread number is only used for extract processes that can be run in multiple parallel threads. It contains the relative thread number of the process. For example, if the arrears process has been set up to run in 20 parallel threads, each of the 20 instances receives its relative thread number (1 through 20). Refer to Optimal Thread Count for Parallel Background Processes in the background process chapter of the source system for more information.
- **Batch thread count.** Thread count is only used for extract processes that can be run in multiple parallel threads. It contains the total number of parallel threads that have been scheduled. For example, if the billing process has been set up to run in 20 parallel threads, each of the 20 instances receives a thread count of 20. Refer to Optimal Thread Count for Parallel Background Processes in the background process chapter of the source system for more information.
- **Batch rerun number.** Rerun number should only be supplied if you need to download an historical run (rather than the latest run).
- **Batch business date.** Business date is only used for extract processes that use the current date in their processing. For example, the Oracle Utilities Customer Care & Billing arrears extracts use the business date to extract arrears as of a given date. If this parameter is left blank, the system date is used. If supplied, this date must be in the format YYYY-MM-DD. This parameter is only used to test how processes behave over time.
- **Override maximum minutes between cursor re-initiation.** This parameter is optional and overrides each extract process's Standard Cursor Re-Initiation Minutes (each extract process reinitiates cursors every 15 minutes You would reduce these values, for example, if you were submitting a job during the day and you wanted more frequent commits to release held resources (or more frequent cursor initiations). You might want to increase these values when an extract process is executed at night (or weekends) and you have a lot of memory available on the servers. The maximum minute between cursor re-initiation parameter is relevant for Oracle implementations only. Most of the system extract processes contain an outermost loop / cursor. The cursor is opened at the beginning of the process and closed at the end. If Oracle detects that the cursor is open for too long, it may incorrectly interpret this as a problem and will display an error that the snapshot is too old. The processing for the extract processes is designed to refresh the cursor based on the minutes between cursor re-initiation in order to prevent this error.
- **User ID.** Please be aware of the following in respect of user ID:
  - The user ID is a user who should have access to all application services in the system. This is because some batch processes call application services to perform maintenance functions (e.g., when an account is updated, the batch process may call the account maintenance application service).
  - This user ID's display profile controls how dates and currency values are formatted in messages.
- **Password.** Password is not currently used.

- **Language Code.** All language-sensitive data is extracted in this language. In addition, all error messages are presented in this language.
- **Trace program at start (Y/N), trace program exit (Y/N), trace SQL (Y/N) and output trace (Y/N).** These switches are only used during QA and benchmarking. If trace program start is set to Y, a message is displayed whenever a program is started. If trace program at exist is set to Y, a message is displayed whenever a program is exited. If trace SQL is set to Y, a message is displayed whenever an SQL statement is executed. If output trace is set to Y, special messages formatted by the extract process are written.

The information displayed when the output trace switch is turned on depends on each extract process. It is possible that an extract process displays no special information for this switch.

- **Initial Load Switch.** This switch controls whether the extract program is run in extract everything mode or extract recent changes mode.
- **File Path and File Name.** These parameters define the file path and/or file name for the output file. When supplying a FILE-PATH variable, the directory specified in the FILE-PATH must already exist and must grant write access to the Oracle Utilities Business Intelligence administrator account. You may need to verify a proper location with your system administrator. The syntax of the FILE-PATH depends on the platform used for your Oracle Utilities Business Intelligence application server. Contact your system administrator for verification. For example, if the platform is UNIX, use forward slashes and be sure to put a trailing slash, for example /spltemp/filepath/ .

  Notes:

  The control file is created with the same name as the data file but with a fixed extension of CTL. For this reason, do not use CTL as the extension when defining value for FILE-NAME parameter.

  In order to avoid overwriting the flat files generated during the previous execution, the extractor programs insert a string containing the concatenated values of data source indicator, batch number and the batch thread number in the name of the generated data and the control file. The value is inserted just before the extension of the file name specified.
- **Maximum Errors.** This parameter is not currently used.
- **UDF and UDMs.** Refer to Extending extractors for the details on how to extend the various UDF and UDM fields.

The list of the extract programs used to populate each fact and dimension can be found in the **Appendix C** and **Appendix F** list the Sync BO names and additional details for each fact and dimension table name.

Data Extraction in NMS

This section describes the data extraction methods used for Oracle Utilities Network Management System.

Change Detect Mechanism

The Oracle Utilities Network Management System (NMS) uses a View- based approach to identify the changed data. These views query the database tables and retrieve required data in the format required in the extract flat file for each Fact/Dimension. One or more database tables can be queried against to retrieve this information.

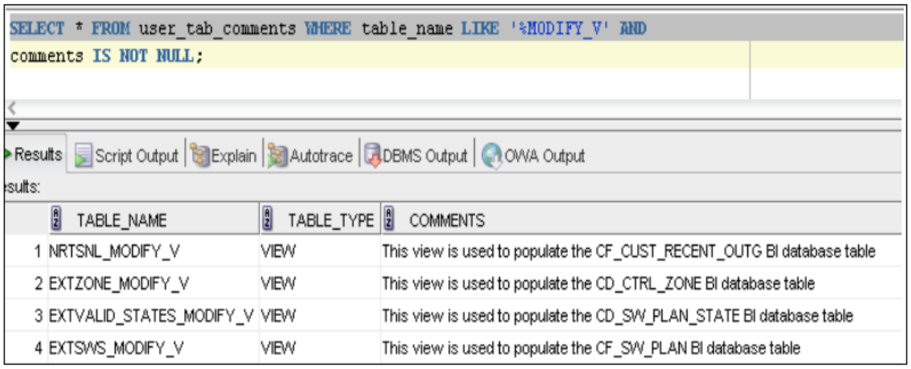
NMS maintains change log tables for updated or deleted records. These log tables store the primary key of the changed data or the deleted record. The view retrieves all the data that have been inserted in the delete log, as well as joins the update log table to the source table to get the updated records. The view also retrieves the inserted data from the source table.

NMS uses two types of Views for Change Detect Mechanism

- **Modify View.** This type of view is used to identify new/changed records from NMS log tables and the actual transactional tables are queried to retrieve the required information.
- **Delete View.** This type of View is used to identify the deleted record information. NMS uses delete_log tables to capture the deleted record information.

The mapping of these views to BI database tables is documented in comments column while creating these views.

For example, in the following image, the NRTSNL_MODIFY_V view is used to populate the CF_CUST_RECENT_OUTG BI Database table:



```
SELECT * FROM user_tab_comments WHERE table_name LIKE '%MODIFY_V' AND
comments IS NOT NULL;
```

	TABLE_NAME	TABLE_TYPE	COMMENTS
1	NRTSNL_MODIFY_V	VIEW	This view is used to populate the CF_CUST_RECENT_OUTG BI database table
2	EXTZONE_MODIFY_V	VIEW	This view is used to populate the CD_CTRL_ZONE BI database table
3	EXTVALID_STATES_MODIFY_V	VIEW	This view is used to populate the CD_SW_PLAN_STATE BI database table
4	EXTSWS_MODIFY_V	VIEW	This view is used to populate the CF_SW_PLAN BI database table

The list of 'modify views' and 'delete views' used to populate each fact and dimension can be found in the section 'Appendix C: NMS Extractors Detail'

Extracting and Transforming Data

Network Management System uses Extract Programs to extract changes into a flat file with the help of extract-scripts or the procedures.

- Each of these scripts is based on direct queries from the NMS Database views defined in the above section and are to be configured to run in scheduled cron jobs and are designed to run periodically.
- The data retrieved from these views is used to generate the data and control files in the configured bi_extract_dir directory (recommended as $HOME/extract).
- Each script generates a log file which should list any errors.

The list of the extract programs used to populate each fact and dimension can be found in the section **Appendix E**.

Data Extraction in MDM and MWM

This section describes the data extraction methods used for Oracle Utilities Meter Data Management and Oracle Utilities Mobile Workforce Management.

Change Detect Mechanism

MDM and MWM edge applications use the Master Data Synchronization mechanism provided by the Oracle Utility Application Framework.

During the Initial Load called Initial Sync, the program picks up all the required data from the source tables and inserts into the Sync Request table.

For the incremental load, called Ongoing Sync, whenever a record is created, updated or deleted in a table, corresponding Sync Request BO is also created. This BO will reference the primary key of the record inserted, updated or deleted. An audit algorithm controls the records to be marked for extract.

When the Sync Request batch is executed, all the sync request records in Sync Request table will be moved to Synchronized state. Run the Extract Batches programs to generate the extract flat files.

In order to extract data using Sync request, user needs to define "Audit" algorithm on MO, to trigger creation of Sync request if there is a change on the entity. User needs to specify the "Sync Request BO" in MO-Options, so that the audit algorithm creates a new Sync request for the Sync Request BO's defined.

For snapshot facts and dimensions, MDM has delivered Java programs to extract data.

Extracting and Transforming Data

MDM and MWM use Extract Batch programs to extract data into a flat file. These programs read data from the Sync Request table to read the primary key, and joins to the source table to get the complete information.

Please note that it is advisable to always execute the Extract Batches immediately after executing the Sync Request batch. You can run the Sync Request batch for a single Sync Request BO or for all the Sync Request BOs.

A list of extract batch information for MDM and MWM is available in **Appendix C** and **Appendix D**.

Note for Data Source Indicator

For MDM and MWM, the data source indicator value must be configured in the feature configuration screen before the initial sync batches are run. This data source indicator should be a number with a maximum of 6 digits.

During a joint MDM-CCB installation,the data source indicator for the MDM source application must be the same as in the CCB source application. This will ensure that all the references for the shared dimensions on the MDM facts will be loaded successfully.

Oracle Warehouse Builder

This section describes Oracle Warehouse Builder (OWB) including the following topics:

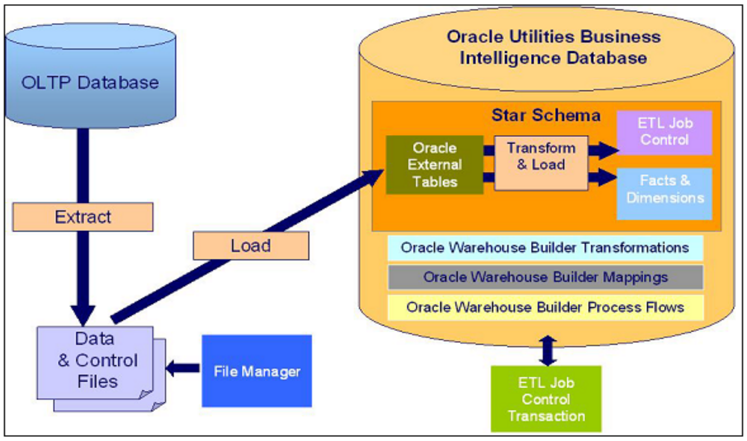
- **Overview of Oracle Warehouse Builder**
- **Extract Programs and External Tables**
- **File Manager**
- **Oracle Warehouse Builder Transformations**

Overview of Oracle Warehouse Builder

Oracle Warehouse Builder is Oracle's data warehousing tool. Oracle Utilities business intelligence uses Oracle Warehouse Builder to store the following items:

- Table designs of the star schemas
- Data mappings that are used to generate batch jobs that perform extract-transform-load operations
- Process flows that validate the extracted information, load the star schemas, and perform exception handling

The following diagram illustrates the components involved in the ETL process for Oracle Utilities business intelligence:


Oracle Utilities Business Intelligence Database
OLTP Database
Star Schema
ETL Job Control
Oracle External Tables
Transform & Load
Facts & Dimensions
Extract
Load
Oracle Warehouse Builder Transformations
Oracle Warehouse Builder Mappings
Oracle Warehouse Builder Process Flows
Data & Control Files
File Manager
ETL Job Control Transaction

Extract Programs and External Tables

The extract programs execute in the source application. They produce flat files that contain the data extracted from the source system. Each process creates:

- A single-record control file that contains information about the entire batch job.
- Data files that contain the information to be loaded into the warehouse. These files are also referred to as the staging files.

Oracle external tables are defined in the warehouse for each type of control and data file. Specifically, two external tables are defined for each fact and dimension that is loaded from flat files. These external tables provide a SQL-based interface to the data in the flat files by the data mappings. A data mapping exists for each fact and dimension.

Within the Oracle database, the external tables have the following naming format:

- STG_table_name_EXT for the data files
- STG_table_name_CTL_EXT for the control files that are used to load a specific table

For example, the External Tables used to load the CD_ACCT table are named STG_ACCT_EXT and STG_ACCT_CTL_EXT.

The flat file names are different from the name of the external tables. The standard format for the file names are table_name_EXT.DAT and table_name_EXT.CTL. So for the CD_ACCT table, the files will be named D_ACCT_EXT.DAT and D_ACCT_EXT.CTL.

Please refer to Data Mapping Guides for the respective application for the list of file names for each fact and dimension.

File Manager

The file manager is a Perl program that resides on the database server. The program is responsible for performing housekeeping activities against the files holding the extracted information. It also ensures that the files are supplied in the correct order.

The program accepts the following parameters:

- The name of the file that the external table reads the data from. This name should match the value of the flat file name without the file extension. So for the load of the CD_ACCT table, this would be D_ACCT_EXT.
- FILE-NAME parameter on the extract batch program.
- The location of the files.

- Mode of execution. The program can be executed in pre-mapping and post-mapping modes.
- Processing condition (success or failure).

In the pre-mapping mode, the file manager performs the following actions:

- Creates “error” and “processed” files inside the folder where the files are located.
- Sorts to get the name of the earliest control and data files that match the file name specified by the parameter passed.
- Copies the data file and the control file to the files that the external table reads. This is required because the external tables are defined to read data from one particular file and the extractor programs insert the data source indicator, batch number and batch thread number in the data and control file names to avoid overwriting the generated files.
- Saves the name of the file being processed in a temporary file. This file is used later in the post-mapping stage to identify the name of the file that was processed. It is also used by the subsequent executions to know if a file is being processed.

In post-mapping mode, depending on the processing condition specified, the file manager moves the processed control and data file to either the error or the processed folder. It also removes the temporary file created in the pre-mapping mode.

Oracle Warehouse Builder Transformations

This section describes the various Oracle Warehouse Builder transformations used to load the extracted information into the data warehouse. It includes the following topics:

- **Pre- and Post-Mapping Functions**
- **Setup Procedures**
- **Dimension Update Procedures**
- **Data Mappings**
- **Process Flows**

Pre- and Post-Mapping Functions

The topics in this section describe how the pre- and post-mapping functions validate and load extracted information into the warehouse. The following functions are invoked by process flows before and after the data mappings are executed:

- **SPL_PREMAP_PROCESS_FNC:** This function is used to validate and load the contents of a control file into the ETL Job Control table before the mapping loads the data file. Once the validations have been made, the function inserts or updates an ETL job control record and marks it “In Progress”.
- **OUBI_POST_MAPPING_PRC:** This procedure is called before a mapping commits to validate that the number of records loaded into the fact or dimension table matches the number of records that should have been loaded based on the record in the control file. If the number loaded is less than the number that should have been loaded, the transaction is rolled back and the load marked will be marked as “In Error” by the SPL_POSTMAP_PROCESS_FNC function.
- **SPL_POSTMAP_PROCESS_FNC:** This function updates the ETL job control record to either “Completed” or “In Error” depending on the status of the data mapping.
- **OUBI_REFRESH_MV_FNC:** This function refreshes a materialized view. It is called after a load of a fact table. It refreshes only the materialized views associated with the fact table being loaded.
- **OUBI_UPDATE_OBIEE_PRC:** This procedure creates a record in the B1_OBIEE_EVENT_POLLING table informing OBIEE that a fact table has new data, and

that queries that are run against this fact table should be sent to Oracle instead of being updated from the OBIEE cache. This procedure is only called when data has been loaded into a fact table, and only after the materialized views have been refreshed.

Setup Procedures

Setup processes are database-stored procedures used to populate some of the dimensions in the warehouse. The following setup processes are included:

- **SPL_LOADDATE:** This process generates data in the DATE dimension table (CD_DATE) for a range of dates. This process should be executed only when setting up the data warehouse for the first time.
- **SPL_LOADSNAPTYPE:** The process generates data in the SNAPSHOT TYPE dimension table (CD_SNAPTYPE).
- **SPL_LOAD_DEFAULT_VALUE:** The process seeds the various dimension tables with '0' key value and '***' dimensional attribute codes. This value is referenced on fact rows that do not contain a reference to a given dimension (because they avoid optional foreign keys on the various fact tables).

Dimension Update Procedures

Type II slowly changing dimensions (SCD) are dimensions that store a history of all changes. These dimensions are used for time series analysis. The following points describe what happens when a change to a dimension is detected:

- The effective end date on the latest record is updated to the change date.
- A new dimension record is created with the effective start date.

Data mappings for such dimensions can be very complex to create, so an update procedure for each such dimension is provided. These procedures are called by the pre-mapping functions to update and insert the dimensional records when a change occurs.

Data Mappings

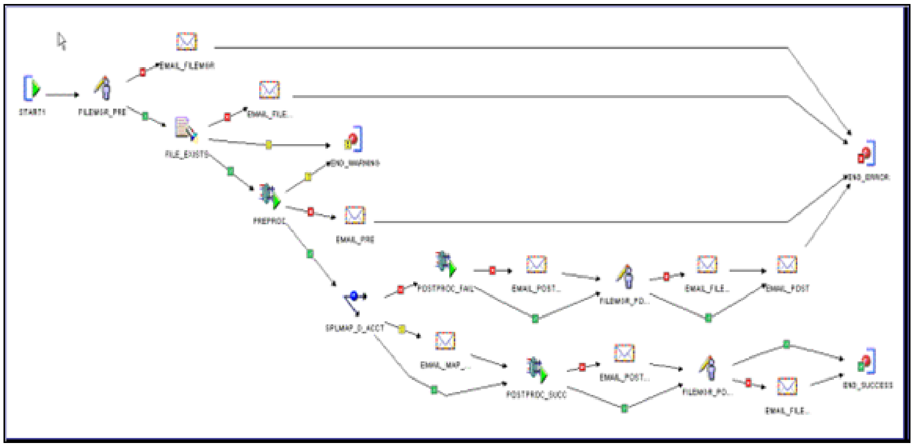
The data mappings load data from the external tables (produced by the extracts) into the facts and dimensions in the warehouse.

For a list of the facts and dimensions, their external tables, and the related data mappings, refer to the data mapping guide for your source application. This document describes the source application’s facts and dimensions and how they are populated.

Process Flows

A separate process flow exists to execute each mapping along with the pre- and post-mapping processes.

The following diagram shows a typical process flow:



Each data load process flow is designed to:

- Execute the file manager to perform housekeeping on the data and control files in pre- and post-mapping modes
- Execute the pre- and post-mapping functions to validate, load, and maintain batch information in the ETL job control transaction
- Execute the data mappings once the file is available and validated
- Send an email if an error occurs. Also, if an error occurs before the mapping executes, the process flow aborts the complete process. Otherwise, it sends an email and continues.

Process flow modules allow you to group process flow packages. Process flow packages, in turn, allow you to group process flows. Together, the process flow modules and packages provide two levels to manage and deploy process flows. You can validate, generate, and deploy process flows at either the module or the package level. All process flows are presently grouped under the following packages for easier administration:

- **INIT_PKG:** This package contains the process flows to load the default records into the dimensions. It also contains process flows to load the date & time dimensions and includes the purge workflow.
- **DIM:** This package contains process flows for dimensions delivered in Oracle Utilities Business Intelligence.
- **DIM2:** This package contains process flows for dimensions delivered in Oracle Utilities Business Intelligence.
- **DIM_MDM:** This package contains process flows for dimensions delivered in Oracle Utilities Business Intelligence for all Oracle Utilities Meter Data Management dimension tables.
- **DIM_MWM:** This package contains process flows for dimensions delivered in Oracle Utilities Business Intelligence for all Oracle Utilities Mobile Workforce Management dimension tables.
- **DIM_UDD:** This contains the process flows for all user defined dimensions delivered in Oracle Utilities Business Intelligence.
- **FACT:** This package contains process flows to load all of the fact tables in Oracle Utilities Business Intelligence.

- **FACT_MDM:** This package contains process flows for facts delivered in Oracle Utilities Business Intelligence for all Oracle Utilities Meter Data Management fact tables.
- **FACT_MWM:** This package contains process flows for facts delivered in Oracle Utilities Business Intelligence for all Oracle Utilities Mobile Workforce Management fact tables.
- **MV_RFSH:** This package contains process flows to refresh the default materialized views created for each fact table. If custom materialized views are created, then a copy of the fact table process flow should be created and the new materialized view refresh added to the copied process flow. Note that the refresh of the materialized views are done in parallel.
- **LOADRFSH:** This package contains process flows to load a fact table and then refresh the materialized views for that fact table. A load refresh process flow initiates the load for facts and subsequently executes the related materialized view refresh using the process flows under the package 'MV_RFSH'.

Appendix A: Package Process Flows lists the process flows in each of the packages.

Please note the following about the various process flows:

- Process flows can be scheduled for execution using the file processor daemon. See **Running and Monitoring Extract Loads** on page 3-11 for more information.
- Process flows for dimensions must be executed before the fact process flows.
- Each process flow executes its data mapping using parallel set-based processing with a commit frequency set to 0.

Running and Monitoring Extract Loads

This section describes how to configure the file processor daemon to run extract file loads. It includes the following topics:

- **About the File Processor Daemon**
- **Log File**
- **Monitoring Jobs**
- **Resolving Errors during Loads**
- **Incorrect Number of Records Loaded**
- **Resubmitting a Failed Job**

About the File Processor Daemon

Oracle Utilities Advanced Spatial and Operational Analytics provides a process to schedule the process flows. File Processor Daemon is a persistent process that keeps running in the background.

The File Processor Daemon is a simple java based utility that mimics the capabilities of a job scheduler. Its primary purpose is to keep monitoring the extract folder periodically. When new data files arrive, it processes them and triggers the appropriate OWB process flows for loading the data.

It has the intelligence to determine the fact dimension dependency. When a fact data file arrives in the extract file directory, it has smartness inbuilt to scan the extract directory to see if there are any data files present for any of the dimensions associated with this particular fact. If so, the loading of this particular fact file is skipped to let the dimension data load first into the data warehouse.

The File Processor Daemon scans the error folder as well to see if any of the dimension load jobs have failed. In this case all the related fact data files are skipped from processing until the related dimensions are loaded successfully. Fact dimension dependency is determined through the database constraints table present in the data warehouse.

The way File Processor Daemon knows which OWB process to be triggered for which data file and what is the exact table name to check while querying the constraints table for fact dimension dependency is through the mappings present in the parameter file. For more details refer to the detailed description of the parameter extract.file.mappingXXX mentioned below.

The installation of the standard setup for the File Processor Daemon is documented in the Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide. All of the standard process flows will be configured to run with the base installation. For information on how to install and run the File Processor Daemon, please refer to the Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide.

The File Processor Daemon reads a parameter file, SchedulerParm.properties, that will need to exist in the directory that the File Processor Daemon is installed in. The released version of this properties file includes entries for all standard process flows, so that if any of the base extract files are present in the extract load directory, they will be processed automatically. No extract configuration needs to be done if only base extracts are being implemented.

