Oracle Utilities Smart Grid Gateway

Database Administrator's Guide

Release 2.0.0 Service Pack 9

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Oracle Utilities Smart Grid Gateway Database Administrator's Guide

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Contents

Appendix D

Preface

This guide provides instructions for installing and maintaining the database for Oracle Utilities Smart Grid Gateway.

This preface contains these topics:

- **Audience**
- **Related Documents**
- **Updates to this Documentation**
- **Conventions**

Audience

Oracle Utilities Smart Grid Gateway Database Administrator's Guide is intended for database administrators who will be installing and maintaining the database for Oracle Utilities Smart Grid Gateway.

Related Documents

For more information, see these Oracle documents:

- *Oracle Utilities Smart Grid Gateway Quick Install Guide*
- *Oracle Utilities Smart Grid Gateway Installation Guide*

Updates to this Documentation

This documentation is provided with the version of the product indicated. Additional and updated information about the operations and configuration of the product is available from the Knowledge Base section of My Oracle Support (http://support.oracle.com). Please refer to My Oracle Support for more information.

Conventions

The following text conventions are used in this document:

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

Chapter 1

Database Overview

This section provides an overview of the Oracle Utilities Smart Grid Gateway database, including:

- **Supported Database Platforms**
- **Database Maintenance Rules**

Note: This service pack is intended to be installed on top of an existing Oracle Utilities Smart Grid Gateway. Please refer to the **Readme.txt** file included with the release package for information about installing the database for this service pack.

Supported Database Platforms

This section defines the platforms on which Oracle Utilities Smart Grid Gateway is verified to operate.

Supported Platforms Summary Table

Oracle Utilities Smart Grid Gateway is certified on the following platforms:

Platform	Database Version
AIX 6.1 TL4 (POWER 64-bit)	Oracle Database Server 11.2.0.1 (64-bit)
Oracle Linux 5.8/6.2 (64-bit) x86_64 (64-bit)	Oracle Database Server 11.2.0.1 (64-bit)
Red Hat Enterprise Linux 5.8/6.2 (64-bit) x86_64 (64-bit)	Oracle Database Server 11.2.0.1 (64-bit)
Solaris 10 (SPARC 64-bit)	Oracle Database Server 11.2.0.1 (64-bit)
Windows Server 2008 R2 (x86_64 64-bit)	Oracle Database Server 11.2.0.1 (64-bit)

The following Oracle Database Server Editions are supported:

- Oracle Database Enterprise Edition
- Oracle Database Standard Edition

> **Note:** Oracle Database Enterprise Edition and the Partitioning and Advanced Compression options are not mandatory but recommended. Standard Edition should only be considered suitable for very small, pilot projects or development environments where scalability, performance, and database size-on-disk are not important considerations. Oracle Database