The following required parameter entries are present in the delivered SchedulerParm.properties file and can be modified if needed for an implementation by using the (configureEnv.sh/cmd) command as documented in the Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide:

Parameter Name	Description
execution.switch	Determines if the file processor daemon is active or inactive. As long as this parameter is set to 1, the file processor daemon will continue to run. To stop the file processor daemon without killing the process, modify this file and set the execution.switch parameter to 0.
scheduler.poll.duration	This parameter determines whether the File Processor Daemon is active or not. As long as this parameter is set to 1, the File Processor Daemon will continue to run. To stop the File Processor Daemon, modify this file and set the execution.switch parameter to 0.
extract.dir.path	This parameter tells the File Processor Daemon where to look for new extract files. This path must match the path that the OWB process flows have been configured to look for extract files.
extract.max.load	This parameter tells the File Processor Daemon how many extract files to load at a single time. If there are more files in the extract directory than the number specified by this parameter, the first set of files found will be loaded with the current run of the File Processor Daemon. This parameter can be modified based on the size of the machine and how many files can be handled at once by the Oracle Warehouse Builder.
extract.file.mapping.count	This parameter tells the File Processor Daemon how many process flows will be listed in the parameter file. This count will need to match the largest extract.file.mapping(N) present in the parameter file. If this count is set to a lower number then the number of mappings, then only this number of mappings will be processed by the File Processor Daemon.

Parameter Name	Description
extract.file.mappingN	N is a number between 1 and the extract.file.mapping.count parameter, or extract.file.mapping.override.count parameter if this is specified. These parameters tell the File Processor Daemon which extract files to look for, and what process flow to run when an extract file is found and the actual table name in the data warehouse. The format of this parameter is: Extract File Name, Process Flow Name, Table Name. The extract file name should be just the base name without the data source indicator, batch number, thread number values and without the .DAT or .CTL extensions. For example, this entry will look for the Account Extract Files and run the SPLWF_D_ACCT process flow when a new account extract file is found: `extract.file.mapping1 = D_ACCT_EXT,SPLWF_D_ACCT,CD_ACCT` The table name will be used for determining the dependency between the facts and dimensions by query the database constraints table. This dependency check is required to avoid processing of any fact data files, if any of its dimension data files are required to be loaded first. It is important when entering values that the N numbers increase sequentially, no numbers are skipped, and the largest N value matches the mapping.count or mapping.override.count parameter specified in the parameter file.

The following optional parameter is not present in the delivered SchedulerParm.properties file but can be added if needed:

Parameter Name	Description
extract.file.mapping.override.count	This parameter provides a way to override the mapping count specified in the extract.file.mapping.count parameter. The default parameter file does not include this parameter. If this parameter is specified, then the extract.file.mapping.count value is not used by the file processor daemon.

The important fields in the parameter file to look at when implementing new loads are the mapping.count and the mappingN parameters. New loads can be added to the parameter file if they have been implemented by a project. It is recommended that the new mappingN values be entered at the end of the list, so that in an upgrade it will be easy to identify those added records when updating the newly released SchedulerParm.properties file.

After updating any of these parameters using the configureEnv program, you must run the initialSetup.sh/cmd script to create the cm_schedulerParm.properties.exit_1.include parameter file. You must place this file in the <INSTALL_DIR>/templates directory, and then restart the file processor daemon. Refer to the *Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide* for more information on this process.

Log File

The instructions on how to start the File Processor Daemon are located in the Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide. Once started, a log file called FileProcessorDaemon.log will be written to by the File Processor Daemon. Messages from the File Processor Daemon are written here for various normal activities. Error messages are also written to this file. If OWB process flows are not triggered properly, review this log file possibly identify the cause of the problem.

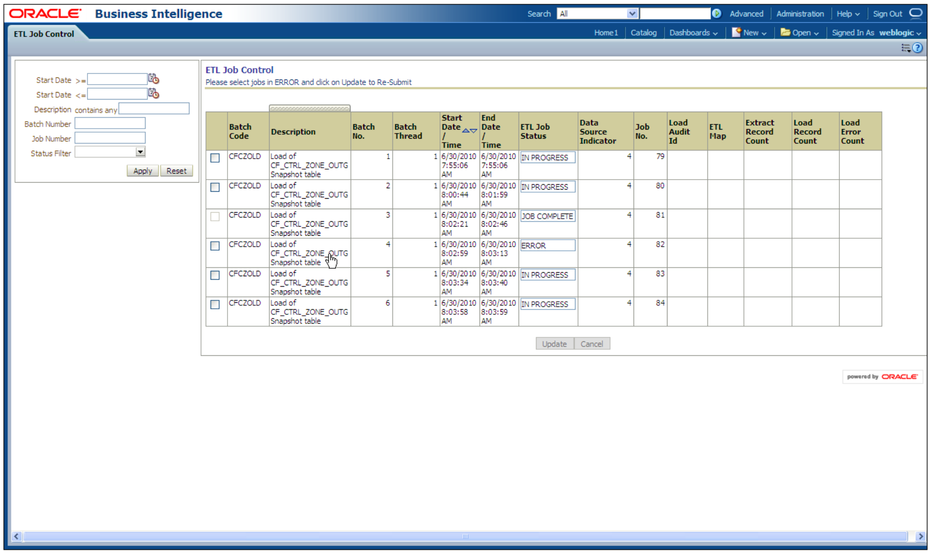
The log file is deleted once it reaches a size of 100 megabytes, and a new file is started, so if older errors are not seen, the file may have been recently purged by the File Processor Daemon.

Monitoring Jobs

> **Note:** You must have the full license of the Oracle Utilities Advanced Spatial and Operational Analytics to use this feature.

The process flows that are run by the file processor daemon are set up two different ways, depending on whether a fact or a dimension extract file is being loaded. For a dimension load, only the dimension file is loaded into the dimension table of the data warehouse. However, when a fact file is loaded, the fact table is updated and then any associated materialized views are refreshed.

The load jobs will be visible in the ETL Job Control Administration Portal. The Job Complete status (JC) indicates that the data file loaded successfully. If a fact is loaded, the Job Complete Status does not indicate that the materialized views were successfully updated. However, an e-mail is sent to the data warehouse administrator if the materialized view refresh fails.



ETL Job Control

Please select jobs in ERROR and click on Update to Re-Submit

	Batch Code	Description	Batch No.	Batch Thread	Start Date / Time	End Date / Time	ETL Job Status	Data Source Indicator	Job No.	Load Audit Id	ETL Map	Extract Record Count	Load Record Count	Load Error Count
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	1	1	6/30/2010 7:55:06 AM	6/30/2010 7:55:06 AM	IN PROGRESS	4	79					
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	2	1	6/30/2010 8:00:44 AM	6/30/2010 8:01:59 AM	IN PROGRESS	4	80					
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	3	1	6/30/2010 8:02:21 AM	6/30/2010 8:02:46 AM	JOB COMPLETE	4	81					
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	4	1	6/30/2010 8:02:59 AM	6/30/2010 8:03:13 AM	ERROR	4	82					
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	5	1	6/30/2010 8:03:34 AM	6/30/2010 8:03:40 AM	IN PROGRESS	4	83					
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	6	1	6/30/2010 8:03:58 AM	6/30/2010 8:03:59 AM	IN PROGRESS	4	84					

In addition, the load jobs will be and any associated errors can be viewed in the OWB Control Center.

In general, if an e-mail message indicating a load failed is not received, then the load of a data file (and any materialized view refresh) was successful.

Resolving Errors during Loads

There are various reasons for why a load fails. The following list provides several things to check when trying to find out why an extract does not load or why an error is generated during a load. For more information about resolving OWB load problems, refer to the Oracle Warehouse Builder User's Guide. You should turn off file processor daemon before debugging.

- **Job Status:** Make sure that jobs are not in an In Progress (IP) or Error (ER) state. The status of a job is stored in the JOB_STATUS_FLG field in the B1_ETL_JOB_CTRL table, and you can view the status on the ETL Job Control Administration Portal. If the data in error has been fixed and the file is ready to reload, then you can reset the Error job status on the ETL Job Control Portal as well.
- **OWB Errors:** There are two views that you can query to see errors from a process flow: ALL_RT_AUDIT_EXEC_MESSAGES and BIREPOWN.WB_RT_ERRORS. These errors should be present in the e-mail messages sent when a mapping fails. However, you can run the following SQL statements to view the errors from the last four hours if the e-mail messages are lost or do not contain any error messages:

  ```
  begin
  owbsys.wb_workspace_management.set_workspace('SPLBIREP','BIREPOWN'
  );
  end;
  -- where workspace name is SPLBIREP and workspace owner is
  BIREPOWN;
  -- replace if necessary. To find the Workspace Name and Owner, run:
  select * from owbsys.WORKSPACE_ASSIGNMENT;
  select to_char( created_on, 'dd-mon-yyyy hh24:mi:ss - ' ) ||
  message_text
  from all_rt_audit_exec_messages
  where created_on > sysdate - .2
  order by message_audit_id;
  ```

- **Error RPE-02248:** If you get this error, then change the Runtime.properties file in the $ORACLE_HOME/owb/bin/admin directory:

  ```
  -- Change these settings from DISABLED to NATIVE_JAVA
  property.RuntimePlatform.0.NativeExecution.FTP.security_constraint
  = NATIVE_JAVA
  property.RuntimePlatform.0.NativeExecution.Shell.security_constrai
  nt = NATIVE_JAVA
  property.RuntimePlatform.0.NativeExecution.SQLPlus.security_constr
  aint = NATIVE_JAVA
  ```

- **Viewing the data in Oracle:** Sometimes it helps to view the data in an extract file from Oracle. This can be done by copying the Extract file to the Staging file used during the load. This file has the same name as the Extract file, without the numbers in the file name. For example, if the Account extract generates these two extract files, D_ACCT_EXT000004000000001001.CTL and D_ACCT_EXT000004000000001001.DAT, then the staging files are named D_ACCT_EXT.CTL and D_ACCT_EXT.DAT.

  After copying the files, the data can be viewed in Oracle using the following two Staging Tables: STG_ACCT_CTL_EXT and STG_ACCT_EXT.

- **Strange Characters in data files:** If you view the data in Oracle and there are strange characters when you run a query, then the character set may be specified incorrectly for the external file. The character set can be changed by running the EditFFCS.TCL file in OWB. You can see the character set for a specific external file by running the following query:

  ```
  select * from dba_external_tables where table_name =
  'STG_ACCT_CTL_EXT';
  ```

Incorrect Number of Records Loaded

During a fact load, if a required dimension record is not found, the fact record will not load and an error message will be sent informing the user that this happened. This section describes how to determine why the records failed to load.

If a data file fails to load, it is moved to the error directory just below the load directory. The load directory can be accessed from the database server. You can determine the directory path using the following query from the DWADM account, and with the Control Table Name that is included in the failed record:

```
SELECT directory_path
FROM user_external_tables a, all_directories b
WHERE a.table_name = UPPER( '&Control_Table_Name' ) AND
b.directory_name = a.default_directory_name AND
b.owner = a.default_directory_owner;
```

For example, if the load directory was /spl/BIDevelopment/bi221prf, the error file would be located in /spl/BIDevelopment/bi221prf/error.

The easiest way to examine the data file that had errors is to copy it into the Load directory, so that you can run Oracle queries against it. The extract file replaces the .DAT file in that directory with the File name. For example, the /spl/BIDevelopment/bi221prf/error/D_ACCT_EXT017933000000001001.DAT file would replace the /spl/BIDevelopment/bi221prf/D_ACCT_EXT.DAT file. The .CTL file in the processed directory can also replace the .CTL file in the load directory.

Once you have copied the file, then you can run queries against the external tables in Oracle. Typically, the data and control file names are based on the name of the table being loaded. For example, if the D_ACCT_EXT file is being loaded, the control file table name would be STG_ACCT_CTL_EXT and the data file name would be STG_ACCT_EXT.

You can run the following query to determine the staging external table names based on the file name in the error directory. In the query, replace FILE_NAME with the first part of the file name in the record:

```
SELECT tbl_name, bus_obj_cd
FROM spladm.b1_md_tbl
WHERE trim(file_name) = upper( '&FILE_NAME' );
```

The Data table name will have a BUS_OBJ_CD value of B1-ETLStagingBO and the Control table name B1-ETLControlBO.

If there are more changed records than were inserted, you will need to determine which records did not load, and the reason. This can be done by running the associated query from the following query. For each Staging File and Load Table a query is provided which will list the Natural Keys present in the staging table that is not currently in the load table. Note that the DATA_SOURCE_IND field is part of the natural key, however, in most cases there will only be a single data source indicator in the Oracle Utilities business intelligence database, so the queries listed here do not include the data source indicator field.

```
SELECT c.load_tbl_name,
c.stg_tbl_name,
b.dim_tbl_name,
b.fld_name,
'SELECT '
|| trim( b.stg_fld_name )
|| ' FROM '
|| trim ( c.stg_tbl_name )
|| ' A WHERE NOT EXISTS ( SELECT 1 FROM '
|| trim( b.dim_tbl_name )
|| ' B WHERE '
|| DECODE( TRIM( B.DIM_TBL_NAME ),
'CD_DATE', ' B.CAL_DT = TO_DATE( SUBSTR( ' || TRIM( B.STG_FLD_NAME
) || ', 1, 8 ), ''YYYYMMDD'' )',
' TRIM( B.' || trim( b.dim_fld_name ) || ') = TRIM( ' || trim(
b.stg_fld_name ) || ' )' )
|| DECODE( TRIM( B.DIM_TBL_NAME ),
'CD_DATE', NULL,
'CD_TIME', NULL,
'CD_SNAP_TYPE', NULL,
' AND B.DATA_SOURCE_IND = A.DATA_SOURCE_IND' )
|| decode( SUBSTR( E.ENABLE_MERGE_FLG, 1, 1 ),
'N', ' AND TO_DATE( SUBSTR( A.UPDATE_DTTM, 1, 8 ), ''YYYYMMDD'' )
BETWEEN B.EFF_START_DTTM AND
B.EFF_END_DTTM ',
NULL )
|| ' );'
FROM spladm.b1_etl_map_join_fld B,
spladm.b1_etl_map C,
spladm.ci_md_tbl_fld D,
spladm.b1_md_tbl E
WHERE b.dim_fld_name <> 'DATA_SOURCE_IND'
AND b.etl_map_name = c.etl_map_name
AND d.tbl_name = c.load_tbl_name
AND d.fld_name = b.fld_name
AND d.required_sw = 'Y'
AND e.tbl_name = b.dim_tbl_name
ORDER BY C.LOAD_tbl_name,
c.stg_tbl_name,
b.fld_name;
```

Once you find the missing records, you can then determine if a required dimension key is missing from the dimension table. Note that it is possible that a later dimension load added the dimension records after the fact table was loaded, so if no records are returned by any of these queries, then reloading the fact records may solve the problem.

There are several different ways to fix the data so that it can be loaded. The method you use to successfully load the data depends on how the data is fixed:

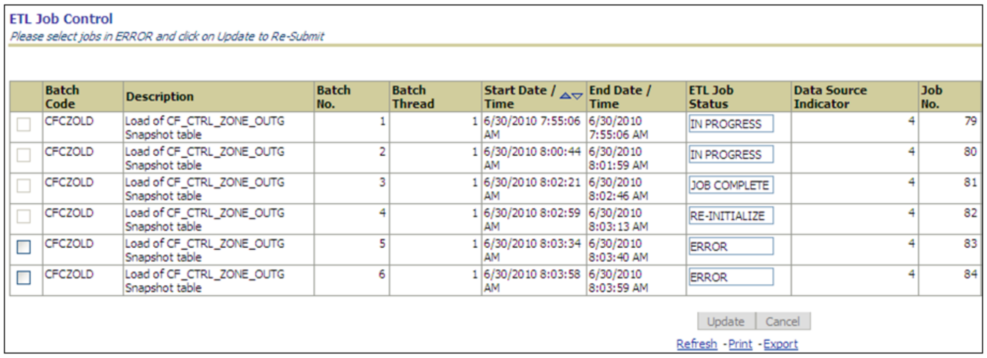
- Make sure that the dimension files were loaded successfully. If there were errors during the dimension load, or the number of records loaded didn't match the number of records in the file, then you may have to figure out why the dimension records didn't load, fix and reload them, before you can work on reloading fact records.
- Fix a fact data problem in the source system. This should allow the data to be re-extracted the next time the fact data is extracted. However, some fact extracts only extract new records, not changed records, so this may not always fix the data in the data warehouse.
- Modify the fact records to have valid dimension keys. If the fact records are modified, then they will need to be added to a new extract file to get reloaded. A manual extract can be done to create a new extract file, and then the modified records can be loaded to this file. The modified records will then be loaded when the next load process is run.
- Change effective start and end dates on the dimension records. If a fact record doesn't load because the update time on the fact record isn't between within the range of the effective start and end date on the dimension, the effective start or end date on the dimension record can be changed manually to allow the load to occur. If this is changed, then the fact records should be added to a new extract file, as described in the preceding item.

Resubmitting a Failed Job

> **Note:** You must have the full license of the Oracle Utilities Advanced Spatial and Operational Analytics to use this feature.

Follow these steps to resubmit a failed job:

1. View the ETL Job Control screen under the Admin menu of Dashboards:



ETL Job Control

Please select jobs in ERROR and click on Update to Re-Submit

	Batch Code	Description	Batch No.	Batch Thread	Start Date / Time	End Date / Time	ETL Job Status	Data Source Indicator	Job No.
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	1	1	6/30/2010 7:55:06 AM	6/30/2010 7:55:06 AM	IN PROGRESS	4	79
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	2	1	6/30/2010 8:00:44 AM	6/30/2010 8:01:59 AM	IN PROGRESS	4	80
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	3	1	6/30/2010 8:02:21 AM	6/30/2010 8:02:46 AM	JOB COMPLETE	4	81
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	4	1	6/30/2010 8:02:59 AM	6/30/2010 8:03:13 AM	RE-INITIALIZE	4	82
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	5	1	6/30/2010 8:03:34 AM	6/30/2010 8:03:40 AM	ERROR	4	83
□	CFCZOLD	Load of CF_CTRL_ZONE_OUTG Snapshot table	6	1	6/30/2010 8:03:58 AM	6/30/2010 8:03:59 AM	ERROR	4	84

2. Select the Job that needs to be restarted. This will change the ETL Job Status on the screen to “RE_INITIALIZE”.

3. Move the data and control files that errored out from the error folder. This is very important because the file processor will not process the files that are in the error folder.

4. Place the corrected files in the data folder and switch on the File Processor Daemon

The corresponding process flow is triggered during the next polling of the file.

Materialized Views

A materialized view is a database object that contains the results of a query. They are local copies of data located remotely, or are used to create summary tables based on aggregations of a table's data. Materialized views, which store data based on remote tables, are also known as snapshots.

Materialized views can be used to achieve different goals, mostly related to performance.

Materialized View Refresh

A materialized view's data does not necessarily match the current data of its master table or master materialized view at all times. A materialized view is a transactionally (read) consistent reflection of its master as the data existed at a specific point in time (that is, at creation or when a refresh occurs). To keep a materialized view's data relatively current with the data of its master, the materialized view must be refreshed periodically. A materialized view refresh is an efficient batch operation that makes a materialized view reflect a more current state of its master table or master materialized view.

A refresh of an updatable materialized view first pushes the deferred transactions at the materialized view site to its master site or master materialized view site. Then, the data at the master site or master materialized view site is pulled down and applied to the materialized view.

A row in a master table can be updated many times between refreshes of a materialized view, but the refresh updates the row in the materialized view only once with the current data. For example, a row in a master table might be updated 10 times since the last refresh of a materialized view, but the result is still only one update of the corresponding row in the materialized view during the next refresh.

For more information on the Materialized views, refer to Chapter 3, “Materialized View Concepts and Architecture”, in the Oracle Database Advanced Replication 11g Release 2,

Query Rewrite

When base tables contain large amount of data, it is expensive and time-consuming to compute the required aggregates or to compute joins between these tables. In such cases, queries can take minutes or even hours to execute. Because materialized views contain already pre-computed aggregates and joins, Oracle Database employs an extremely powerful process called query rewrite to quickly answer the query using materialized views.

One of the major benefits of creating and maintaining materialized views is the ability to take advantage of query rewrite, which transforms a SQL statement expressed in terms of tables or views into a statement accessing one or more materialized views that are defined on the detail tables. The transformation is transparent to the end user or application, requiring no intervention and no reference to the materialized view in the SQL statement. Because query rewrite is transparent, materialized views can be added or dropped just like indexes without invalidating the SQL in the application code.

A query undergoes several checks to determine whether it is a candidate for query rewrite. If the query fails any of the checks, then the query is applied to the detail tables rather than the materialized view. This can be costly in terms of response time and processing power.

A query is rewritten only when a certain number of conditions are met:

- Query rewrite must be enabled for the session.
- A materialized view must be enabled for query rewrite.
- The rewrite integrity level should allow the use of the materialized view. For example, if a materialized view is not fresh and query rewrite integrity is set to ENFORCED, then the materialized view is not used.
- Either all or part of the results requested by the query must be obtainable from the precomputed result stored in the materialized view or views.

To test these conditions, the optimizer may depend on some of the data relationships declared by the user using constraints and dimensions, among others, hierarchies, referential integrity, and uniqueness of key data, and so on.

For more details on query rewrite support in oracle products, see Chapter 17, "Basic Query Rewrite" in the Oracle Database Data Warehousing Guide.

How are materialized views used in the Oracle Utilities Advance Spatial and Operational Analytics product?

- OUBI product utilizes materialized views to improve the performance of the dashboard & analytics utilizing the query rewrite feature.
- Materialized view refresh is set to force on demand, which means that the oracle optimizer selects whether to use a Complete Refresh or Fast Refresh based on the volume of the changes required.
- Materialized views are refreshed as part of the Load Refresh process for the corresponding fact.
- OBIEE uses cache for recently used queries to improve the performance of dashboards. However when materialized views or facts are updated the cache associated with those entities becomes stale and can give results that are not up to date. OUASA provides an automatic cache refresh mechanism which is executed along with the materialized view refreshes. This is done by the OUBI_UPDATE_OBIEE_PRC procedure mentioned earlier under "Oracle Warehouse Builder Transformations"

Parallelism and Partitioning

This section discusses how to properly configure the database for partitioning and parallelism for better system performance.

Partitioning

Partitioning helps to scale a data warehouse by dividing database objects into smaller pieces, enabling access to smaller, more manageable objects. Having direct access to smaller objects addresses the scalability requirements of data warehouses.

It takes longer to scan a big table than it takes to scan a small table. Queries against partitioned tables may access one or more partitions that are small in contrast to the total size of the table. Similarly, queries may take advantage of partition elimination on indexes. It takes less time to read a smaller portion of an index from disk than to read the entire index. Index structures that share the partitioning strategy with the table, such as local partitioned indexes, can be accessed and maintained on a partition-by-partition basis.

The database can take advantage of the distinct data sets in separate partitions if you use parallel execution to speed up queries, DML, and DDL statements. Individual parallel execution servers can work on their own data sets, identified by the partition boundaries.

Parallel Execution

Parallel execution enables the application of multiple CPU and I/O resources to the execution of a single database operation. It dramatically reduces response time for data-intensive operations on large databases typically associated with a decision support system (DSS) and data warehouses. You can also implement parallel execution on an online transaction processing (OLTP) system for batch processing or schema maintenance operations such as index creation. Parallel execution is sometimes called parallelism. Parallelism is the idea of breaking down a task so that, instead of one process doing all of the work in a query, many processes do part of the work at the same time. An example of this is when four processes combine to calculate the total sales for a year, each process handles one quarter of the year instead of a single process handling all four quarters by itself. The improvement in performance can be quite significant. Parallel execution improves processing for:

- Queries requiring large table scans, joins, or partitioned index scans
- Creation of large indexes
- Creation of large tables (including materialized views)
- Bulk insertions, updates, merges, and deletions

For more details on parallelism, partitioning, and other performance enhancement options, see the Oracle Database VLDB and Partitioning Guide 11g Release 2.

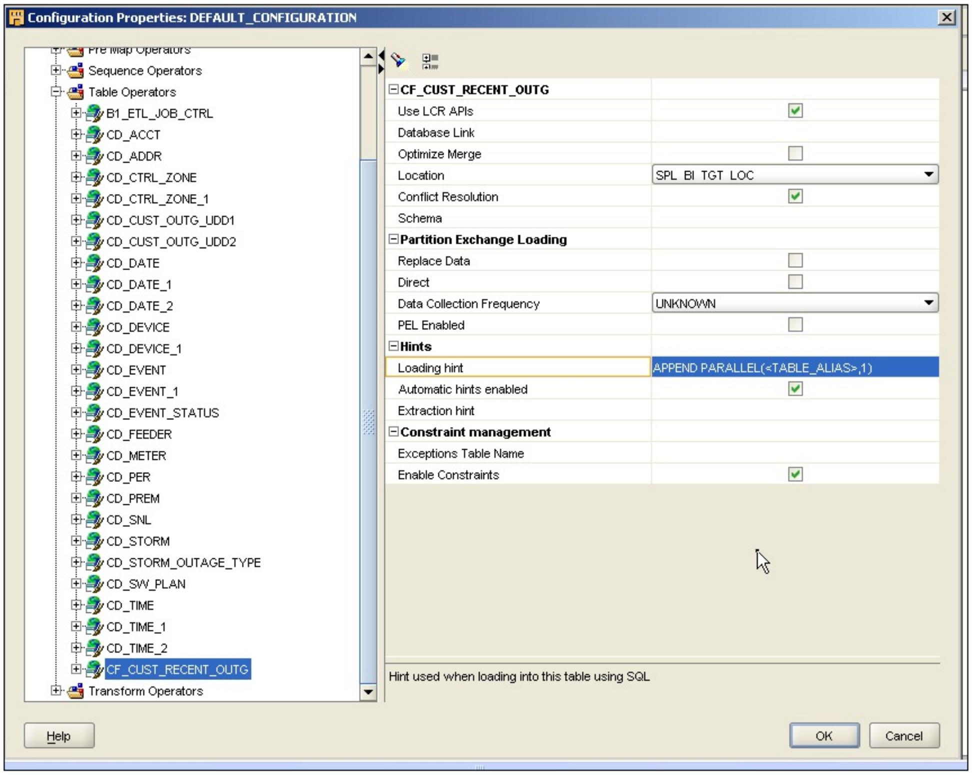
Parallelism in OWB Mappings

OWB mappings generate PL/SQL packages which utilize bulk load to populate the target entities. These jobs can make use of the parallel DML feature available with the Oracle database. All mappings have been configured for parallelism however the degree of parallelism has been set to a default of 1. Customers can appropriately change the degree of parallelism based on their hardware setup, data volumes for individual entities and the performance gain obtained by increasing the degree of parallelism.

The installation or Upgrade of Oracle Utilities Advance Spatial and Operational Analytics prompts you to set the degree of parallelism. However, if you want to change the degree of parallelism, please follow these steps in OWB:

1. Open Oracle Warehouse builder designer
2. Navigate to the mapping for which you would like to modify the degree of parallelism
3. On the context menu; click on configure
4. Navigate to the target entity and change the loading hint (highlighted in the image below), by replacing the value 1 with an appropriate degree of parallelism

Save the changes and redeploy the mapping.



CF_CUST_RECENT_OUTG	
Use LCR APIs	☑
Database Link	
Optimize Merge	☐
Location	SPL_BI_TGT_LOC
Conflict Resolution	☑
Schema	
Partition Exchange Loading	
Replace Data	☐
Direct	☐
Data Collection Frequency	UNKNOWN
PEL Enabled	☐
Hints	
Loading hint	APPEND PARALLEL(<TABLE_ALIAS>,1)
Automatic hints enabled	☑
Extraction hint	
Constraint management	
Exceptions Table Name	
Enable Constraints	☑

Hint used when loading into this table using SQL

Parallelism in Materialized Views

The materialized views can also utilize parallelism to refresh the snapshot data quickly. All materialized views have been preconfigured to a default degree of parallelism of 1. However this can easily be changed during install or post install from the database or through OWB.

To change the degree of parallelism at the time of the installation, refer to the installation guide.

Use the following command To change the degree of parallelism through database:

```
ALTER MATERIALIZED VIEW <MVIEW_NAME> PARALLEL <DEGREE>.
```

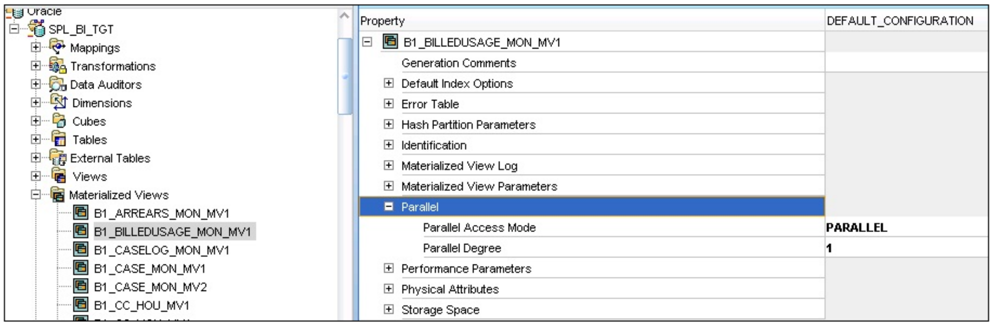
Specify the materialized view for which you want to change the parallelism by replacing <MVIEW_NAME> with the actual materialized view name and < DEGREE> with an appropriate integer value greater than 1.

This does not require the materialized view to be recreated.

Follow these steps to change the degree of parallelism for a materialized view using OWB:

1. Open Oracle Warehouse builder designer
2. Navigate to the mapping for which you would like to modify the degree of parallelism
3. On the context menu; click on configure
4. Change the property for the "Parallel Degree" to an appropriate value
5. Save changes and redeploy the materialized view.

Caution: Before changing the degree of parallelism for mappings or materialized views, understand and analyze the implications of the change and the capability of the hardware to support the changes.



Property	DEFAULT_CONFIGURATION
B1_BILLEDUSAGE_MON_MV1	
Generation Comments	
Default Index Options	
Error Table	
Hash Partition Parameters	
Identification	
Materialized View Log	
Materialized View Parameters	
Parallel	
Parallel Access Mode	PARALLEL
Parallel Degree	1
Performance Parameters	
Physical Attributes	
Storage Space	

Partitioning

The materialized views and the facts which are components of the OUBI product are not partitioned by default. Customers who have the partitioning license can opt to partition the materialized views and the facts as another way to increase the overall performance of the product.

Partitioning Recommendations:

It is recommended that the materialized views be partitioned on the year and month columns. Most of the dashboards and analytics are month and year based hence partitioning on the month and year would improve the efficiency of the data fetches in the dashboards.

In particular, we recommend to partitioning the following materialized views used in the TopX reports be partitioned on the month and year keys:

```
B1_VEE_EXCP_TOPX_MON_MV1

B1_DEV_ACT_TOPX_MON_MV1

B1_DEVICE_EVT_MON_TOPX_MV1

B1_SP_SNAP_MON_TOPX_MV1

B1_SP_UT_AGE_MON_TOPX_MV1

B1_CONSUMPTION_MON_TOPX_MV1

B1_CREW_TASKS_MON_MV1

B1_CMP_SHIFT_MON_MV1

B1_FLD_ACTIVITY_MON_MV1
```

The facts can become huge quite quickly and partitioning based on the date key of the fact may help in improving the performance.

Note: This is not the complete list of MVs delivered with OUASA v2.4.0.

Tables to consider for Partitioning

If the partitioning of materialized view does not prove sufficient to achieve desired performance you can consider partitioning Fact tables as well.

Because the primary keys for all tables are sequential, it is possible to partition any table based on the primary key field. However, you should partition Fact tables based on one of the Date Keys present in the table. Some of the date keys are optional, so it is important to pick a date key field that will always have a non-zero value. Also, because the RECENT fact tables should be purged daily, these tables do not need to be partitioned.

The following is a list of the tables and corresponding key columns that are candidates for partitioning. The partitioning key listed is the suggested date key field that should not have 0 values. (Note - The optimal partition key for a table may vary depending on data, the list below is just a potential candidate keys for partitioning).

Table Name	Partition Column Name
CF_ARREARS	DATE_KEY
CF_BILLED_USAGE	BILL_DATE_KEY
CF_CASE	OPEN_DATE_KEY
CF_CASE_LOG	LOG_DATE_KEY
CF_CC	CC_DATE_KEY
CF_CITY_OUTG	BEGIN_DATE_KEY
CF_COLL_EVT	EVENT_DATE_KEY
CF_COLL_PROC	START_DATE_KEY
CF_CTRL_ZONE_OUTG	BEGIN_DATE_KEY
CF_CUST_RECENT_OUTG	BEGIN_DATE_KEY
CF_CUST_RST_OUTG	BEGIN_DATE_KEY
CF_FEEDER_DLVRD_LOAD	SNAPSHOT_DATE_KEY
CF_OP_ACTG	TRANS_DATE_KEY
CF_ORDER	CREATE_DATE_KEY
CF_OUTG	SNAPSHOT_DATE_KEY
CF_PAY_TNDR	PAYEVT_DATE_KEY
CF_RST_CALL	CALL_DATE_KEY
CF_RST_CREW	ASSIGN_DATE_KEY
CF_RST_JOB	BEGIN_DATE_KEY
CF_SA	START_DATE_KEY
CF_STRM_INV	SNAPSHOT_DATE_KEY
CF_SW_PLAN	BEGIN_DATE_KEY
CF_SW_PLAN_STATE	BEGIN_DATE_KEY
CF_TD_ENTRY	CREATE_DATE_KEY
CF_UCOL_EVT	EVT_DATE_KEY
CF_UCOL_PROC	START_DATE_KEY
CF_FLD_ACTIVIT	SCHED_START_DATE_KEY, STATUS_DATE_KEY, CRE_DATE_KEY

Table Name	Partition Column Name
CF_CMP_SHIFT	SHIFT_PLANNED_START_DATE_KEY
CF_CREW_TASK	FROM_DATE_KEY
CF_INSTALL_EVT INSTALL	DATE_KEY
CF_SP_SNAP	DATE_KEY
CF_VEE_EXCP	DATE_KEY
CF_DEVICE_ACTIVITY	START_DATE_KEY
CF_DEVICE_EVT	START_DATE_KEY
CF_SP_UT_AGE	DATE_KEY

Caution: Before partitioning the facts or materialized views, understand and analyze the implications of the change and the capability of the hardware to support the changes.

Purging Audit Records

Oracle Utilities Advance Spatial and Operational Analytics utilizes Oracle Workflow when running Oracle Warehouse Builder Process flows to load extract files into the Data warehouse. Even if extract files are not present, records are created in Audit tables each time a process flow is run. Depending on the frequency with which process flows are scheduled, these audit tables could grow to become unmanageable, and can cause upgrades or process flow changes to fail when being deployed.

A few of these audit tables include the run-time Oracle workflow audit tables, and can grow very large:

- WF_ITEM_ATTRIBUTE_VALUES - This table stores the run-time values of the Item Attributes for a particular Process flow.
- WF_ITEM_ACTIVITY_STATUSES - This table, along with the WF_ITEM_ACTIVITY_STATUSES_H, contain all of the activities executed by a specific occurrence of a Process flow.
- WF_NOTIFICATION_ATTRIBUTES - This table contains the run-time values of all the Message Attributes for a specific Notification

In addition, Oracle Warehouse Builder also contains audit tables that can also grow very large if not purged periodically.

Oracle Utilities Advance Spatial and Operational Analytics includes a Purge process flow that calls the Oracle Warehouse Builder and Oracle Workflow APIs to purge these audit tables as well. The OUBIWF_PURGE_RT_AUDIT process flow in the INIT_PKG Package is set up to purge audit data that is older than one month.

The OUBIWF_PURGE_RT_AUDIT process flow is not run from the file processor daemon, so you must schedule it using a scheduler tool that can run OWB Process Flows. You can also schedule the procedure that this process flow calls, OUBI_PURGE_RT_AUDIT_DATA_PRC, using a tool that can call a PL/SQL command. This procedure requires no parameters, and can be called directly from a PL/SQL block, like this:

```
BEGIN
     OUBI_PURGE_RT_AUDIT_DATA_PRC;
```

```
END;
```

You should run either this purge routine, or the OWB and OWF purge routines at least monthly, so that the audit tables remain small. It is recommended to purge these tables at least once a month.

Purging ETL Job Control Tables

It is recommended that the ETL Job Control tables are purged on a regular basis. For analysis purposes it is suggested to retain 30-90 days of data but depending on your need this value should be appropriately adjusted.

The ETL Job Control table resides in the dwadm schema on the BI instance. A sample script to purge the ETL Job Control table is shown below. Provide an appropriate value for the number of days for which data needs to be retained in the ETL Job Control table.

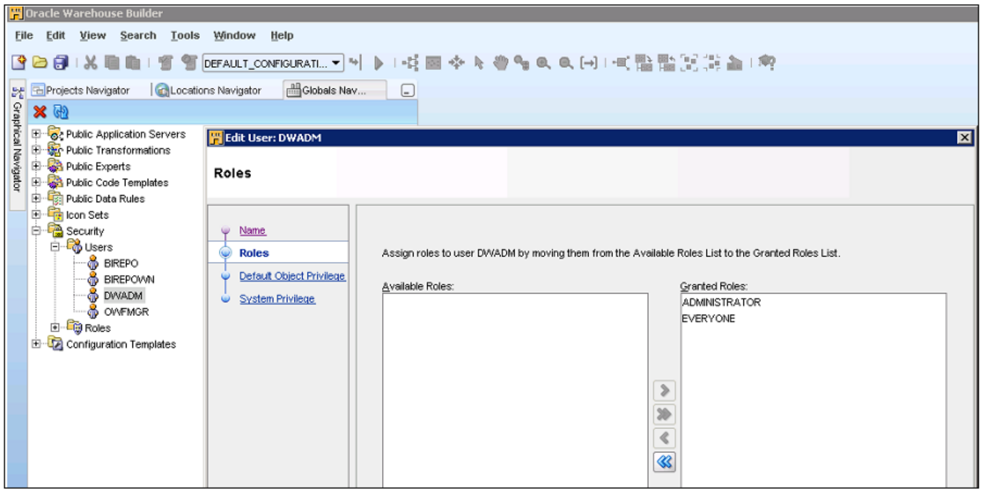
```
delete from b1_etl_job_ctrl
 where start_dttm < sysdate -&days_to_retain
   and end_dttm is not null
   and job_status_flag = 'JC';
commit;
```

> **Note:** You should make a backup before proceeding.

Configuring OWB to Enable Purging

Follow these steps to configure OWB to allow the DWADM schema to execute the OUBI_PURGE_RT_AUDIT_DATA_PRC procedure successfully:

1. The DWADM user should be given Administration privileges on the workspace. The following image shows the Administrator role granted to a DWADM user.



Edit User: DWADM

Roles

Assign roles to user DWADM by moving them from the Available Roles List to the Granted Roles List.

Available Roles:

Granted Roles:
ADMINISTRATOR
EVERYONE

2. The following objects should be granted roles to DWADM:
   - OWFMGR.WF_PURGE
   - OWBSYS.WB_RT_AUDIT_PURGE
   - OWBSYS.WB_RT_AUDIT_EXECUTIONS
   - OWBSYS.WB_RT_DEF_EXECUTION_OPERATORS
3. Create synonyms for the following objects in the DWADM schema:
   - OWBSYS.WB_RT_AUDIT_EXECUTIONS
   - OWBSYS.WB_RT_DEF_EXECUTION_OPERATORS

Chapter 4

Configuring Dashboards

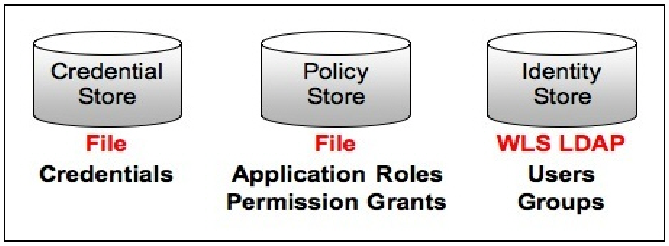
This section describes the configuration dashboards in Oracle Utilities Advanced Spatial and Operational Analytics (OUASA), including:

- **Configuring User Security**
- **OUASA: Configuring Drill Back**
- **OUASA: Spatial Data Configuration**
- **OUASA: Label Configuration**
- **Supporting Multiple Languages**

Configuring User Security

OBIEE 11g provides a scalable default security mechanism available for immediate implementation after installation. The default security mechanism provides controls to manage users and groups, grant permissions, and store credentials. The following security controls are available after the installation:

- An embedded LDAP server in WebLogic available to store users and groups known as **Identity Store.**
- A file to store the permission grants information known as the **Policy Store.**
- A file to store user and system credentials for inter process communication known as the **Credential Store.**



OBIEE 11g also includes many changes in how security is configured, such as:

- User and Groups are no longer defined in the RPD.
- User Profile is derived from the LDAP server.
- RPD is protected by RPD Password.
- RPD is encrypted.
- Applications Roles are introduced.

- User Administrator and Group Administrators are not coded in the RPD.
- Administrator User not used for Inter-Process Communication (component to component).
- Credential Store storage mechanism.

Authentication

In OBIEE 10g default authentication is RPD based. In 11g, the user and group definitions are moved to the Identity Store, which is an LDAP server embedded with the WebLogic server. WebLogic is the default authentication provider for OBIEE 11g, so creation of users and groups and the association of members to groups are managed in the WebLogic administration console. Users are authenticated by the WebLogic server based on the credentials in the embedded WebLogic LDAP server. The embedded LDAP server is default Authentication provider for WebLogic and for OBIEE.

OBIEE 11g gets user, groups and other user attributes from the WebLogic LDAP server. This also eliminates the limitation we had with previous versions of OBIEE where only one group for a user can be read directly from an LDAP server.

An application role defines the set of permissions granted to a user or group. Default application roles have corresponding default system user groups used in assigning catalog permissions and system privileges.

The following default application roles are shipped with the default security configuration:

- **BISystem:** This role is designed for system tasks and is usually not assigned to users.
- **BIConsumer:** This role grants the permissions necessary to use, or to consume, content created by other users. By default, every Oracle Business Intelligence authenticated user is part of the BIConsumers group and does not need to be explicitly added to the group or role.
- **BIAuthor:** This role grants the permissions necessary to create and edit content for other users to use, or to consume. Any member of the BIAuthors group is explicitly granted this role and implicitly granted the BIConsumer role.
- **BIAdministrator:** This role grants the administrative permissions necessary to configure and manage the Oracle Business Intelligence installation. Any member of the BIAdministrators group is explicitly granted this role and implicitly granted the BIAuthor and BIConsumer roles.

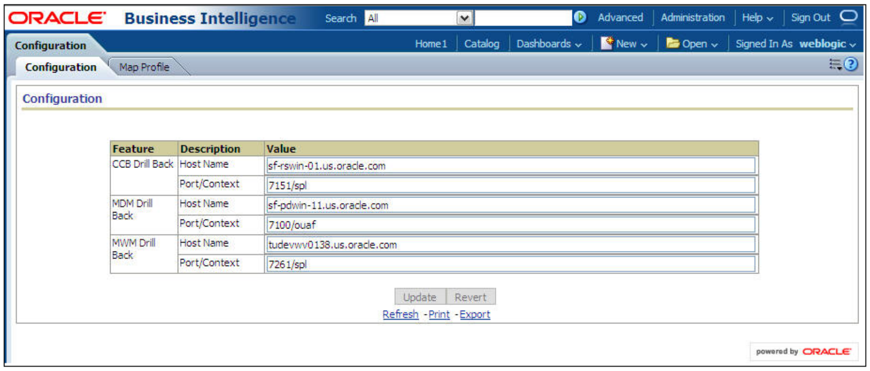
Additional roles can be created as required and users can be assigned to these roles to control the access provided to the users.

Refer to the Oracle Fusion Middleware Administrator's Guide for Oracle Business Intelligence Publisher for further details on user creation, access control, and administering OBIEE.

OUASA: Configuring Drill Back

The OUASA provides multiple drill back functionality from various reports in OUASA to the source applications (MDM, MWM and CCB). You must configure the drill back by providing required information for this functionality to work.

The Configuration dashboard under Administration group can used for configuring various options in OUASA. The first tab, 'Configuration', contains drill-back settings for the source applications.



Configuration

Feature	Description	Value
CCB Drill Back	Host Name	sf-rswin-01.us.oracle.com
	Port/Context	7151/spl
MDM Drill Back	Host Name	sf-pdwin-11.us.oracle.com
	Port/Context	7100/ouaf
MWM Drill Back	Host Name	tudevwv0138.us.oracle.com
	Port/Context	7261/spl

Please update the host name, port, and the context root folder for the various edge applications on this page. After updating the value for the environment, the drill back links on the various dashboard pages will then use the new values when an item is selected.

Currently the product supports drill back to CCB, MDM and MWM edge applications. The customers are required to configure for all those applications for which they have implemented the OUASA analytics and can ignore configuration for applications which they haven't implement.

OUASA - Answer Configuration

The Tamper Events analytic report in the **Overview** dashboard under Meter Data Management Menu needs to be configured before data can be viewed in this report. This report needs to be configured to set the appropriate code for tamper events which needs to be shown in the answer. The appropriate code as available in the source Oracle Utilities Meter Data Management application needs to be set here.

OUASA: Spatial Data Configuration

This section describes how to configure mapping for Oracle Utilities Advanced Spatial and Operational Analytics. It includes the following topics:

- **Loading Geographic Data**
- **Integrating Mapping with the NMS Network Model**
- **Configuring MapViewer for Dashboards**
- **Map Profile Configuration**

Loading Geographic Data

In order to place information on a geographic map, data in the data warehouse must match geographic data (themes) that are configured in Oracle MapViewer.

The standard map answers delivered with Oracle Utilities Advanced Spatial Analytics include maps that query state, city, county, postal codes and network model summary data. Because Oracle Utilities Advanced Spatial Analytics does not have access to this spatial data (and each customer would require different spatial data), you must set up the geographic themes used in the maps. For detailed instructions on how to set up these standard spatial themes, refer to the Oracle Utilities Advanced Spatial Analytics Installation Guide.

The installation instructions refer to shape files downloaded from the US Census bureau. However, shape files can also be used for the state, city, county and zip code boundaries. The only requirement is that the names of the geographic entities in the shape file match the corresponding name in the CD_ADDR table. This is not usually a problem for postal code data, but can be an issue for city and county names, as different sources may use different names to refer to geographic places. Make sure after loading the MapViewer shapefiles that the names in the geographic tables match the names that are in the CD_ADDR table. If they do not match, then the maps may not display correctly.

Integrating Mapping with the NMS Network Model

Oracle Utilities Network Management provides a mechanism to create spatial themes in Oracle MapViewer for the entire electrical network model. The default implementation of Oracle Utilities Advanced Spatial Analytics does not provide links to these Mapviewer themes, but it is possible to modify the maps in the Outage Analytics dashboards to show the various elements of the network model on the Outage Maps. This section provides an overview of the steps needed to provide the network model on the outage maps. For detailed information on the steps needed to set up the NMS Model Build process, please refer to the NMS Installation Guide.

To build the network model in NMS, the model build process must be set up to populate the geometry columns. Detailed instructions for this can be found in the NMS Installation Guide.

To ensure that the network model can be displayed without coordinate translations during runtime, one of the geometry columns should use the same projection coordinate system as the base map used by the Outage Analytics Outage maps. If Oracle eLocation is being used as the base map, then this would be srid 54004.

Once the model build is set up to populate the geometry columns, themes for the various network model components must be built. For example, there may be a theme for transformers, another theme for conductors, and other themes as required to build the network model. NMS provides templates that can help with setting up these themes, which in a base product installation might be ten or more themes. For more information, please refer to the NMS Installation Guide.

After the NMS Network Model themes are set up, they can be accessed directly from the Outage Analytics Outage Maps, or they can be copied to the MapViewer instance being used by the OBIEE dashboards. There are advantages to either option:

- If the NMS themes are accessed directly, then near real-time device status information can be displayed in the Outage Analytics Outage Maps. Caching will affect the lag time of the status information. This can be a good or bad, depending on how the refresh frequency of the NRT outage information in the data warehouse is set. There may be information in the device status that might not have been extracted yet, which could cause a mismatch between the database data and the spatial data.
- Display of the NMS themes will require access to the NMS database, so if the database is down, or network access to the database is not available from the data warehouse database, then the themes would not display on the maps.
- There could be a performance impact on the NMS database if a large number of users are displaying the outage maps in the OBIEE dashboards.
- If the themes are accessed in the BI database, then a mechanism will need to be set up to periodically copy any changes to the Network Model from NMS to BI. The DIAGRAM_OBJECTS table, along with the Theme Metadata will need to be copied.

For each theme defined in the NMS Network Model that should be displayed on an Outage Map, the static text for the answer will need to be updated to access that theme, and provide a check box that will turn the theme on or off. Please note that if this change is done, the process described in the OBIEE customization section above should be followed. First create a copy of the answer that needs to be modified, edit that copy of the answer, and then modify the dashboard to access the copy of the answer instead of the released copy of the answer.

Consider the following example. You want to add two NMS themes named 'Transformers' and 'Conductors' to the Outage Map answer on the Overview tab of the Outage Dashboard. If you edit the dashboard page, you will see that this answer is called 'outage demo' and exists in the /Shared Folders/Outage Analytics/Spatial Requests folder.

To edit modify this answer, follow these steps:

Create a folder called ‘Project Customizations’ or some other unique name in the /Shared Folders folder, and copy the outage demo answer into it.

1. Open the outage demo answer and edit the static text box.
2. In the static text box, edit the JavaScript code to add the new Transformers and Conductors themes. The following code should be added just before the addLegendFilter code. Set the legendSelected parameter to ‘Y’ to display the network model themes when the map first opens up.

```
var parm11 = new Array();
parm11['nodeId'] = 'MapNode1';
parm11['legendLabel']='Show Transformers';
parm11['theme'] = 'Transformer';
parm11['legendSelected'] = 'N';
addStaticThemeParameter(parm11);

var parm12 = new Array();
parm12['nodeId'] = 'MapNode1';
parm12['legendLabel']='Show Conductors';
parm12['theme'] = 'Conductors';
parm12['legendSelected'] = 'N';
addStaticThemeParameter(parm12);
```

Note: There is an issue with using the Firefox Browser to edit static text. When you use Firefox, all of the text cannot be viewed in the browser. Because of this, you should use Internet Explorer when editing the static text for the Map answers in Oracle Utilities Advanced Spatial Analytics.

Configuring MapViewer for Dashboards

This section describes the different methods of implementing maps in Oracle Utilities Advanced Spatial Analytics, including:

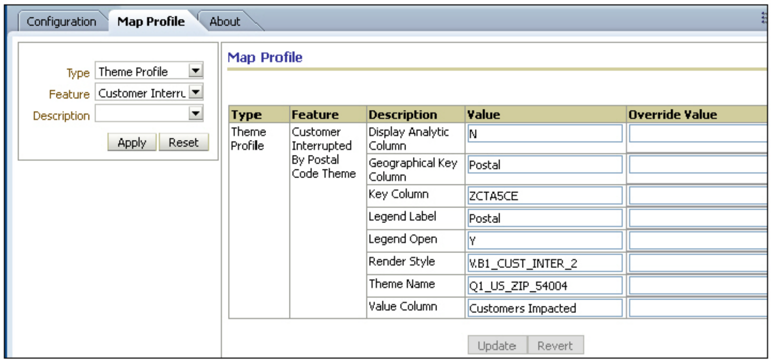
- **Custom Implementation Method**
- **Standard Implementation Method**

Custom Implementation Method

The custom implementation method has been used for Outage Maps from NMS dashboards and is similar to the stand-alone MapViewer setup used in OBIEE Versions prior to 11g. Sets of Map attribute and theme profiles are provided to support this method. Attribute profiles hold the data source information and the API keys. Theme profiles are used to map the Geographic column with the key column. Using this method you can:

- Create new answers using static text view with a call to the Standard APIs along with the theme profiles that should be applied.

- Update theme profiles from the Map Profile Page that is provided in the Configuration Dashboard. You can override the base values by using the Override Value column, as shown in the following image:



Type: Theme Profile
Feature: Customer Interru
Description:

Map Profile

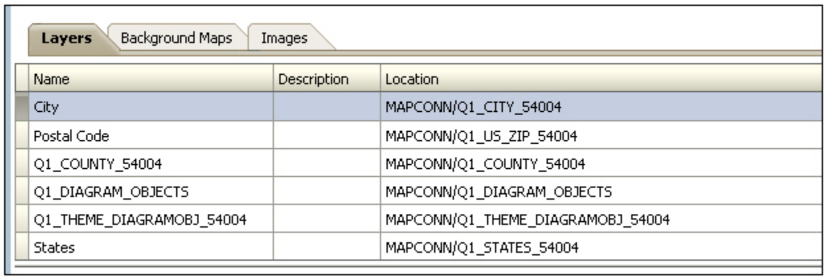
Type	Feature	Description	Value	Override Value
Theme Profile	Customer Interrupted By Postal Code Theme	Display Analytic Column	N	
		Geographical Key Column	Postal	
		Key Column	ZCTA5CE	
		Legend Label	Postal	
		Legend Open	Y	
		Render Style	V.B1_CUST_INTER_2	
		Theme Name	Q1_US_ZIP_54004	
		Value Column	Customers Impacted	

Please note that no support is provided to create new theme profiles. Upgrade scripts are provided to load the custom themes into the new Configuration table.

Standard Implementation Method

The standard implementation method is the default implementation method for OBIEE 11g. This form of map can be seen in various dashboards like MDM, MWM and CCB Analytics. Using this method you can create new answers using the Map View. This view uses the configuration defined under the Administration menu, in Manage Map Data.

The layers, background maps, and the images being used in the map must be defined in this page. The Key column and geographical columns are to be mapped for each Subject Area to be used in the analysis. This is a one-time setup unless new subject areas are added.



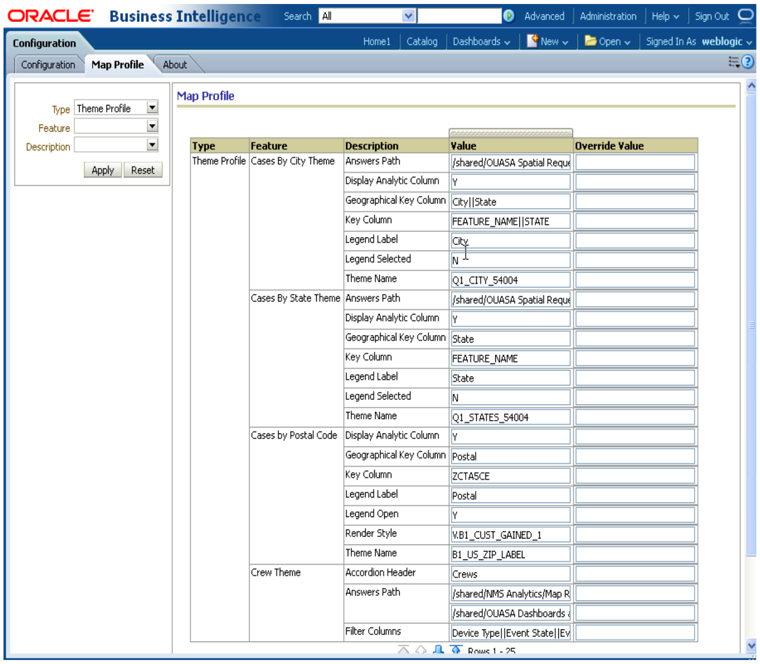
Name	Description	Location
City		MAPCONN/Q1_CITY_54004
Postal Code		MAPCONN/Q1_US_ZIP_54004
Q1_COUNTY_54004		MAPCONN/Q1_COUNTY_54004
Q1_DIAGRAM_OBJECTS		MAPCONN/Q1_DIAGRAM_OBJECTS
Q1_THEME_DIAGRAMOBJ_54004		MAPCONN/Q1_THEME_DIAGRAMOBJ_54004
States		MAPCONN/Q1_STATES_54004

Please note that you should not customize the map metadata until after you import the Spatial Catalog file.

For customizations that involve map analysis, all customer modifications must be done in a separate folder in order for those modifications to be preserved when you upgrade Oracle Utilities Advanced Spatial Analytics.

Map Profile Configuration

The configuration dashboard contains three tabs that are used for configuring various items for OBIEE. The Map Profile configuration tab contains configuration options for the 10g version of the maps used in the NMS dashboards.


ORACLE Business Intelligence
Search All
Advanced | Administration | Help | Sign Out
Configuration
Home1 | Catalog | Dashboards | New | Open | Signed In As weblogic
Configuration | Map Profile | About
Type Theme Profile
Feature
Description
Apply | Reset
Map Profile
Rows 1 - 25

Type	Feature	Description	Value	Override Value
Theme Profile	Cases By City Theme	Answers Path	/shared/OUASA Spatial Reque	
		Display Analytic Column	Y	
		Geographical Key Column	City||State	
		Key Column	FEATURE_NAME||STATE	
		Legend Label	City	
		Legend Selected	N	
		Theme Name	Q1_CITY_54004	
	Cases By State Theme	Answers Path	/shared/OUASA Spatial Reque	
		Display Analytic Column	Y	
		Geographical Key Column	State	
		Key Column	FEATURE_NAME	
		Legend Label	State	
		Legend Selected	N	
		Theme Name	Q1_STATES_54004	
	Cases by Postal Code	Display Analytic Column	Y	
		Geographical Key Column	Postal	
		Key Column	ZCTA5CE	
		Legend Label	Postal	
		Legend Open	Y	
		Render Style	V.B1_CUST_GAINED_1	
		Theme Name	B1_US_ZIP_LABEL	
	Crew Theme	Accordion Header	Crews	
		Answers Path	/shared/NMS Analytics/Map R	
			/shared/OUASA Dashboards ä	
		Filter Columns	Device Type||Event State||Ev	

OUASA: Label Configuration

This section describes how to create and customize the labels that appear in answers and dashboards.

> **Note:** You must have the full license of the Oracle Utilities Advanced Spatial and Operational Analytics to use this feature.

This section includes the following topics:

- **Overview of Labels**
- **Overriding Base Labels**
- **Supporting Multiple Languages**

Overview of Labels

Oracle Utilities Advanced Spatial Analytics uses labels for columns and tables in the delivered OBIEE repository file when displaying the columns in the presentation folders for users. From there these labels are displayed in the answers for the columns on the dashboards. In addition, the answers are also titled based on labels stored in metadata displayed in report titles, sub-titles and other dashboard strings.

The main reason that the application uses labels instead of hard-coding the text values in the answers and RPD file is to support translation of dashboards into different languages and allow easy overriding of labels for customers that want to customize the field label.

For example, within an answer, labels can be referred to by biServer variables. For example, the Device Activity - Distributions report uses this variable in the title section of the answer: @{biServer.variables['NQ_SESSION.B1_RPT_DEV_ACTI_DISTRIBUTION']}. The B1_RPT_DEV_ACTI_DISTRIBUTION label is defined in the B1_MD_FLD table in DWADM schema.

For columns in the fact and dimension tables, labels exist for every field. For example, the UDF1_DESCR column in the CD_ACCT table has the Description of Customer Class, and the Customer Class label is what is displayed in the presentation folder for this field.

Overriding Base Labels

There are several reasons that an implementation may want to update an existing label:

1. A field may contain data that doesn't match the default extracted data for that field. In the CD_ACCT example above, you may elect to store information other than customer class in the UDF1_DESCR field. If an extract change is made to the default CD_ACCT extract, an implementation could change the label for the UDF1_DESCR field of the CD_ACCT table in one place and the label would change in all dashboards and answers that display that field. This reason would also apply if data is extract to a UDF field that doesn't already have a default population.
2. Even if you use the default extract code, you may want to call the data extracted something other than the default name. In the CD_ACCT example, if you call the field extracted into the UDF1_DESCR field Account Class instead of Customer Class, you can make this change in one place and have it updated on all dashboards and answers.
3. You want to provide multilingual labels for your users. The Oracle Utilities Advanced Spatial Analytics application provides the labels to a user based on the language they selected when logging into OBIEE, assuming that the language is present in the B1_MD_FLD table. An implementation can add their own translated fields, or can download supported language packs from the Oracle Software Delivery Cloud. Note that multilingual support is only provided for labels, and not for the underlying data in the data warehouse. The data displayed in all database tables is not translatable from extract language.

To update a label for a base field, use the Base Field Maintenance dashboard in the Administration portal.

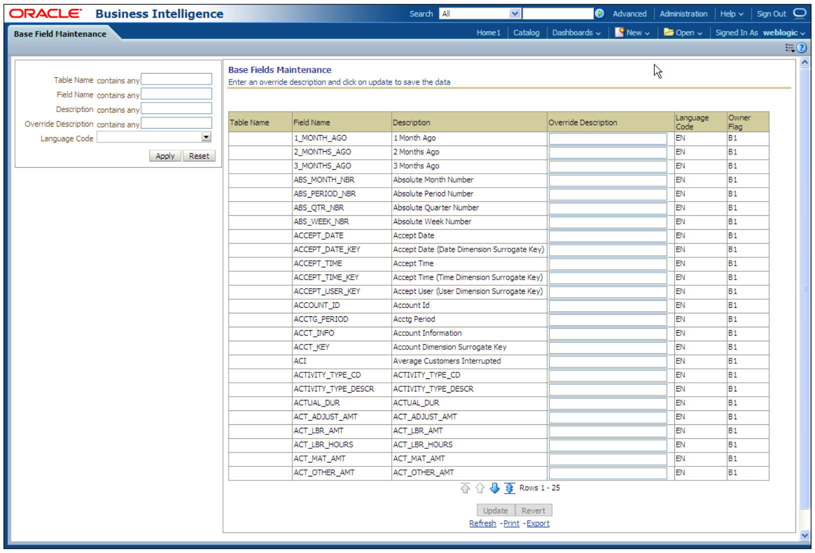


Table Name contains any
Field Name contains any
Description contains any
Override Description contains any
Language Code

Base Fields Maintenance

Enter an override description and click on update to save the data

Table Name	Field Name	Description	Override Description	Language Code	Owner Flag
	1_MONTH_AGO	1 Month Ago		EN	B1
	2_MONTHS_AGO	2 Months Ago		EN	B1
	3_MONTHS_AGO	3 Months Ago		EN	B1
	ABS_MONTH_NBR	Absolute Month Number		EN	B1
	ABS_PERIOD_NBR	Absolute Period Number		EN	B1
	ABS_QTR_NBR	Absolute Quarter Number		EN	B1
	ABS_WEEK_NBR	Absolute Week Number		EN	B1
	ACCEPT_DATE	Accept Date		EN	B1
	ACCEPT_DATE_KEY	Accept Date (Date Dimension Surrogate Key)		EN	B1
	ACCEPT_TIME	Accept Time		EN	B1
	ACCEPT_TIME_KEY	Accept Time (Time Dimension Surrogate Key)		EN	B1
	ACCEPT_USER_KEY	Accept User (User Dimension Surrogate Key)		EN	B1
	ACCOUNT_ID	Account Id		EN	B1
	ACCTG_PERIOD	Acctg Period		EN	B1
	ACCT_INFO	Account Information		EN	B1
	ACCT_KEY	Account Dimension Surrogate Key		EN	B1
	ACI	Average Customers Interrupted		EN	B1
	ACTIVITY_TYPE_CD	ACTIVITY_TYPE_CD		EN	B1
	ACTIVITY_TYPE_DESCR	ACTIVITY_TYPE_DESCR		EN	B1
	ACTUAL_DUR	ACTUAL_DUR		EN	B1
	ACT_ADJUST_AMT	ACT_ADJUST_AMT		EN	B1
	ACT_LBR_AMT	ACT_LBR_AMT		EN	B1
	ACT_LBR_HOURS	ACT_LBR_HOURS		EN	B1
	ACT_MAT_AMT	ACT_MAT_AMT		EN	B1
	ACT_OTHER_AMT	ACT_OTHER_AMT		EN	B1

Rows 1 - 25

There are four types of labels that can be queried in this screen.

- **Table Labels:** For records that have the Table Name field populated but not the Field Name, this label is shown in the presentation folder for the fields that are available in this table. For example, the CD_ACCT table has the label 'Account Dimension' displayed in the Presentation folders wherever it is used.
- **Field Labels:** For records that have both the Table Name and Field Name fields populated, this label is shown in the presentation folder and on answers whenever that field is used. For example, the UDF1_DESCR field in the CD_ACCT table has the label 'Customer Class'

displayed whenever it is used in an answer, or when a user selects it from the presentation folder when creating a new answer.

- **Report Labels:** Records that have a field name like 'B1_RPT%' and no table name value are used for the titles of answers in the dashboards. For example, the B1_RPT_DEV_ACTI_DISTRIBUTION label is defined to be 'Device Activity Distribution', and this is displayed on the MDM dashboard when the answer is displayed.
- **Other Labels:** All other non-report labels that have a field name but no table name are used for calculations that are computed in the RPD Logical layer for display on answers. For example, the B1_APPT_IND_SUM label is defined to be 'Number of Appointments', and is used in MWM answers that compute the number of crew appointments based on the Appointment Indicator field in the CF_CREW_TASK fact table.

If a base field label should be changed, then the implementation team can query the required record on the Base Field Maintenance dashboard, and populate a value in the Override Description field, and click Update. Once populated, the OBIEE Server will need to be restarted (as documented in the installation guide) for the change to take effect.

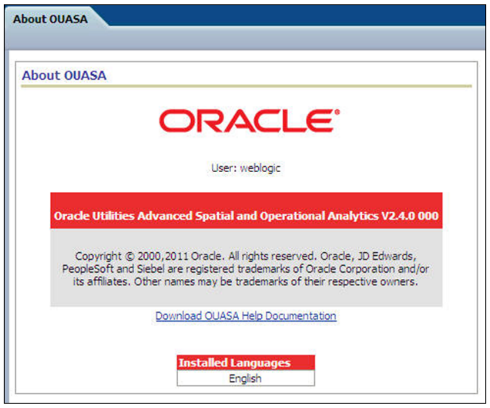
Supporting Multiple Languages

Oracle Utilities Advanced Spatial Analytics is released with default support for English labels on all dashboards and answers. And OBIEE and OUASA both provide multiple language support.

The default language on the login page is English, however user can select any of the supported language on login page or can change the preferred language under Administration menu, to view Dashboards in a different language. If the customer has not purchased and applied the specific language pack, and a user selects a language other than English, the default OBIEE labels will still be translated in selected language but OUASA product specific labels will appear in English.

Oracle Utilities Advanced Spatial Analytics may release various language packs depending on user demand, so if the language needed has been released, installing the language pack will be sufficient for creating the labels needed by the dashboards.

To view the list OUASA language pack applied on an environment, user can navigate to 'About OUASA' dashboard under the About heading.



About OUASA

User: weblogic

Oracle Utilities Advanced Spatial and Operational Analytics V2.4.0 000

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Download OUASA Help Documentation

Installed Languages
English

Please contact your Oracle support representative to purchase a OUASA Language Pack for additional language support.

Chapter 5

Customizations

Oracle Utilities Advanced Spatial and Operational Analytics come with out of the box solution with Extractors & Schemas, ETL programs, OWB configurations and OBIEE Analytics. You can customize the product to suite your extended requirements easily. This section describes how to customize Oracle Utilities Advanced Spatial and Operational Analytics. It includes the following topics:

- **User Defined Columns**
- **Extending Extractors and Schema**

User Defined Columns

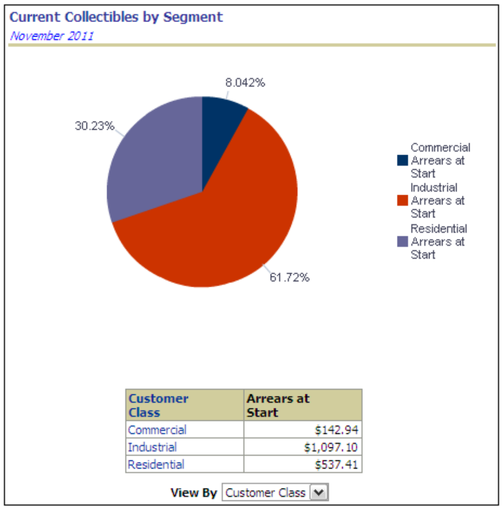
This section covers the general data warehousing concepts that are required to understand the various user defined columns that are already available as placeholders in the OUBI product. For specific details on how to extend a particular dimension's UDFs or fact's UDMs refer to the individual sections of the various extraction approaches.

This section includes the following topics:

- **User Defined Fields (UDFs)**
- **User-Defined Measure (UDMs)**
- **User Defined Dimension (UDDs)**
- **User-Defined Degenerate Dimensions (UDDGENs)**
- **User-Defined Foreign Key Dimensions (UDDFKs)**
- **Extending Extractors and Schema**

User Defined Fields (UDFs)

Users look at the facts in the data warehouse by slicing and filtering the analytic data by different dimensions. For example, the following graph shows collectible sliced by customer class (the Collectibles fact is sliced by the customer class field on the account dimension):


8.042%
30.23%
61.72%
Commercial Arrears at Start
Industrial Arrears at Start
Residential Arrears at Start

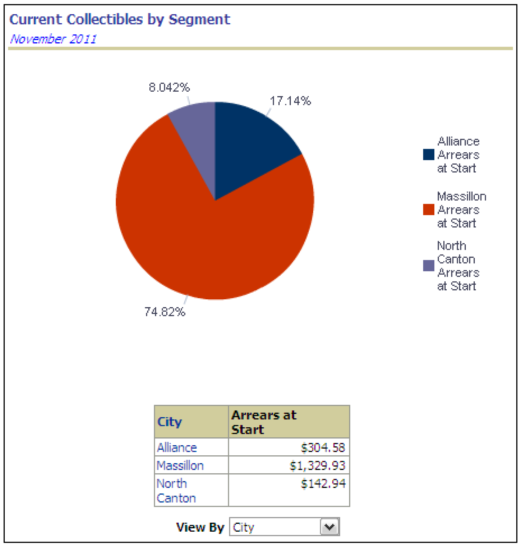
Current Collectibles by Segment

November 2011

Customer Class	Arrears at Start
Commercial	$142.94
Industrial	$1,097.10
Residential	$537.41

View By Customer Class

Whereas the following report slices the same fact by a different field on a different dimension (the city on the address dimension). In addition, it limits the analysis to a specific customer class: Commercial.


8.042%
17.14%
74.82%
Alliance Arrears at Start
Massillon Arrears at Start
North Canton Arrears at Start

Current Collectibles by Segment

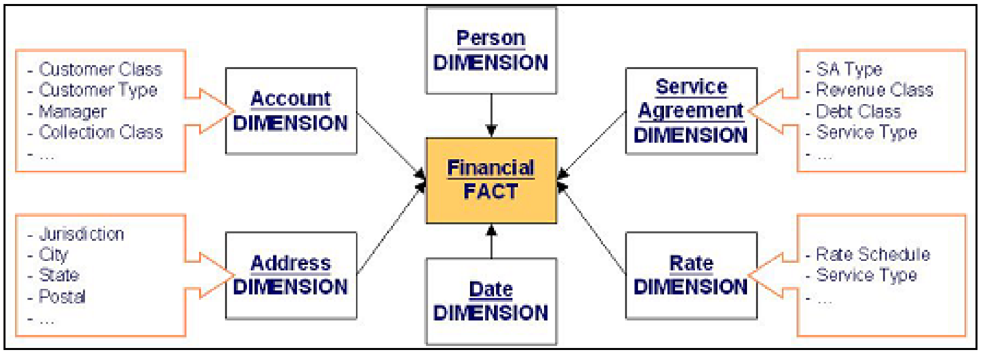
November 2011

City	Arrears at Start
Alliance	$304.58
Massillon	$1,329.93
North Canton	$142.94

View By City

This examples show how a single report can be sliced and filtered by different dimensional attributes.

Users can "slice and filter" a fact using any field on any dimension linked to the analytic's fact. For example, users can slice reports related to the financial fact by any field on its dimensions. The following simplified data model of the financial fact's star schema helps clarify this concept:



This data model shows that the financial fact has 6 dimensions. This means that graphs can be configured to allow end users to slice the financial fact by any of the attributes on the six dimensions. For example, you could set up a report to slice the financial fact by any combination of:

- The Account Dimension's Customer Class and Manager
- The Address Dimension's Jurisdiction
- The Service Agreement Dimension's Revenue Class
- The Rate Schedule Dimension's Rate
- ….

You could set up another report to slice and filter this fact by a different combination of fields. You should also be aware that this example is simplified. In reality, most facts have more than six dimensions and most dimensions have several fields.

An artificial limit. While Oracle Utilities Business Intelligence allows you to slice and filter a fact by any field on its dimension, you may want to limit the number of fields on your report to a discreet group. Why? Because the materialized views that you set up to make the system perform may become unwieldy if they contain too many fields.

If you wish to change the UDFs on your dimensions at a future date, you can. The following points summarize the major steps involved in doing this:

- Update the meta-data in the source system to populate the UDFs on the respective dimensions. For more detailed information refer to the "Extending extractors for UDFs and UDMs" section under each of the different extraction approach sections.
- Update the dimensions extract program to extract the new fields.
- Run the respective extract in "extract everything" mode or the Initial Load batch control depending upon your particular approach.

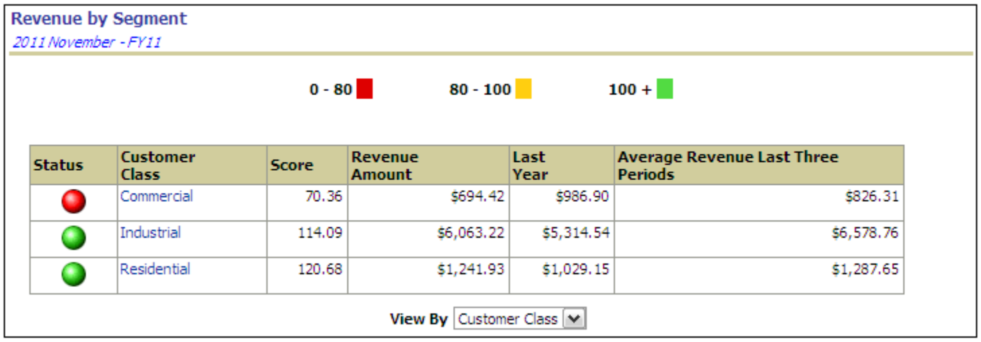
Doing the above allows all new facts to be sliced and filtered by the newly added UDFs. If you want to "slice and filter" historical facts by the new fields, you must update the historical dimensions to contain the current value of the new UDFs.

User-Defined Measure (UDMs)

A measure is a column on a fact that holds a measurable value. For example, the financial fact has a measure that holds the amount of revenue produced by a bill.

Most facts in the Oracle Utilities Business Intelligence data warehouse have several measures. For example, in addition to the revenue measure, the financial fact also has measures holding the total taxes and other charges on a bill.

For example, the following report shows several measures - Score, Revenue Amount for the current, last and the last three periods.



Revenue by Segment

2011 November - FY11

0 - 80 🟥 80 - 100 🟨 100 + 🟩

Status	Customer Class	Score	Revenue Amount	Last Year	Average Revenue Last Three Periods
●	Commercial	70.36	$694.42	$986.90	$826.31
●	Industrial	114.09	$6,063.22	$5,314.54	$6,578.76
●	Residential	120.68	$1,241.93	$1,029.15	$1,287.65

View By Customer Class

The facts and their extract programs are delivered with all of the obvious measures populated. However, if your implementation requires additional measures you can populate user-defined measures (UDM) on the facts. To do this, you introduce logic to the fact's extract program (in a user exit) to populate one or more UDM's accordingly. We'd like to stress that no database or OWB changes are necessary as both the data warehouse and OWB are delivered ready to support the newly populated UDM's.

UDM. We use the acronym UDM (user-defined measure) to reference the measures on the facts that you populate with implementation-specific measures.

User Defined Dimension (UDDs)

As described earlier, you can set up analytic reports to "slice and filter" a fact using any field on the dimensions linked to the fact. Oracle Utilities Business Intelligence delivers facts referencing the obvious dimensions. However, your implementation may need to link additional dimensions to some facts. For example, the financial fact is delivered assuming that the revenue, tax, and expense amounts should be aggregated regardless of the GL (general ledger) accounts impacted by a financial transaction (e.g., if a given adjustment references 6 revenue GL accounts, all 6 revenue amounts are summarized onto a single financial fact). This means that you cannot "slice and filter" revenue by specific general ledger accounts. If you want to offer this option to your users, you must introduce an additional dimension to the financial fact (in addition, you must change the fact's extract program to extract at this new level of granularity).

UDD. We use the acronym UDD (user-defined dimension) to reference implementation-specific dimensions on the fact tables. All fact tables are delivered referencing several empty UDD's for you to use.

The following points summarize how to set up a new UDD:

- You must create database trigger(s)/view(s) or sync BO(s) to cause new and changed dimensions to be interfaced to the data warehouse. There are many examples of dimensional triggers in the operational system that can be used as samples for your new triggers.
- You must create a new program to extract the new dimension's values. This extract will be executed in the operational system and will produce a flat-file containing the dimension's values. There are many examples of dimensional extract programs in the operational system that can be used as a basis of your new program.
- The flat-file produced by your extract is the input to Oracle Warehouse Builder. Oracle Warehouse Builder is delivered preconfigured to load the data warehouse from the flat-file.
- Run the new extract program in "extract everything" mode and let Oracle Warehouse Builder populate the dimension's rows.
- Return to Oracle Utilities Business Intelligence and display the UDD table by update the OBIEE rpd file. Enter the appropriate Override Label of each User Defined Fields (UDFs)

on the table (these are the dimensional attributes that users use to slice and filter the dimension's facts). For example, if the dimension is meant to hold GL accounts, it would make sense to define at least two UDFs:

  - The GL account number
  - The GL account type (e.g., revenue, expense, tax)

- Transfer to the operational system (e.g., Oracle Utilities Customer Care & Billing) and introduce user-exit code to the extract program to the appropriate UDD values for the fact. Refer to the edge applications chapter for the various approaches for more information about the extract programs.
- When you extract the facts after this point, the flat-file supplied to Oracle Warehouse Builder will be populated with the appropriate references to your UDD(s).

Increasing Granularity

UDDs may or may not increase the granularity of the fact. By increasing granularity, we mean that the number of rows or records extracted for the fact (i.e., the grains of detail) increases. Adding a UDD that does not change the number of rows in a fact does not impact the granularity of the fact.

Granularity Increased

An example showing an increase in granularity would be adding a UDD for distribution code. Prior to adding a UDD for distribution code one bill results in one financial fact record. After adding the UDD one bill results in many financial fact records (one per distribution code referenced on the bill segment). Increasing the number of records extracted means increasing the granularity.

When a UDD results in an increase in granularity, the implementation needs to include a change to the base code for the extract (i.e., develop a new extract by copying the base-package version).

Granularity NOT Increased

An example showing no increase in granularity would be adding a UDD for adjustment type. Since each financial transaction can only reference one adjustment type, adding this as a UDD would not increase the number of fact records produced by a financial transaction, and would therefore not increase granularity.

In this case, you only need to develop a new extract to extract the adjustment types, and make a simple change to the financial extract to populate a UDD with the adjustment type for the financial transaction.

After you have set up User Defined Dimension (UDDs), User Defined Measure (UDMs), and User Defined Fields (UDFs), you can then create new analytics reports to view this information.

User-Defined Degenerate Dimensions (UDDGENs)

Degenerate dimension (UDDGEN) columns reside directly on fact tables and can be used to filter fact data in the same way that User Defined Fields (UDFs) are. For example, currency code columns are commonly used UDDGENs in Oracle Utilities Business Intelligence. These columns exist on most of the fact tables and can be used to limit fact data shown in reports to a given currency code. Most fact tables in Oracle Utilities Business Intelligence are delivered with multiple UDDGENs. These columns are populated by introducing user-exit code in the respective fact extract programs. The main benefit of using UDDGENs as opposed to using User Defined Dimension (UDDs) is that UDDGENs can be populated in the fact extract program and therefore reduce implementation time.

User-Defined Foreign Key Dimensions (UDDFKs)

Earlier, two techniques to add additional dimensions to a base-package fact were described:

- **User Defined Dimension (UDDs)** described how you can set up new dimensions.
- **User-Defined Degenerate Dimensions (UDDGENs)** described how you can populate a degenerate dimension on a fact.

However, there may be requirements that can be easily satisfied by adding an existing dimension to a fact. For example, the case fact is not delivered referencing the service agreement dimension. If your users require analytics that "slice and filter" cases by service agreement dimensional attributes, you can configure the system to reference the existing service agreement dimension on the case fact. Facts that support this type of extension contain columns called user defined foreign keys (UDDFKs). If you do not see these columns on a fact, then this functionality is not available.

Extending Extractors and Schema

Using these UDFs, UDMs, UDDs, UDDGENs and UDDFKs, you can extend the extractors and schema delivered with the base product. The process to extend the extractors and schema varies based on the type of change detect mechanism used for the based application. The following topic describes this process for each type, including:

- **Extending CCB and WAM**
- **Extending NMS**
- **Extending MDM and MWM**

Extending CCB and WAM

Oracle Utilities Customer Care & Billing and Oracle Utilities Work and Asset Management use the trigger based approach to detect the changes to the base table that need to be populated in the data warehouse.

Most extract processes support populating User Defined Fields (UDFs) and User Defined Measure (UDMs) fields on their flat file records with specific fields from the source system. For example, you can set up the premise extract program to populate the first UDF on its flat file with the premise's city (or county or any address-oriented field).

You tell an extract program which fields to populate on the flat file by populating the batch process's parameters. The number and type of parameters differs depending on the extract and type of information being extracted, but in general, there are two types of fields that can be transferred to the flat file:

- **Columns.** Many dimensional extracts allow predefined columns to be populated on the flat file. For example, you can set up the premise extract program to populate the first UDF on its flat file with the premise's city (or county or any address-oriented column). An analogous concept is used to populate UDMs on the fact extracts.
- **Characteristics.** Many dimensional extracts allow characteristics to be populated on the flat file. For example, you can set up the premise extract program to populate the first UDF on its flat file with the premise's "tax" characteristic (or and premise-oriented characteristic).

> **Note:** Characteristics and UDM's. Most dimensional extracts support the population of their UDFs with characteristic values. A limited number of fact extracts allow characteristics to be used to populate UDMs (this is because most of the transaction files that trigger the fact extracts do not contain characteristics).

You identify how an extract populates its UDFs and UDMs by populating parameters. Specifically, each UDF / UDM supported by an extract has two parameters that must be populated:

- **Type.** This parameter defines if the field is a true column or a characteristic. Enter PROG if you want to populate a UDF / UDM with a column. Enter CHAR if you want to populate the UDF / UDM with a characteristic.

- **Value.** This parameter defines the respective column or characteristic.

To define a column, the value should be in the formation Table.Column (e.g., CI_PREM.CITY_UPR - would be used on the address extract to populate a UDF with the upper-case format of an address's city).

To define a characteristic, enter the characteristic's type code. Note, as of the current release only predefined value characteristics are supported.

> **Note:** For more information refer to the relevant fact and dimension chapter for a description of each extract program and the various UDF and UDM parameters that are supported in each.

Extracting Additional Fields

While the extract programs are delivered to populate their flat files with commonly used information, you may want to populate the User Defined Fields (UDFs) and User Defined Measure (UDMs) with information not supported by the base-package. To do this, you must introduce "user-exit" code to the respective extract programs. Refer to your technical implementation team if you require this type of processing.

Extending NMS

Oracle Utilities Network Management System uses the view based approach to detect the change in the source table that needs to be populated in the data warehouse.

For any changes required in Extracts like populating the UDFs and UDMs with new column values, follow the below approach:

- Create new views to extract data as required
- Create a new extract program/procedure to access the view from above step. Please make sure that the existing views/scripts are not updated as it might lead to upgrade impacts.
- Run the new extract program to retrieve data into flat files.

The detail given in **Appendix E** about the source Extract scripts and View names would be useful when trying to duplicate the scripts.

Extending MDM and MWM

Oracle Utilities Meter Data Management and Oracle Utilities Mobile Workforce Management use the BO Sync based approach to detect the change in the source table that needs to be populated in the data warehouse.

This approach also supports the population of User Defined Fields (UDFs) and User Defined Measure (UDMs) fields on their flat file records with specific fields from the source system. For example, you can set up the metadata in the source system to populate the first UDF on Service Point Dimension's flat file with the time zone (or any Service Point-oriented field).

Now a particular fact or dimension may fall into one of these two extraction styles, both of them have their own ways of being extended. In both the methods one the metadata has been configured appropriately the respective batch controls have to be run again to generate the new flat files with the UDF/UDM columns populated.

Sync BO Style

Element Population Rule: The following BO option on the sync BO, can be added

Option Type	Sequence	Option Value
Element Population Rule	<A unique sequence number>	sourceElement=XXX populateTargetWithInfo String=true/false targetElement=XXX

The sourceElement attribute refers to the element in the BO specified in the option type 'BO Element to Read'. The targetElement attribute refers to the element in the sync BO's data area that needs to be populated with. The limitation of this method is that if a particular UDF or UDM column is to be populated by a element from a different BO, this cannot be used.

Post Service Script: The following BO option on the sync BO, can be added

Option Type	Sequence	Option Value
Post Service Script for Extract	<A unique sequence number>	Custom Service Script Name

Here the option value to be supplied is the name of the customer service script which has the logic to populate the UDF/UDM columns with the desired values. The only thing to be noted here is that the schema of the service script should be the same data area used in the sync BO, include Data Area specified on the sync request BO's option in the Script schema..

Non-sync BO Style

Algorithm Soft parameters: Certain algorithms delivered as part of the source system allows additional soft parameters for the end users to supply custom element population rules. The usage of this parameter values is the same as explained for the 'Element Population Rule' above in the Sync BO style.

New Algorithm: In case where the user needs to drastically change the logic of populating the UDF/UDM columns or even the remaining set of fields in the flat files, users may wish to create a new algorithm and plug in on the originating BO. This algorithm will have to be plugged on with a higher sequence than the base product algorithm. Additional care will have to taken since this will completely override the existing algorithm logic and this will have to supply to logic of populating the entire flat file.

In addition to all the methods mentioned above, the user has the option of writing a service script and specifying it as an user exit option on the batch control. The service script has to have the same data area as being used in the original sync BO or the plug-in algorithm.

Chapter 6

Adding New Requirements

This section describes how the product can be extended by customers to add the functionality that is not built into the product. This section includes the following topics that help developing the new requirements:

- **Customizing Dashboards**
- **Creating a New Star Schema**
- **OWB Objects**
- **Running the OWB Code Generator**
- **Loading and Deploying TCL files in OWB**
- **File Processor Daemon**
- **Auto Cache Refresh**
- **ETL Customization**

Customizing Dashboards

This section describes how to use OBIEE to customize Oracle Utilities Advanced Spatial and Operational Analytics. It includes the following topics:

- **Modifying the RPD File**
- **Customizing Answers**
- **Creating New Answers**
- **Adding New Labels**

Modifying the RPD File

All customer modifications must be done in a separate repository file, separate from the product's out-of-the-box repository. Any customizations are merged into the upgraded repository file through the Merge utility of Oracle Business Intelligence Enterprise Edition, together with the product's out-of-the-box repository file. Oracle recommends that you use a staging environment for the repository upgrade.

However, as long as customer modifications are done on top of a copy of our base repository file, the OBIEE upgrade process should be able to handle most customizations that may be made to the repository file. The simpler the changes, the less complex the upgrade will be, so you should try to limit the changes made to our repository file.

For information about managing, upgrading, and merging repository (.rpd) files, see the Oracle Business Intelligence Server Administration Guide.

Customizing Answers

All customer modifications must be done in a separate folder in order for those modifications to be preserved during an upgrade of Oracle Utilities Advanced Spatial Analytics. If an existing answer needs to be changed to meet your requirements, a copy of the product report should be created and changes made to the copy, not to the original report, and the dashboard should be changed to point to the new copy.

Please note that dashboards are overwritten during the upgrade and any mappings between dashboards and customized answers are lost and will need to be re-mapped manually. Therefore, you should use a staging environment for upgrade and manually remap dashboards before moving the upgraded customized content into the production environment.

For more details about managing, upgrading, and merging presentation catalogs, see the Oracle Business Intelligence Presentation Services Administration Guide.

Creating New Answers

Oracle Utilities Advanced Spatial Analytics provides out-of-the-box dashboards with rich set of analytics for Credit & Collection Analytics, Customer Analytics, Distribution Analytics, Meter Data Analytics, Mobile Workforce Analytics, Outage Analytics, Revenue Analytics and Work & Assets Analytics. Still if required, customer can create new answers or dashboards.

Just as with customization of existing answers, new answers should also be saved in a separate folder so that they are not overwritten during an upgrade of Oracle Utilities Advance Spatial Analytics.

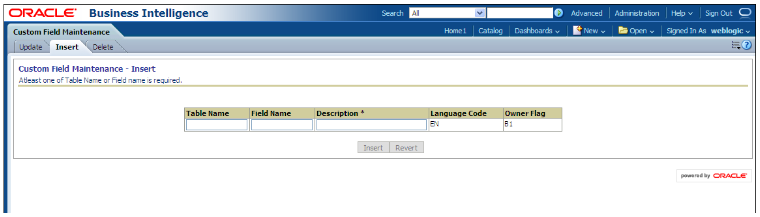
A customer implementation can create field labels for use in their answers, or the labels can just be created directly in the answer if you have no multilingual requirements. If product labels are used in an answer, they could be modified during an upgrade unless you have entered an override label. In general, try to limit the changes to existing labels, but there can be situations when they are updated.

Adding New Labels

If an implementation wants to use the label mechanism for new answers, then the Custom Field Maintenance dashboard can be used to add, update and delete custom labels, which can then be used in answers, and in logical and physical objects in the RPD file.

Only custom field labels, identified by a CM owner flag, can be updated or deleted, and new labels will be created with a CM owner flag. A label that already exists cannot be created, so if a base labels already exists, an implementation can update the override label as described in the preceding section.

To create a new label, select the Insert tab, and populate the Table Name (if needed), Field Name (if needed), and the Description associated with the field, and click Insert. A new record will be created that can then be used similarly to how labels are used in the base RPD file and on base answers.



Custom Field Maintenance - Insert

Atleast one of Table Name or Field name is required.

Table Name	Field Name	Description *	Language Code	Owner Flag
			EN	B1

To update an existing CM label, query the field to be updated on the Update Table, change the description associated with the field, and click Update.

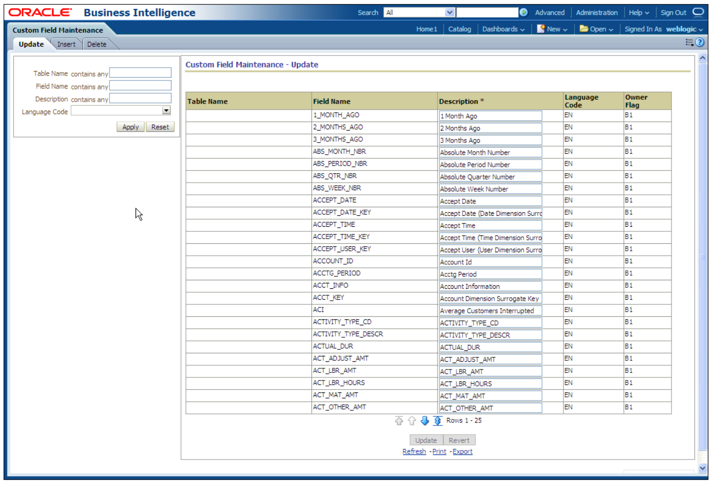

ORACLE Business Intelligence
Search All
Advanced | Administration | Help | Sign Out
Home1 | Catalog | Dashboards | New | Open | Signed In As weblogic
Custom Field Maintenance
Update | Insert | Delete
Apply | Reset
Update | Revert
Refresh - Print - Export

Table Name contains any
Field Name contains any
Description contains any
Language Code

Custom Field Maintenance - Update

Table Name	Field Name	Description *	Language Code	Owner Flag
	1_MONTH_AGO	1 Month Ago	EN	B1
	2_MONTHS_AGO	2 Months Ago	EN	B1
	3_MONTHS_AGO	3 Months Ago	EN	B1
	ABS_MONTH_NBR	Absolute Month Number	EN	B1
	ABS_PERIOD_NBR	Absolute Period Number	EN	B1
	ABS_QTR_NBR	Absolute Quarter Number	EN	B1
	ABS_WEEK_NBR	Absolute Week Number	EN	B1
	ACCEPT_DATE	Accept Date	EN	B1
	ACCEPT_DATE_KEY	Accept Date (Date Dimension Surro	EN	B1
	ACCEPT_TIME	Accept Time	EN	B1
	ACCEPT_TIME_KEY	Accept Time (Time Dimension Surro	EN	B1
	ACCEPT_USER_KEY	Accept User (User Dimension Surro	EN	B1
	ACCOUNT_ID	Account Id	EN	B1
	ACCTG_PERIOD	Acctg Period	EN	B1
	ACCT_INFO	Account Information	EN	B1
	ACCT_KEY	Account Dimension Surrogate Key	EN	B1
	ACI	Average Customers Interrupted	EN	B1
	ACTIVITY_TYPE_CD	ACTIVITY_TYPE_CD	EN	B1
	ACTIVITY_TYPE_DESCR	ACTIVITY_TYPE_DESCR	EN	B1
	ACTUAL_DUR	ACTUAL_DUR	EN	B1
	ACT_ADJUST_AMT	ACT_ADJUST_AMT	EN	B1
	ACT_LBR_AMT	ACT_LBR_AMT	EN	B1
	ACT_LBR_HOURS	ACT_LBR_HOURS	EN	B1
	ACT_MAT_AMT	ACT_MAT_AMT	EN	B1
	ACT_OTHER_AMT	ACT_OTHER_AMT	EN	B1

Rows 1 - 25

A CM label can be deleted using the Delete tab by selecting the check box next to each record that should be deleted and then click Delete.

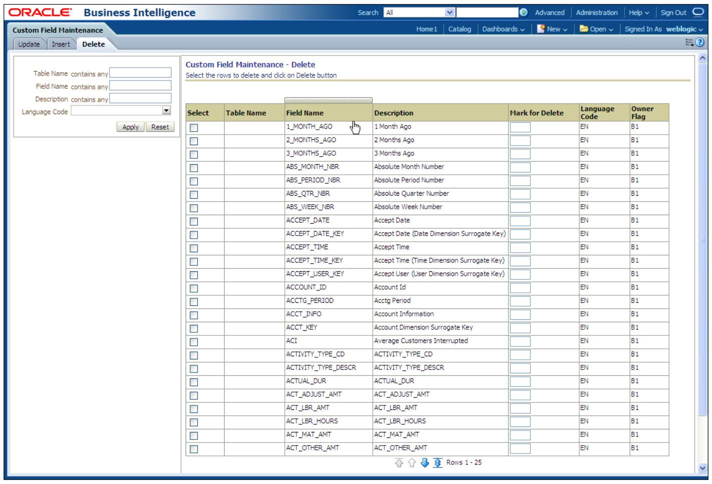

ORACLE Business Intelligence
Search All
Advanced | Administration | Help | Sign Out
Home1 | Catalog | Dashboards | New | Open | Signed In As weblogic
Custom Field Maintenance
Update | Insert | Delete
Apply | Reset

Table Name contains any
Field Name contains any
Description contains any
Language Code

Custom Field Maintenance - Delete
Select the rows to delete and click on Delete button

Select	Table Name	Field Name	Description	Mark for Delete	Language Code	Owner Flag
□		1_MONTH_AGO	1 Month Ago		EN	B1
□		2_MONTHS_AGO	2 Months Ago		EN	B1
□		3_MONTHS_AGO	3 Months Ago		EN	B1
□		ABS_MONTH_NBR	Absolute Month Number		EN	B1
□		ABS_PERIOD_NBR	Absolute Period Number		EN	B1
□		ABS_QTR_NBR	Absolute Quarter Number		EN	B1
□		ABS_WEEK_NBR	Absolute Week Number		EN	B1
□		ACCEPT_DATE	Accept Date		EN	B1
□		ACCEPT_DATE_KEY	Accept Date (Date Dimension Surrogate Key)		EN	B1
□		ACCEPT_TIME	Accept Time		EN	B1
□		ACCEPT_TIME_KEY	Accept Time (Time Dimension Surrogate Key)		EN	B1
□		ACCEPT_USER_KEY	Accept User (User Dimension Surrogate Key)		EN	B1
□		ACCOUNT_ID	Account Id		EN	B1
□		ACCTG_PERIOD	Acctg Period		EN	B1
□		ACCT_INFO	Account Information		EN	B1
□		ACCT_KEY	Account Dimension Surrogate Key		EN	B1
□		ACI	Average Customers Interrupted		EN	B1
□		ACTIVITY_TYPE_CD	ACTIVITY_TYPE_CD		EN	B1
□		ACTIVITY_TYPE_DESCR	ACTIVITY_TYPE_DESCR		EN	B1
□		ACTUAL_DUR	ACTUAL_DUR		EN	B1
□		ACT_ADJUST_AMT	ACT_ADJUST_AMT		EN	B1
□		ACT_LBR_AMT	ACT_LBR_AMT		EN	B1
□		ACT_LBR_HOURS	ACT_LBR_HOURS		EN	B1
□		ACT_MAT_AMT	ACT_MAT_AMT		EN	B1
□		ACT_OTHER_AMT	ACT_OTHER_AMT		EN	B1

Rows 1 - 25

Creating a New Star Schema

The star schema is perhaps the simplest data warehouse schema. It is called a star schema because the entity-relationship diagram of this schema resembles a star, with points radiating from a central table. The center of the star consists of a large fact table and the points of the star are the dimension tables.

A star query is a join between a fact table and a number of dimension tables. Each dimension table is joined to the fact table using a primary key to foreign key join, but the dimension tables are not joined to each other. The optimizer recognizes star queries and generates efficient execution plans for them. It is not mandatory to have any foreign keys on the fact table for star transformation to take effect.

A typical fact table contains keys and measures. A star join is a primary key to foreign key join of the dimension tables to a fact table. The main advantages of star schemas are that they:

- Provide a direct and intuitive mapping between the business entities being analyzed by end users and the schema design.
- Provide highly optimized performance for typical star queries.

- Are widely supported by a large number of business intelligence tools, which may anticipate or even require that the data warehouse schema contain dimension tables.

Star schemas are used for both simple data marts and very large data warehouses. Once the model has been designed, the OWB code generator can be utilized to generate the mappings and process flows.

For more details on data modeling refer to Oracle® Database Data Warehousing Guide 11g Release 2: Chapter 19 Schema Modeling Techniques

OWB Objects

OWB Object	Description
Facts	The new fact table designed for storing the measures and attributes, and foreign keys to dimensions
Dimensions	Any new dimensions that are needed to support analytics
Sequences	Sequences used to generate the surrogate keys for new facts and dimensions
Staging Tables	External tables required to import data from files into the target
Mappings	The job definition to extract, transform and load the target facts/dimensions from external tables
Workflows	Process flows defined for the execution of the mappings. Typical process flow generated by the OWB code generator includes the mapping, and is followed by a process flow to refresh the associated materialized views and creating an entry into the event polling table to refresh the OBIEE cache.

These are the steps to be followed to create the OWB code:

1. Create a fact or dimension.
2. Specify the column sizes.
3. Specify the external table name.
4. Map a column from external table to target.
5. Specify the join conditions.
6. Generate the OWB code.

Running the OWB Code Generator

The OWB Code Generator is used to create OMBPlus TCL scripts. OMBPlus is an OWB scripting language that can create, alter, delete and deploy OWB objects. The GenOWB.exe program is located in the scripts folder in the Database Package.

GenOWB.exe must be run on a Windows machine that can connect to the data warehouse database. Use the following syntax to run the OWB Code Generator:

```
GenOWB.exe -d <DBInfo> -t <TableName> -m <Mapping/Workflow/
StagingTables/Facts/Dimension/All> -a <Dimensions/Facts/All> -h -g
```

The parameters to GenOWB.exe are:

Parameter	Value
-d	Database information: Database User ID, password, database TNS name (for example, dwadm, dwadm, or bivmdv)
-t	Name of dimension or fact tables
-m	Generate: • Mapping (M) • WorkFlow (W) • Staging Tables (S) • Sequences (Q) • Facts (F) • Dimensions (D) • All (A)
-a	Generate Mapping/Workflow/Staging Tables/Sequences/ Cubes/Dimensions for all (D)imension Tables, all (F)act tables or (A)ll Dimension and Fact tables (D/F/A)
-x	Generate DROP statement? (Y)es or (N)o. Default is No.
-h	Help
-g	generate debug info

When the OWB Code Generator is run for a table, the following types of files can be generated:

- **seq_nam.TCL:** A file that creates the sequence in OWB used for the primary key of the table to be loaded. For example, the SPL_ACCT_SEQ.TCL file will create the sequence used to populate the primary key of the CD_ACCT table. Note that the sequence should also be created manually in the database, as we do not recommend deploying sequences from OWB to the database.
- **tbl_name.TCL:** A file that creates the table definition in OWB. For example, the CD_ACCT.TCL script will create the CD_ACCT table in OWB. Note that tables should also be created manually in the database, as we do not recommend deploying tables from OWB to the database.
- **stg_file_name.TCL:** A file that creates the data file definition in OWB. For example, the STG_ACCT_FF.TCL will create the definition of the CD_ACCT extract file.
- **ctl_file_name.TCL:** A file that creates the control file definition in OWB. For example, the STG_ACCT_CTL_FF.TCL will create the definition of the CD_ACCT control file.
- **stg_tbl_name.TCL:** A file that creates the data file external table definition in OWB. For example, the STG_ACCT_EXT.TCL will create the definition of the CD_ACCT external table STG_ACCT_EXT.
- **ctl_tbl_name.TCL:** A file that creates the control file external table definition in OWB. For example, the STG_ACCT_CTL_EXT.TCL will create the definition of the CD_ACCT control table STG_ACCT_CTL_EXT.
- **owb_map_name.TCL:** A file that creates the OWB mapping that will load the data from the external table into the data warehouse table. For example, the SPLMAP_D_ACCT.TCL

script will create the SPLMAP_D_ACCT mapping that reads records from the STG_ACCT_EXT and STG_ACCT_CTL_EXT files and load the extracted records into the CD_ACCT table.

- **owb_wf_name.TCL:** A file that creates the process flow that will take an extract file and load it into the fact or dimension table. For example, the SPLWF_D_ACCT.TCL will create the SPLWF_D_ACCT process flow which file will check to see if an account extract file exists in the data load directory and if it does load it into the CD_ACCT table.
- **OUBI_LDRF_wf_name.TCL:** A file that is created only for fact loads, which will create a process flow that calls the data file loading process flow and the materialized view refresh process flow sequentially. Note that for this process flow to be created, the materialized view refresh process flow must exist. For example, the OUBI_LDRF_FT.TCL file will create the OUBI_LDRF_FT process flow that calls the SPLWF_F_FT and OUBI_RFSH_FT process flows.

Depending on which OWB objects will be changed, the parameters to the GenOWB.exe program can be modified. In the prior example for the CF_CASE table change, the following two commands should be run:

```
GenOWB.exe -d spluser,spluser_pw,BICONN -t CF_CASE -m M -x Y
GenOWB.exe -d spluser,spluser_pw,BICONN -t CF_CASE -m W -x Y
```

The first command creates the SPLMAP_F_CASE.TCL file and the second command creates the SPLWF_F_CASE.TCL and OUBI_LDRF_CASE.TCL files, with drop commands in each file since the objects should already exist in the OWB repository.

Loading and Deploying TCL files in OWB

Once the TCL scripts have been created, they will need to be loaded into the OWB repository using OMBPlus. OMB Plus is a flexible, high-level command line metadata access tool for Oracle Warehouse Builder. Use OMB Plus to create, modify, delete, and retrieve object metadata in Warehouse Builder design and runtime repositories. For more information about OMBPlus refer to the Oracle Warehouse Builder API and Scripting Reference document.

To open an OMBPlus window, in the OWB Design Center select View->OMB*Plus.

From within the OMBPlus window, there are many OMBPlus commands available, but the following commands are the two that will usually be used:

- cd SOURCE_DIRECTORY
- source TCL_FILE

Note that OMBPlus is case sensitive, so that the commands must be specified in lowercase. Also, the ‘\’ is an escape character in OMBPlus, so within a directory name, two ‘\’s must be used if it is needed.

To load the files that would have been created by using the commands in the previous section, assume that the TCL files are in the c:\bi\tcl directory. The following OMBPlus commands can be used to load the files:

```
cd c:\\bi\\tcl
source SPLMAP_F_CASE.TCL
source SPLWF_F_CASE.TCL
source OUBI_LDRF_CASE.TCL
```

The order that the TCL files are loaded is important, as the objects are dependant on other objects. If an Object is deleted from OWB by running a TCL file, then references to that object are dropped from already existing OWB objects. So in all cases, the order that the TCL files are listed in the preceding section should always be used. Also, if an earlier object is recreated, all of the other objects that are listed afterwards also need to be created.

For example, if a change needs to be made to an OWB mapping, the owb_map_name.TCL, owb_wf_name.TCL and OUBI_LDRF_wf_name.TCL (for facts) scripts will have to be regenerated and reloaded into OMBPlus.

After loading some of these TCL scripts, the customizations that were done prior to earlier deployments will be lost, so the preconditions to deployment must be redone. The following is a list of the scripts that you must rerun after changes are made:

- EditFFCS.tcl – this will need to be run if Flat File TCL scripts (stg_file_name.TCL and ctl_file_name.TCL) are loaded.
- EditFFLL.tcl – This will need to be run if External Table TCL scripts (stg_tbl_name.TCL and ctl_tbl_name.TCL) are loaded.
- EDITFP.tcl and editmail.tcl – These scripts will need to be run is Process Flow TCL scripts (owb_wf_name.TCL) are loaded.

File Processor Daemon

When new extracts are set up on the source application side and new OWB process flows have been setup to load the new flat files, the File Processor Daemon needs to be extended to allow the processing of the new flat files.

More specifically the parameters file needs to be extended to include the new mappings. In the new CM parameters file these following two types of mapping need to be present

- extract.file.mapping.override.count
- extract.file.mappingXXX

The details of these two parameters have already been mentioned previously in Chapter 3 under the section "Running and Monitoring Extract Loads"

For more details on extending the file processor daemon, please refer to Oracle Utilities Advanced Spatial and Operational Analytics Installation Guide

Auto Cache Refresh

OBIEE provides a mechanism called Event Polling, which allows OBIEE to query a Database Table to find out when data has been updated in fact or dimension tables. By modifying the OWB load process to populate an Event Polling table, we can let OBIEE know when data has been updated in the data warehouse, and enable OBIEE to know when to refresh the cache data that has been queried before.

A new event polling table has be made available as part of Oracle Utilities Advanced Spatial Analytics B1_OBIEE_EVENT_POLLING.

The use of an Oracle BI Server event polling table (event table) is a way to notify the Oracle BI Server that one or more physical tables have been updated and then that the query cache entries are stale.

Each row that is added to an event table describes a single update event, such as an update occurring to a Product table.

The Oracle BI Server cache system reads rows from, or polls, the event table, extracts the physical table information from the rows, and purges stale cache entries that reference those physical tables.

For new requirements, new extractors will be created along with new OWB load processes to load data into the new fact or dimension tables. Here in order to ensure that the OBIEE cache data is automatically refreshed, an additional step has to be included in the OWB process flow to ensure that an entry is made in the available event polling table B1_OBIEE_EVENT_POLLING.

This will ensure that whenever new data is loaded by the OWB process flow, the OBIEE cache is automatically refreshed and made available for the analytics reports.

Refer to an existing base product supplied OWB process flow for samples.

ETL Customization

This section describes how to customize the ETL process for the different Oracle Utilities products, including:

- **NMS**
- **MDM and MWM**
- **CCB and WAM**

NMS

As mentioned in the prior sections, Network Management System uses the view-based approach to detect the change in the source table that needs to be populated in the data warehouse.

To populate the new facts / dimensions, the following approach is to be followed:

1. Create new modify and delete views that have the business logic to extract the required data.
2. Create a new extract program/procedure to access the view from above step.
3. Run the new extract program to retrieve data into flat files.

The detail given in Appendix C about the source Extract scripts and View names would be useful reference when trying to create new scripts.

MDM and MWM

There are two options to extract new Dimension or Fact data.

For all the facts and dimensions other than those of snapshot type, it is advisable to use the Master Data Synchronization mechanism provides by the Oracle Utilities Application Framework. Please follow the following steps to create the new sync request BO:

1. Copy an existing Sync Request BO.
2. Modify the following BO Options in the newly created BO:
    a. **BO to Read.** This needs to be populated with the BO which has elements that need to be extracted.
    b. **Snapshot Data Area.** This defines the schema which will be exactly extracted in the flat file, including the order of elements and the element types.
    c. **Post processing service script.** If you want to extract data which is not available in the schema BO to Read BO, you will have to write a processing script to extract such elements.
    d. **Element Population Rule.** If you want to move data from an element defined on BO to Read BO to another element defined in the snapshot data area, you can populate the Element Population Rule.
    e. **Batch for Extract.** This is the name of the batch that needs to be executed to extract the flat files. You can use an existing batch or create a new one based on the requirement.
    f. **Star Schema Type.** Mention whether this BO is for a Fact or Dimension.
3. Create an Audit algorithm to define the logic to control the creation of Sync Request BO. Please refer to an existing audit algorithm delivered in the edge application.

4. Add the newly created Sync Request BO to the MO Option '   '.

For snapshot type facts and dimensions, you can create a java batch program to extract the data without using the Sync Request BO. Please refer to the following steps to create such program:

1. Define Data Area that reflects the structure of the flat file, including the data type and order of elements.
2. Write the logic to populate this Data Area with the information to be extracted.
3. Invoke the BusinessService "F1-ConvertXMLToFileFormat" to transform Data Area into the fixed length string. This string would be written to the extract file when the program is executed.

CCB and WAM

As mentioned previously in Chapter 3, CCB and WAM uses the trigger-based approach to detect the change in the source table that needs to be populated in the data warehouse.

To populate the new facts / dimensions, the following approach is to be followed:

1. Create new triggers that have the business logic to extract the required data from the new tables.
2. Create a new extract program/procedure to with the desired extraction logic from the change log tables.
3. Create new batch controls for the extract programs.
4. Run the new batch controls to retrieve data into flat files.

The detail given in Appendix B about the source Extract Programs and trigger names would be useful reference when trying to create the new extracts.

Chapter 7

OWB Licensing and Optional Features

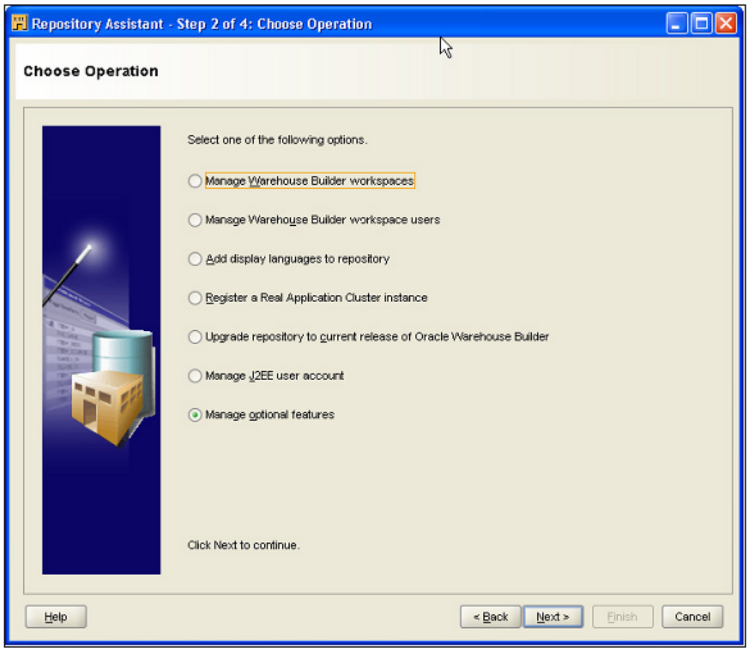
Oracle Warehouse Builder provides various optional features which are not included in the basic ETL feature group. The basic ETL feature group is included in the Oracle Database Enterprise Edition license, so there is no additional license cost to use these basic features. The standard ETL processes included in Oracle Utilities Advanced Spatial and Operational Analytics use only the features that are included in the basic ETL feature group.

In addition, the OWB Code Generator will not create any code that requires the use of optional OWB features, so any additional ETL code created by an implementation using the OWB Code Generator will not require additional OWB License costs.

However, if Oracle Warehouse Builder is used to create other ETL code outside of the OWB Code Generator, the use of optional features may require additional OWB licenses.

Disabling Optional Features in OWB

To ensure that optional features are not used, Oracle Warehouse Builder provides a means to disable the use of optional features. After starting the Warehouse Builder Repository Assistant, choose the “Manage optional features” operation, as shown in the following image:



Repository Assistant - Step 2 of 4: Choose Operation

Choose Operation

Select one of the following options.

○ Manage Warehouse Builder workspaces

○ Manage Warehouse Builder workspace users

○ Add display languages to repository

○ Register a Real Application Cluster instance

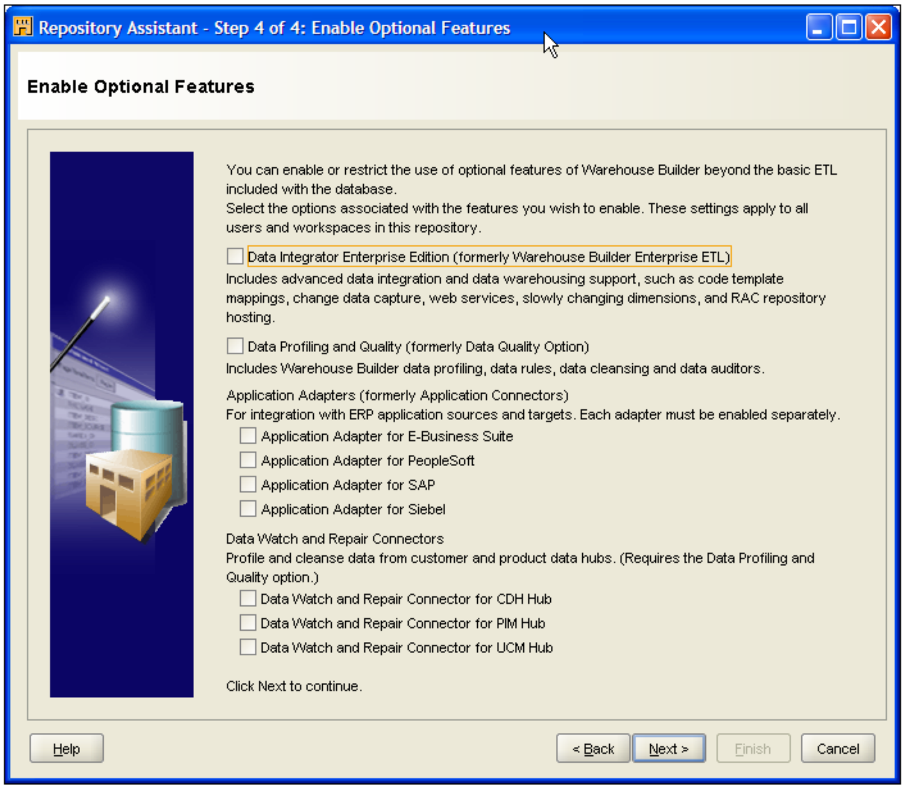
○ Upgrade repository to current release of Oracle Warehouse Builder

○ Manage J2EE user account

● Manage optional features

Click Next to continue.

After entering the password for the OWBSYS user, deselect all of the licensed option names on the Enable Optional Features page:


Repository Assistant - Step 4 of 4: Enable Optional Features

Enable Optional Features

You can enable or restrict the use of optional features of Warehouse Builder beyond the basic ETL included with the database.
Select the options associated with the features you wish to enable. These settings apply to all users and workspaces in this repository.

□ Data Integrator Enterprise Edition (formerly Warehouse Builder Enterprise ETL)
Includes advanced data integration and data warehousing support, such as code template mappings, change data capture, web services, slowly changing dimensions, and RAC repository hosting.

□ Data Profiling and Quality (formerly Data Quality Option)
Includes Warehouse Builder data profiling, data rules, data cleansing and data auditors.

Application Adapters (formerly Application Connectors)
For integration with ERP application sources and targets. Each adapter must be enabled separately.
- □ Application Adapter for E-Business Suite
- □ Application Adapter for PeopleSoft
- □ Application Adapter for SAP
- □ Application Adapter for Siebel

Data Watch and Repair Connectors
Profile and cleanse data from customer and product data hubs. (Requires the Data Profiling and Quality option.)
- □ Data Watch and Repair Connector for CDH Hub
- □ Data Watch and Repair Connector for PIM Hub
- □ Data Watch and Repair Connector for UCM Hub

Click Next to continue.

Once the options are deselected, the new selections will take effect for any new connections to Oracle Warehouse Builder, and if options are used that are not available, an error dialog will be displayed.

For more information about the feature groups and licensing of Oracle Warehouse Builder, visit the OWB page on OTN, at: http://www.oracle.com/technetwork/developer-tools/warehouse.

Chapter 8

Maintaining Environments

This section describes how to maintain your Oracle Utilities Advanced Spatial and Operational Analytics environments, including moving code changes from one environment to another. This section includes the following topics:

- **Overview of Environment Maintenance**
- **Moving Code**
- **Database Cloning**

Overview of Environment Maintenance

You should implement processes to maintain code control over various environments. The following components of the Oracle Utilities Advanced Spatial Analytics should be handled separately.

- OBIEE Web Catalog
- OBIEE Repository File
- Field Label Metadata
- OWB Repository
- OUAF Metadata (only required if there are OWB customizations)
- Mapviewer Spatial Data

Assuming that custom changes are made to any of these objects, then a mechanism must be put into place to develop, test, and move these customizations to production.

Moving Code

During the development phase of coding, you usually do not need to move code from a development environment to any other environments. However, once a project moves to the QA or production phases, code changes may need to be migrated.

For example, in an internal development process, there may be two Development environments, one for OBIEE Dashboard creation and one for OWB Development. When you want to create a QA environment, you can build a QA environment from scratch, meaning that an empty database is created, OWB objects are imported and deployed, and the OBIEE web catalog and repository file are created fresh.

To do this, use the installation process for creating an empty Oracle database, OWB repository, and WebLogic environment. Then use the OWB Export process to create two MDL files from the Development environment, one for the locations and one for all of the other OWB objects. You should then copy the OBIEE Repository file, and use the OBIEE export process to create the OBIEE web catalog files.

Once you have these files, follow the install process to load the MDL files in the OWB repository, copy the OBIEE Repository file into the QA WebLogic environment, update the user name, password and database connections for the QA databases, and import the web catalog export files into the same location as they were in the development environment.

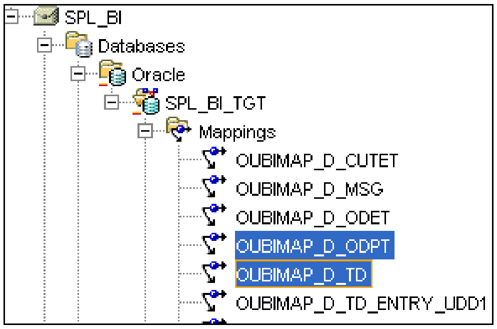
This process works well for a development move to QA, but will not work once a system goes into production, because parts of this process require the creation of an empty database, which is not something that should be done in a production environment.

In situations where bug fixes have been made in a development environment and they need to be moved to a production environment, you can to export the entire OWB repository and OBIEE web catalog and replace this in the production environment. Use this method to move the code if it is not known exactly which objects have changed.

For OWB though, if the modified objects are known, then it is possible to export only the changed objects, import them in the QA environment, and then, once QA is successful, do the same import process into the production environment. Another option is to save the TCL files that were created by the OWB Code Generator, and then load them into the QA and production environments.

To create an MDL file for a known set of OWB objects, the follow these steps:

1. Logon to Workflow Development Database using Design Center as Repository Owner (BIREPOWN).
2. Review the modified OWB objects and select the OWB objects:



SPL_BI
Databases
Oracle
SPL_BI_TGT
Mappings
OUBIMAP_D_CUTET
OUBIMAP_D_MSG
OUBIMAP_D_ODET
OUBIMAP_D_ODPT
OUBIMAP_D_TD
OUBIMAP_D_TD_ENTRY_UDD1

3. Export them by navigating to **Design > WareHouse Builder Metadata**
4. Review the path for MDL and log file and select **Export all dependencies**.
5. Click **Export**.
6. Use the created MDL file to move objects from a Development environment to a QA or Production environment.

This process assumes that database changes are handled outside of OWB. So new tables, modifications to existing tables, or materialized view log changes should be handled via SQL scripts created by the Development team.

For OBIEE, if a full move is not desired, there are ways of merging code in the web catalog and also in the repository file. These methods are documented in the OBIEE Administration guide. See Chapter 24, “Moving Between Environments,” in the System Administrator's Guide for Oracle Business Intelligence Enterprise Edition 11g Release 1. This chapter shows how you can move Oracle Business Intelligence to a new environment or from a test to a production environment.

For moving modified override labels from development to QA to production: For MapViewer data, it should be added to QA or production environments the same way that it is added to development. If a shapefile is downloaded and added to the Development environment, the same shapefile should be added to the QA and production environments.

Finally, it is very important that the process of moving code from development to QA is exactly the same as the process that moves the code to production. It is only by following the same sequence of steps in both cases that the movement process is also tested. If one process is followed to move code to QA and another process is followed to move code to Production, then problems can arise in the move to production that were not seen in the move to QA.

Database Cloning

You can use database cloning to move the entire development database to a QA environment or a new production environment. This cannot be used to move a development database to an existing production environment, as the existing production database tables will be overwritten. But for QA purposes, this can move the development database quicker than a fresh install. Note that this does not move the OBIEE objects, but does handle all of the OWB code, field label changes, mapviewer metadata, and any new database objects.

To clone a development database, following these steps:

1. Clone the existing database.
2. Go to the ORACLE_HOME/owb/UnifiedRepos directory, and connect to database as sys.
3. Execute reset_owbcc_home.sql and remote_owb_install.sql scripts.
4. Go to ORACLE_HOME/owb/rtp/sql directory.
5. Connect with OWBSYS user and execute reset_repository.sql
   You may get the following error:

   ```
   ERROR at line 1:
   ORA-29532: Java call terminated by uncaught Java exception:
   java.sql.SQLException: The file
   /orasw/app/oracle_test/product/11.2.0/dbhome_1/owb/bin/admin/
   rtrepos.properties
   cannot be accessed or has not been properly created on the server
   tudevlv0335.
   If the file does not exist or if the database owner (normally user
   'oracle')
   does not have the required file permissions or if the file has not
   been
   properly created then the file can be recreated by running the
   SQL*Plus script
   /orasw/app/oracle_test/product/11.2.0/dbhome_1/owb/rtp/sql/
   reset_repository.sql
   (in a RAC environment the file must be manually copied to each
   server which is
   used for OWB). Otherwise if using a 10.2 database instance, then
   please run the
   SQL*Plus script
   /orasw/app/oracle_test/product/11.2.0/dbhome_1/owb/UnifiedRepos/
   reset_owbcc_home
   .sql.The exception which caused this failure is
   'java.security.AccessControlException(the Permission
   (java.io.FilePermission
   /orasw/app/oracle_test/product/11.2.0/dbhome_1/owb/bin/admin/
   rtrepos.properties
   Writ
   ```

If you do see this error, follow these steps:

a. Connect as sys to database and execute reset_owbcc_home.sql and remote_owb_install.sql again.

b. Connect with OWBSYS and execute reset_repository.sql.

6. Submit the SELECT * FROM OWBRTPS query.
   An updated oracle home is shown in the value column.

7. Connect with OWBSYS and submit select SERVER_SIDE_HOME from WB_RT_SERVICE_NODES query.
   The updated oracle home is shown.

8. Log in to the design repository and get the name of all the control centers with which locations are registered.

9. Go to the ORACLE_HOME/owb/rtp/sql directory, connect with OWBSYS and execute UpdateControlCenter.sql for all control centers with which locations are registered. Provide the following inputs:

```
 Enter Workspace Name: SPLBIREP
 Enter Workspace User Name: BIREPOWN
 Enter Control Center Name: BI24TEST
 Host: tudevlv0335.us.oracle.com
 Port: 1521
 Service Name: OWBTEST
 New Net Service Name: OWBTEST
 Select Workspace Id for workspace SPLBIREP and user BIREPOWN
 Workspace id = 2
 Update location properties for BI24TEST
 Location Type =  Control Center
 Control Center BI24TEST Found
 Connection Type = Default HOST:PORT:SERVICE Updating...
 Updating CMPLocation_Host = tudevlv0335.us.oracle.com
 CMPLocation_Host Not Found Inserting
 Updating CMPLocation_Port = 1521
 CMPLocation_Port Not Found Inserting
 Updating CMPLocation_ServiceName = OWBTEST

 PL/SQL procedure successfully completed.
```

10. Go to ORACLE_HOME/owb/rtp/sql directory, connect with OWBSYS and execute UpdateLocation.sql for all locations. Make sure to provide correct version numbers. For example:

```
Enter Workspace Name: SPLBIREP
Enter Workspace User Name: BIREPOWN
Enter Location Name: SPL_BI_TGT_LOC
New Host: tudevlv0335.us.oracle.com
New Port: 1521
New Service Name: OWBTEST
New Net Service Name: OWBTEST
New Version: 11.2
Select Workspace Id for workspace SPLBIREP and user BIREPOWN
Workspace id = 2
Update location properties for SPL_BI_TGT_LOC
Location Type =  Oracle Database
Location SPL_BI_TGT_LOC Found
Connection Type = Default HOST:PORT:SERVICE Updating...
```

```
Updating CMPLocation_Host = tudevlv0335.us.oracle.com
Updating CMPLocation_Port = 1521
Updating CMPLocation_ServiceName = OWBTEST
Updating CMPLocation_Version = 11.2

PL/SQL procedure successfully completed.
```

11. Connect to OWBSYS and select EXECUTE UPDATE WB_RT_SERVICE_NODES SET CONNECT_SPEC='localhost:1521:<dbname>'; commit;
12. Connect to the control center manager in the design repository.
13. Register all locations.
14. Unregister all locations.
15. Save all objects and exit from control center manager.
16. Double click the control center and move all selected locations to available locations.
17. Click OK.
18. Rename the control center as required.
19. Set the other control centers with which locations are registered as default control center for default_configuration and connect to control center.
20. Register all locations.
21. Unregister all locations.
22. Select SAVE ALL OBJECTS and exit from the control center.
23. Double click the control center and move all selected locations to available locations.
24. Click OK.
25. Rename the control center as required.
26. Repeat steps for setting the control centers for all registered centers.

    This removes all control center information from the registration tab of all locations. If you do not remove control center dependencies, you are able to register locations with any control center but not able to update location information after you unregister the location.

    Move the locations from the available section to the selected location in the required control center. Then set the required control center as default control center for default_configuration and log in to control center.

    After this, locations are available for update and can be registered, then objects can be deployed.

Appendix A

Package Process Flows

This section lists the process flows that are included with each package.

Package name	Process Flow
DIM	SPLWF_D_ACCT
	SPLWF_D_ADDR
	SPLWF_D_ADJ_TYPE
	SPLWF_D_ASSET
	SPLWF_D_CALL_INFO
	SPLWF_D_CAMPAIGN
	SPLWF_D_CASETYPE_STATUS
	SPLWF_D_CASE_COND
	SPLWF_D_CC_TYPE
	SPLWF_D_COLLEVT_TYPE
	SPLWF_D_COLLPROC_STATUS
	SPLWF_D_COLLPROC_TMPL
	SPLWF_D_CREW
	SPLWF_D_CTRL_ZONE
	SPLWF_D_DELETE
	SPLWF_D_DEVICE
	SPLWF_D_EVENT
	SPLWF_D_EVENT_STATUS
	SPLWF_D_FAILURE
	SPLWF_D_FISCAL_CAL
	SPLWF_D_FT_TYPE

Package name	Process Flow
	SPLWF_D_METER
	SPLWF_D_OP_ACCT
	SPLWF_D_OP_ACTG_TY
	SPLWF_D_OP_EXP
	SPLWF_D_OP_UOM
	SPLWF_D_ORDER_CAN_RSN
	SPLWF_D_ORDER_STATUS
	SPLWF_D_PAY_CAN_RSN
	SPLWF_D_PER
	SPLWF_D_PKG
	SPLWF_D_PLANNER
	SPLWF_D_PREM
	SPLWF_D_RATE
	SPLWF_D_REPAIR
	SPLWF_D_ROOT_CAUSE
	SPLWF_D_SA
	SPLWF_D_SA_STATUS
	SPLWF_D_SEVEVT_TYPE
	SPLWF_D_SNL
	SPLWF_D_SQI
	SPLWF_D_STOCK_ITMTY
	SPLWF_D_STRM
	SPLWF_D_STRM_TR_TY
	SPLWF_D_TNDR_SRCE
	SPLWF_D_TNDR_STATUS
	SPLWF_D_TNDR_TYPE
	SPLWF_D_TOU
	SPLWF_D_UCOLEVT_TYPE
	SPLWF_D_UCOLPROC_STATUS
	SPLWF_D_UCOLPROC_TMPL
	SPLWF_D_UOM
	SPLWF_D_USER
	SPLWF_D_WRKORD_TY

Package name	Process Flow
DIM2	OUBIWF_D_CUTET
	OUBIWF_D_MSG
	OUBIWF_D_ODET
	OUBIWF_D_ODPT
	OUBIWF_D_TD
	OUBIWF_D_TD_PRIORITY
	OUBIWF_D_TD_ROLE
	OUBIWF_D_TD_SKILL
	OUBIWF_D_TD_STATUS
	OUBIWF_D_TD_TYPE
	SPLWF_D_CC_UDD1
	SPLWF_D_CC_UDD2
	SPLWF_D_CREW_SHIFT
	SPLWF_D_FEEDER
	SPLWF_D_FT_UDD1
	SPLWF_D_FT_UDD2
	SPLWF_D_GL_ACCT
	SPLWF_D_PHASE
	SPLWF_D_SERVICE_AREA
	SPLWF_D_STORM
	SPLWF_D_STORM_OUTAGE_TYPE
	SPLWF_D_SW_PLAN
	SPLWF_D_SW_PLAN_STATE
DIM_MDM	OUBIWF_D_CONS_TYPE
	OUBIWF_D_CONTACT
	OUBIWF_D_DAYS_LASTUT_TYPE
	OUBIWF_D_DAYS_LAST_MSRMT
	OUBIWF_D_DEVICE_ACTIVITY_TYPE
	OUBIWF_D_DEVICE_EVT_STATUS
	OUBIWF_D_DEVICE_EVT_TYPE
	OUBIWF_D_DEV_ACT_STATUS
	OUBIWF_D_EXCP_SEV
	OUBIWF_D_EXCP_TYPE

Package name	Process Flow
	OUBIWF_D_IE_STATUS
	OUBIWF_D_IMD_TYPE
	OUBIWF_D_MC
	OUBIWF_D_MSRMT_COND
	OUBIWF_D_MTR_DEVICE
	OUBIWF_D_SP
	OUBIWF_D_SPR
	OUBIWF_D_SP_STATUS
	OUBIWF_D_SP_UT_AGE_TYPE
	OUBIWF_D_UOM_TOU
	OUBIWF_D_UOM_TOU_SQI
	OUBIWF_D_US
	OUBIWF_D_USAGE_GROUP
	OUBIWF_D_VEE_RULE
	OUBIWF_D_APPT_TM
DIM_MWM	OUBIWF_D_APPT_TM_OF_DAY
	OUBIWF_D_CREW_TM_USG
	OUBIWF_D_EARLY_LOGOFF_TM
	OUBIWF_D_LATE_LOGON_TM
	OUBIWF_D_RESP_TM_DEV
	OUBIWF_D_SHIFT_BO_STATUS
	OUBIWF_D_TASK_BO_STATUS
	OUBIWF_D_TASK_TYPE
	OUBIWF_D_TRAVEL_DIST_DEV
	OUBIWF_D_TRAVEL_DUR_DEV
	OUBIWF_D_WORK_DUR_DEV
DIM_UDD	OUBIWF_D_CMP_SHIFT_UDD1
	OUBIWF_D_CMP_SHIFT_UDD2
	OUBIWF_D_CONSUMPTION_UDD1
	OUBIWF_D_CONSUMPTION_UDD2
	OUBIWF_D_CREW_TASK_UDD1
	OUBIWF_D_CREW_TASK_UDD2
	OUBIWF_D_DEVICE_ACTIVITY_UDD1

Package name	Process Flow
	OUBIWF_D_DEVICE_ACTIVITY_UDD2
	OUBIWF_D_DEVICE_EVT_UDD1
	OUBIWF_D_DEVICE_EVT_UDD2
	OUBIWF_D_FLD_ACTIVITY_UDD1
	OUBIWF_D_FLD_ACTIVITY_UDD2
	OUBIWF_D_INSTALL_EVT_UDD1
	OUBIWF_D_INSTALL_EVT_UDD2
	OUBIWF_D_SP_SNAP_UDD1
	OUBIWF_D_SP_SNAP_UDD2
	OUBIWF_D_SP_UDD1
	OUBIWF_D_SP_UDD2
	OUBIWF_D_SP_UT_AGE_UDD1
	OUBIWF_D_SP_UT_AGE_UDD2
	OUBIWF_D_TD_ENTRY_UDD1
	OUBIWF_D_TD_ENTRY_UDD2
	OUBIWF_D_TD_ENTRY_UDD3
	OUBIWF_D_TD_ENTRY_UDD4
	OUBIWF_D_TD_ENTRY_UDD5
	OUBIWF_D_VEE_EXCP_UDD1
	OUBIWF_D_VEE_EXCP_UDD2
	SPLWF_D_ARREARS_UDD1
	SPLWF_D_ARREARS_UDD2
	SPLWF_D_FT_GL_UDD1
	SPLWF_D_FT_GL_UDD2
FACT	OUBIWF_F_CUTEV
	OUBIWF_F_ODEV
	OUBIWF_F_ODPR
	OUBIWF_F_RECENT_TD_ENTRY
	OUBIWF_F_TD_ENTRY
	SPLWF_F_ARREARS
	SPLWF_F_BILLED_USAGE
	SPLWF_F_CASE
	SPLWF_F_CASE_LOG

Package name	Process Flow
	SPLWF_F_CC
	SPLWF_F_CITY_OUTG
	SPLWF_F_COLL_EVT
	SPLWF_F_COLL_PROC
	SPLWF_F_CTRL_ZONE_OUTG
	SPLWF_F_CUST_RECENT_OUTG
	SPLWF_F_CUST_RST_OUTG
	SPLWF_F_FEEDER_DLVRD_LOAD
	SPLWF_F_FT
	SPLWF_F_FT_GL
	SPLWF_F_OP_ACTG
	SPLWF_F_ORDER
	SPLWF_F_OUTG
	SPLWF_F_PAY_TNDR
	SPLWF_F_PURGE_RECENT
	SPLWF_F_RECENT_CALL
	SPLWF_F_RECENT_CREW
	SPLWF_F_RECENT_JOB
	SPLWF_F_RST_CALL
	SPLWF_F_RST_CREW
	SPLWF_F_RST_JOB
	SPLWF_F_SA
	SPLWF_F_SEV_EVT
	SPLWF_F_STRM_INV
	SPLWF_F_STRM_TR
	SPLWF_F_SW_PLAN
	SPLWF_F_SW_PLAN_STATE
	SPLWF_F_UCOL_EVT
	SPLWF_F_UCOL_PROC
	SPLWF_F_WRKORD_TK
FACT_MDM	OUBIWF_F_CONSUMPTION
	OUBIWF_F_DEVICE_ACTIVITY
	OUBIWF_F_DEVICE_EVT

Package name	Process Flow
	OUBIWF_F_INSTALL_EVT
	OUBIWF_F_SP
	OUBIWF_F_SP_SNAP
	OUBIWF_F_SP_UT_AGE
	OUBIWF_F_VEE_EXCP
FACT_MWM	OUBIWF_F_CMP_SHIFT
	OUBIWF_F_CREW_TASK
	OUBIWF_F_FLD_ACTIVITY
INIT_PKG	LOAD_DATE
	LOAD_DEFAULT_VALUE
	LOAD_SNAPTYPE
	LOAD_TIME
	OUBIWF_PURGE_RT_AUDIT
MV_RFSH	OUBI_RFSH_ARREARS
	OUBI_RFSH_BILLED_USAGE
	OUBI_RFSH_CASE
	OUBI_RFSH_CASE_LOG
	OUBI_RFSH_CC
	OUBI_RFSH_CITY_OUTG
	OUBI_RFSH_CMP_SHIFT
	OUBI_RFSH_COLL_EVT
	OUBI_RFSH_COLL_PROC
	OUBI_RFSH_CONSUMPTION
	OUBI_RFSH_CREW_TASK
	OUBI_RFSH_CTRL_ZONE_OUTG
	OUBI_RFSH_CUST_RECENT_OUTG
	OUBI_RFSH_CUST_RST_OUTG
	OUBI_RFSH_DEVICE_ACTIVITY
	OUBI_RFSH_DEVICE_EVT
	OUBI_RFSH_FEEDER_DLVRD_LOAD
	OUBI_RFSH_FLD_ACTIVITY
	OUBI_RFSH_FT
	OUBI_RFSH_FT_GL

Package name	Process Flow
	OUBI_RFSH_INSTALL_EVT
	OUBI_RFSH_OP_ACTG
	OUBI_RFSH_ORDER
	OUBI_RFSH_OUTG
	OUBI_RFSH_PAY_TNDR
	OUBI_RFSH_RECENT_CALL
	OUBI_RFSH_RECENT_CREW
	OUBI_RFSH_RECENT_JOB
	OUBI_RFSH_RECENT_TD_ENTRY
	OUBI_RFSH_RST_CALL
	OUBI_RFSH_RST_CREW
	OUBI_RFSH_RST_JOB
	OUBI_RFSH_SA
	OUBI_RFSH_SP
	OUBI_RFSH_SP_SNAP
	OUBI_RFSH_SP_UT_AGE
	OUBI_RFSH_STRM_INV
	OUBI_RFSH_STRM_TR
	OUBI_RFSH_SW_PLAN
	OUBI_RFSH_SW_PLAN_STATE
	OUBI_RFSH_TD_ENTRY
	OUBI_RFSH_UCOL_EVT
	OUBI_RFSH_UCOL_PROC
	OUBI_RFSH_VEE_EXCP
	OUBI_RFSH_WRKORD_TK
LOADRFSH	OUBI_LDRF_ARREARS
	OUBI_LDRF_BILLED_USAGE
	OUBI_LDRF_CASE
	OUBI_LDRF_CASE_LOG
	OUBI_LDRF_CC
	OUBI_LDRF_CITY_OUTG
	OUBI_LDRF_CMP_SHIFT
	OUBI_LDRF_COLL_EVT

Package name	Process Flow
	OUBI_LDRF_COLL_PROC
	OUBI_LDRF_CONSUMPTION
	OUBI_LDRF_CREW_TASK
	OUBI_LDRF_CTRL_ZONE_OUTG
	OUBI_LDRF_CUST_RECENT_OUTG
	OUBI_LDRF_CUST_RST_OUTG
	OUBI_LDRF_CUTEV
	OUBI_LDRF_DEVICE_ACTIVITY
	OUBI_LDRF_DEVICE_EVT
	OUBI_LDRF_FEEDER_DLVRD_LOAD
	OUBI_LDRF_FLD_ACTIVITY
	OUBI_LDRF_FT
	OUBI_LDRF_FT_GL
	OUBI_LDRF_INSTALL_EVT
	OUBI_LDRF_ODEV
	OUBI_LDRF_ODPR
	OUBI_LDRF_OP_ACTG
	OUBI_LDRF_ORDER
	OUBI_LDRF_OUTG
	OUBI_LDRF_PAY_TNDR
	OUBI_LDRF_RECENT_CALL
	OUBI_LDRF_RECENT_CREW
	OUBI_LDRF_RECENT_JOB
	OUBI_LDRF_RECENT_TD_ENTRY
	OUBI_LDRF_RST_CALL
	OUBI_LDRF_RST_CREW
	OUBI_LDRF_RST_JOB
	OUBI_LDRF_SA
	OUBI_LDRF_SEV_EVT
	OUBI_LDRF_SP
	OUBI_LDRF_SP_SNAP
	OUBI_LDRF_SP_UT_AGE
	OUBI_LDRF_STRM_INV

Package name	Process Flow
	OUBI_LDRF_STRM_TR
	OUBI_LDRF_SW_PLAN
	OUBI_LDRF_SW_PLAN_STATE
	OUBI_LDRF_TD_ENTRY
	OUBI_LDRF_UCOL_EVT
	OUBI_LDRF_UCOL_PROC
	OUBI_LDRF_VEE_EXCP
	OUBI_LDRF_WRKORD_TK

Appendix B

Oracle Utilities Customer Care and Billing Extractor Details

This section includes the details for the Oracle Utilities Customer Care and Billing extractors:

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CF_ARREARS	EXTSAARS	CI_SA	C1_BI_F_SAAC	
CF_BILLED_USAGE	EXTBLUSG	CI_FT	C1_BI_F_FTFZ	
CF_CASE	EXTCASE	CI_CASE	C1_BI_F_CASE	
CF_CASE_LOG	EXTCLOG	CI_CASE_LOG	C1_BI_F_CLOG	
CF_CC	C1-CSCNT	CI_CC	C1_BI_F_CUSTCONT	
CF_COLL_EVT	C1-CUTEV	CI_CUT_EVT	C1_BI_F_CUTEV	
	C1-ODEV	CI_OD_EVT	C1_BI_F_ODEV	
	EXTCOLEV	CI_COLL_EVT	C1_BI_F_COLEV	
	EXTSEVEV	CI_SEV_EVT	C1_BI_F_SEVEV	
CF_COLL_PROC	C1-ODPR	CI_OD_PROC	C1_BI_F_ODPR	
	EXTCOLPR	CI_COLL_PROC	C1_BI_F_COLPR	
CF_FT	EXTFIN	CI_FT	C1_BI_F_BUFZ	
CF_FT_GL	C1-FTGL	CI_FT_GL	C1_BI_F_FTGL	
CF_ORDER	C1-ORDER	CI_ENRL	C1_BI_F_ORDER	
CF_PAY_TNDR	C1-PYTND	CI_PAY_TNDR	C1_BI_F_PAYTNDR	
CF_RECENT TD_ENTRY	C1-RECTD	CI_TD_ENTRY	C1_BI_F_RECTD	
CF_SA	EXTSAACC	CI_SA	C1_BI_F_SAAC	
CF_TD_ENTRY	C1-TDENT	CI_TD_ENTRY	C1_BI_F_TDENT	
CF_UCOL_EVT	EXTUNCEV	CI_WO_EVT	C1_BI_F_UNCEV	
CF_UCOL_PROC	EXTUNCPR	CI_WO_PROC	C1_BI_F_UNCPR	

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_ACCT	EXTACCT	CI_ACCT	C1_BI_D_ACCT	UDF1_CD - CUST_CL_CD UDF1_DESCR - CI_CUST_CL_L.DESCR UDF2_CD - ACCT_MGMT_GRP_CD UDF2_DESCR - CI_ACCT_MGMT_GR_L.DESCR UDF3_CD - CIS_DIVISION UDF3_DESCR - CI_CIS_DIVISION_L.DESCR UDF4_CD - BILL_CYC_CD UDF4_DESCR - CI_BILL_CYC_L.DESCR UDF5_CD - COLL_CL_CD UDF5_DESCR - CI_COLL_CL_L.DESCR
CD_ADDR	EXTADDR	CI_PREM	C1_BI_D_ADDR	UDF1_CD - CITY_UPR UDF1_DESC - CITY_UPR UDF2_CD - COUNTY UDF2_DESC - COUNTY UDF3_CD - POSTAL UDF3_DESC - POSTAL UDF4_CD - STATE UDF4_DESC - CI_STATE_L.DESCR UDF5_CD - COUNTRY UDF5_DESC - CI_COUNTRY_L.DESCR UDF6_CD - GEO_CD UDF6_DESC - GEO_CD
CD_ADJ_TYPE	EXTADJT	CI_ADJ_TYPE	C1_BI_D_ADJT, C1_BI_D_ADJTD	UDF1_CD - AP_REQ_TYPE_CD UDF1_DESCR - CI_APREQ_TYPE_L.DESCR UDF2_CD - DST_ID UDF2_DESCR - CI_DST_CODE_L.DESCR

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_CAMPAIGN	C1-CMPGN	CI_CAMPAIGN	C1_BI_D_CMPGN, C1_BI_D_CMPAIGND	UDF1_CD - CAMP_STATUS_FLG UDF1_DESCR - CI_LOOKUP_VAL_L.DESCR
CD_CASE_TYPE_STATUS	EXTCTS	CI_CASE_STATUS	C1_BI_D_CTS	
CD_CASE_COND	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP C1_BI_D_LKUPD	
CD_CC_TYPE	C1-CCTTY	CI_CC_TYPE	C1_BI_D_CCNCTYPD	
CD_COLLEVT_TYPE	C1-CUTET	CI_CUT_EVT_TYPE	C1_BI_D_CUTETD	
	C1-ODET	CI_OD_EVT_TYPE	C1_BI_D_ODETD	
	EXTSET	CI_SEV_EVT_TYPE	C1_BI_D_SET C1_BI_D_SETD	
	C1-EXTCET	CI_COLL_EVT_TYP	C1_BI_D_CET C1_BI_D_CETD	
CD_COLLPROC_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_COLLPROC_TMPL	EXTCPT	CI_COLL_PROC_TM	C1_BI_D_CPTD	
	C1-ODPT	CI_OD_PROC_TMP	C1_BI_D_ODPTD	
CD_FISCAL_CAL	EXTFIPD	CI_CAL_PERIOD	C1_BI_D_FIPD C1_BI_D_FIPDD	
CD_FT_TYPE	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP C1_BI_D_LKUPD	
CD_GL_ACCT	C1-FTGL	CI_FT_PROC		
CD_MSG	C1-MSG	CI_MSG	C1_BI_D_MSG C1_BI_D_MSGD, C1_BI_D_MSGCAT, C1_BI_D_MSGCATD	
CD_ORDER_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUp C1_BI_D_LKUPD	
CD_ORDER_CAN_RSN	C1-OCNRS	CI_ENRL_CAN_RSN	C1_BI_D_OCNRSND	
CD_ORDER_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP C1_BI_D_LKUPD	
CD_PAY_CAN_RSN	C1-PCNRS	CI_PAY_CAN_RSN	C1_BI_D_PCNCRSND	

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_PER	EXTPER	CI_PER	C1_BI_D_PER C1_BI_D_PERN, C1_BI_D_PERP	
CD_PKG	C1-PCKGE	CI_PKG	C1_BI_D_PKGD	
CD_PREM	EXTPREM	CI_PREM	C1_BI_D_PREM	UDF1_CD - CIS_DIVISION UDF1_DESCR - CI_CIS_DIVISION_L.DESCR UDF2_CD - PREM_TYPE_CD UDF2_DESCR - CI_PREM_TYPE_L.DESCR UDF3_CD - LS_SL_FLG UDF3_DESCR - CI_LOOKUP_VAL_L.DESCR UDF4_CD - TREND_AREA_CD UDF4_DESCR - CI_TREND_AREA_L.DESCR UDF5_CD - IN_CITY_LIMIT UDF5_DESCR - IN_CITY_LIMIT
CD_RATE	EXTRATE	CI_RS	C1_BI_D_RATE C1_BI_D_RATED	UDF1_CD - SVC_TYPE_CD UDF1_DESCR - CI_SVC_TYPE_L.DESCR UDF2_CD - FREQ_CD UDF2_DESCR - CI_FREQ_L.DESCR

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_SA	EXTSA	CI_SA	C1_BI_D_SA	UDF1_CD - SVC_TYPE_CD UDF1_DESCR - CI_SVC_TYPE_L.DESCR UDF2_CD - CIS_DIVISION UDF2_DESCR - CI_CIS_DIVISION_L.DESCR UDF3_CD - SA_TYPE_CD UDF3_DESCR - CI_SA_TYPE_L UDF4_CD - CI_SA_TYPE.REV_CL_CD UDF4_DESCR - CI_REV_CL.DESCR UDF5_CD - SIC_CD UDF5_DESCR - CI_SIC_L.DESCR UDF6_CD - CI_SA_TYPE.DEP_CL_CD UDF6_DESCR - CI_DEP_CL_L.DESCR UDF7_CD - CI_ENRL.CAMPAIGN_CD UDF7_DESCR - CI_CAMPAIGN_L.DESCR UDF8_CD - CI_SA_TYPE.DEBT_CL_CD UDF8_DESCR - CI_DEBT_CL_L.DESCR
CD_SA_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_SQI	EXTSQI	CI_SQI	C1_BI_D_SQID	
CD_TD	C1-TD	CI_TD_ENTRY	C1_BI_D_TDENT	
CD_TD_PRIORITY	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_TD_ROLE	C1-TDROL	CI_ROLE	C1_BI_D_TDROLE, C1_BI_D_TDROLED	
CD_TD_SKILL	C1-TDSKL	Populated via extracts from Characteristic data		
CD_TD_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_TD_TYPE	C1-TDTYP	CI_TD_TYPE	C1_BI_D_TDTYP, C1_BI_D_TDTYPD	
CD_TNDR_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_TNDR_SRCE	C1-TNDCT	CI_TNDR_SRCE	C1_BI_D_TNDSRCE, C1_BI_D_TNDSRCED	

Fact / Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_TNDR_TYPE	C1-TNDTY	CI_TENDER_TYPE	C1_BI_D_TNDTYPED	
CD_TOU	EXTTOU	CI_TOU	C1_BI_D_TOUD	
CD_UCOLEVT_TYPE	EXTUET	CI_WO_EVT_TYP	C1_BI_D_UET, C1_BI_D_UETD	
CD_UCOLPROC_STATUS	EXTLKUP	CI_LOOKUP_VAL	C1_BI_D_LKUP, C1_BI_D_LKUPD	
CD_UCOLPROC_TMPL	EXTUCPT	CI_WO_PROC_TMPL	C1_BI_D_WPTD	
CD_UOM	EXTUOM	CI_UOM	C1_BI_D_UOM, C1_BI_D_UOMD	
CD_USER	EXTUSER	SC_USER	C1_BI_D_USER	

Appendix C

Oracle Utilities Meter Data Management Extractor Details

This section contains detailed level information for each fact and dimension from the MDM edge application.

Fact / Dimension Table Name	Initial Load Batch Control	Extract Batch Control	Sync BO	System Event / Default Algorithm
CF_CONSUMPTION	D2-SPCFX		Usage Snapshot / D2-SP-CA	
CF_SP_SNAP	D1-SPSFX		Service Point Snapshot / D1-SPSNAP-SE	
CF_DEVICE_EVT	D1-DEVIL	D1-DEVFX	D1- DeviceEventFact	
CF_INSTALL_EVT	D1-INEIL	D1-INEFX	D1- InstallEventFact	
CF_SP		D1-SPAFX	D1-SPAccumulationFact	
CF_DEVICE_ACTIVITY	D1-ACTIL	D1-ACTFX	D1- DeviceEventFact	
CF_SP_UT_AGE	D2-SUAFX		Unreported Usage Analysis Snapshot / D2-SP-UT-AGE	
CF_VEE_EXCP	D2-SVEFX		SP VEE Exception Snapshot / D2-SPVEEEXC	
CD_CONS_TYPE	D2-CSTIL	D2-CSTDX	D2-ConsumSnapshotTypeDimension	
CD_MTR_DEVICE	D1-DVCIL	D1-DVCDX	D1-DeviceDimension	
CD_MC	D1-MCIL	D1-MCDX	D1-MeasuringComponentDimension	
CD_SPR	D1-SPRIL	D1-SPRDX	D1-ServiceProviderDimension	
CD_SP	D1-SPIL	D1-SPDX	D1-SPDimension	

Fact / Dimension Table Name	Initial Load Batch Control	Extract Batch Control	Sync BO	System Event / Default Algorithm
CD_ADDR	D1-ADRIL	D1-ADRDX	D1-AddressDimension	
CD_US	D2-USIL	D2-USDX	D2-USDimension	
CD_USAGE_GROUP	D2-UGIL	D2-UGDX	D2-UsageGroupDimension	
CD_CONTACT	D2-CONIL	D2-CONDX	D2-ContactDimension	
CD_MSRMT_COND	D2-MRCIL	D2-MRCDX	D2-MsrmtConditionDimension	
CD_UOM_TOU	D2-UTIL		Extension possible via service scripts specified as user exit s on the batch controls.	
CD_IE_STATUS	D1-IESIL	D1-IESDX	D1-IEBOStatusAndReasnDimension	
CD_SP_STATUS	D1-SPSIL	D1-SPSDX	D1-SPBOStatusAndReasnDimension	
CD_DAYS_LAST_MSRMT	D1-LNMIL	D1-LNMDX	D1-DaysSinceLastNormalMsrmtDim	
CD_EXCP_TYPE	D2-EXTIL	D2-EXTDX	D2-ExceptionTypeDimension	
CD_IMD_TYPE	D2-ITLIL		No extension allowed here due to simplicity of dimension	
CD_EXCP_SEV	D2-EXLIL		No extension allowed here due to simplicity of dimension	
CD_VEE_RULE	D2-VERIL	D2-VERDX	D2-VEERuleDimension	
CD_DEVICE_ACTIVITY_STATUS	D1-ACSIL	D1-ACSDX	D1-ActivityBOStatusAndReasnDim	
CD_DEVICE_ACTIVITY_TYPE	D1-ATYIL	D1-ATYDX	D1-ActivityAccumulationFac	
CD_DEVICE_EVT_STATUS	D1-DESIL	D1-DESDX	D1-DEBOStatusAndReasnDimension	
CD_DEVICE_EVT_TYPE	D1-DETIL	D1-DETDX	D1-DeviceEventTypeDimension	
CD_SP_UT_AGE_TYPE	D2-UTAIL	D2-UTADX	D2-SPUTAgingTypeDimension	
CD_DAYS_LASTUT_TYPE	D2-LUTIL	D2-LUTDX	D2-DaysSinceLastUTDimension	

Fact / Dimension Table Name	Initial Load Batch Control	Extract Batch Control	Sync BO	System Event / Default Algorithm
CD_UOM_TOU_SQI	D2-UTSIL		Extension possible via service scripts specified as user exit s on the batch controls.	

Appendix D

Oracle Utilities Mobile Workforce Management Extractor Details

The section contains the summary of the batch programs and sync business objects for each fact/dimension.

Fact /Dimension Table Name	Initial Load Batch Control	Extract Batch Control	Sync BO
CD_CREW_SHIFT	M1-SFTIL	M1-CRSDX	M1-CrewShiftDimension
CD_CREW_TM_USG	M1-CTUIL	M1-CTUDX	M1-CrewTimeUsageDimension
CD_APPT_TM	M1-APTIL	M1-APTDX	M1-AppointmentTimeDimension
CD_APPT_TM_OF_DAY	M1-ATDIL	M1-ATDDX	M1-AppointmentTmOfDayDimension
CD_TRAVEL_DIST_DEV	M1-TDDIL	M1-TADDX	M1-TravelDurDeviationDimension
CD_SERVICE_AREA	M1-SERIL	M1-SERDX	M1-ServiceAreaDimension
CD_CREW	M1-CREIL	M1-CREDX	M1-CrewDimension
CD_TASK_TYPE	M1-TKTIL	M1-TKTDX	M1-TaskTypeDimension
CD_ADDR	M1-LOCIL,M1-CSAIL,M1-TKAIL	M1-ADRDX	M1-AddressDimension
CD_SHIFT_BO_STATUS	M1-SBSIL	M1-SBSDX	M1-ShiftBoStatusResDimension
CD_TASK_BO_STATUS	M1-TBSIL	M1-TBSDX	M1-TaskBoStatusReasonDimension
CD_LATE_LOGON_TM	M1-LLTIL	M1-LLTDX	M1-LateLogonTimeDimension

Fact /Dimension Table Name	Initial Load Batch Control	Extract Batch Control	Sync BO
CD_EARLY_LOGOFF	M1-ELTIL	M1-ELTDX	M1-EarlyLogoffTimeDimension
CD_TRAVEL_DUR_DEV	M1-TADIL	M1-TDDDX	M1-TravelDistDevDimension
CD_WORK_DUR_DEV	M1-WDDIL	M1-WDDDX	M1-WorkDurationDevtnDimension
CD_RESP_TM_DEV	M1-RTDIL	M1-RTDDX	M1-RespTimeDevDimension
CF_FLD_ACTIVITY	M1-ACTIL	M1-ACTFX	M1-ActivityFact
CF_CMP_SHIFT	M1-SFTIL	M1-CCSFX	M1-CompletedShiftFact
CF_CREW_TASK	M1-SFTIL	M1-CRTFX	M1-CrewTaskFact

Appendix E

Oracle Utilities Network Management System Extractor Details

This section contains a summary of the Extract scripts and the corresponding view names for each fact and dimension:

Table Name	Extract Program	Extract Procedure	Modify View	Delete View
CD_ACCT	bi_customer_extractor	PR_BI_EXTOACCT	EXTOACCT_MODIFY_V	EXTOACCT_DELETE_V
CD_ADDR	bi_customer_extractor	PR_BI_EXTOADDR	EXTOADDR_MODIFY_V	EXTOADDR_DELETE_V
CD_CALL_INFO	bi_event_extractor AND nrt_extractor	PR_BI_EXTCINFO	EXTCINFO_MODIFY_V	EXTCINFO_DELETE_V
CD_CREW	bi_common_extractor	PR_BI_EXTOACCT	EXTOCREW_MODIFY_V	EXTOCREW_DELETE_V
CD_CTRL_ZONE	bi_common_extractor	PR_BI_EXTZONE	EXTZONE_MODIFY_V	EXTZONE_DELETE_V
CD_DEVICE	bi_common_extractor	PR_BI_EXTDEV	EXTDEV_MODIFY_V	EXTDEV_DELETE_V
CD_EVENT	bi_event_extractor AND nrt_extractor	PR_BI_EXTJOBD	EXTJOBD_MODIFY_V	EXTJOBD_DELETE_V
CD_EVENT_STATUS	bi_common_extractor	PR_BI_EXTESTAT	EXTESTAT_MODIFY_V	EXTESTAT_DELETE_V
CD_FEEDER	bi_feeder_extractor	PR_BI_EXTFDR	EXTFDR_MODIFY_V	EXTFDR_DELETE_V
CD_METER	bi_customer_extractor	PR_BI_EXTOMTR	EXTOMTR_MODIFY_V	EXTOMTR_DELETE_V
CD_PER	bi_customer_extractor	PR_BI_EXTOPER	EXTOPER_MODIFY_V	EXTOPER_DELETE_V
CD_PHASE	bi_feeder_extractor	PR_BI_EXTPHASE	EXTPHASE_MODIFY_V	
CD_PREM	bi_customer_extractor	PR_BI_EXTOPREM	EXTOPREM_MODIFY_V	EXTOPREM_DELETE_V
CD_SNL	bi_customer_extractor	PR_BI_EXTCSP	EXTCSP_MODIFY_V	EXTCSP_DELETE_V
CD_STORM	bi_event_extractor and nrt_extractor	PR_BI_EXTSTORM	EXTSTORM_MODIFY_V	EXTSTORM_DELETE_V
CD_STORM_OUTAGE_TYPE	bi_common_extractor and bi_event_extractor	PR_BI_EXTSTORMOT	EXTSTORMOT_MODIFY_V	

Table Name	Extract Program	Extract Procedure	Modify View	Delete View
CD_SW_PLAN	bi_switch_extractor	PR_BI_EXTSWSD	EXTSWSD_MODIFY_V	EXTSWSD_DELETE_V
CD_SW_PLAN_STATE	bi_switch_extractor	PR_BI_EXTVALST	EXTVALID_STATES_MODIFY_V	
CD_USER	bi_common_extractor	PR_BI_EXTOUSER	EXTOUSER_MODIFY_V	EXTOUSER_DELETE_V
CF_CUST_RECENT_OUTG	nrt _extractor	PR_BI_NRTCOF	NRTSNL_MODIFY_V	EXTSNL_DELETE_V
CF_CUST_RST_OUTG	bi_event _extractor	PR_BI_EXTCOF	EXTSNL_MODIFY_V	EXTSNL_DELETE_V
CF_FEEDER_DLVRD_LOAD	bi_feeder_extractor	PR_BI_ EXTFDRLD	EXTFDRLD_MODIFY_V	
CF_RECENT_CALL	nrt _extractor	PR_BI_NRTINC	EXTINC_MODIFY_V	EXTINC_DELETE_V
CF_RECENT_CREW	nrt _extractor	PR_BI_NRTCRWA	EXTCRWA_MODIFY_V	
CF_RST_CREW	bi_event_extractor	PR_BI_EXTCRWA	EXTCRWA_MODIFY_V	
CF_RST_JOB	bi_event _extractor	PR_BI_EXTJOBT	EXTJOBT_MODIFY_V	EXTJOBT_DELETE_V
CF_SW_PLAN	bi_switch_extractor	PR_BI_ EXTSWS	EXTSWS_MODIFY_V	EXTSWS_DELETE_V
CF_SW_PLAN_STATE	bi_switch_extractor	PR_BI_ EXTSWSLOG	EXTSWSLOG_MODIFY_V	

Appendix F

Oracle Utilities Work and Asset Management Extractor Details

This section includes the details for the Oracle Utilities Work and Asset Management extractors:

Fact/Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_ASSET	EXTDASSET	SA_ASSET	SDBT_BI_ADIU_ASSET	UDF1: Asset Class UDF2: Criticality UDF3: Building UDF4: Location UDF5: Process UDF6: Asset Record Type UDF7: Facility UDF8: Organization UDF9: Company
CD_CREW	EXTDWRKC	SA_CREW	SDBT_BI_ADIU_CREW	
CD_FAILURE	EXTDFAIL	SA_AUTHORITY	SDBT_BI_ADIU_FAILURE	
CD_OP_ACCT	EXTDOPAC	SA_ACCOUNT_DATA	SDBT_BI_ADIU_ACCT_DATA	UDF1: Area UDF2 : Facility UDF3 : Organization UDF4 : Company UDF5 : Level-1 Department UDF6 : Level-2 Department UDF7 : Level-3 Department
CD_OP_ACTG_TY	EXTDOATT	SA_AUTHORITY	SDBT_BI_ADIU_OP_ACTG_TR_TY	
CD_OP_EXP	EXTDOPEX			UDF1 : Expense Category UDF2 : Facility
CD_OP_UOM	EXTDOUOM	SA_AUTHORITY	SDBT_BI_ADIU_OUOM	
CD_PLANNER	EXTDWRKP	SA_RULE_KEY	SDBT_BI_ADIU_RULE_KEY_PLAN	

Fact/Dimension Table Name	Batch Control Name	Source Table Name	Trigger Name	UDFs/UDMs being used
CD_REPAIR	EXTDREPR	SA_AUTHORITY	SDBT_BI_ADIU_REPAIR	UDF1: Facility
CD_ROOT_CAUSE	EXTDROOT	SA_AUTHORITY	SDBT_BI_ADIU_ROOTCAUSE	
CD_STOCK_ITMTY	EXTDSITE	SA_STOREROOM_LOG	SDBT_BI_AI_STRM_LOG	UDF1 : Stock Type UDF2 : Stock Class UDF3 : Commodity Category UDF4 : Commodity Name UDF5 : Commodity UDF6 : Facility
CD_STRM	EXTDSTRM	SA_STOREROOM_SETUP	SDBT_BI_ADIU_STRM_SETUP	UDF1 :Storeroom Type UDF2 : Facility UDF3 : Organization UDF4 : Company
CD_STRM_TR_TY	EXTDSTTT	SA_STOREROOM_LOG	SDBT_BI_AI_STRM_LOG	
CD_WRKORD_TY	EXTDWOTY	SA_AUTHORITY	SDBT_BI_ADIU_WRK_ORD_TYPE	
CF_OP_ACTG	EXTFOPAT	SA_AUTHORITY	SDBT_BI_ADIU_OP_ACTG_TR_TY	
CF_STRM_INV	EXTFSTOR	SA_STOREROOM_SETUP	SDBT_BI_ADIU_STRM_SETUP	
CF_STRM_TR	EXTFSTTR	SA_STOREROOM_LOG	SDBT_BI_AI_STRM_LOG	
CF_WRKORD_TK	EXTFWRKT	SA_WORK_ORDER_TASK	SDBT_BI_WORK_ORDER_TASK	UDM1: Days Late UDM2: Days to close UDM3 : Scheduled Downtime Indicator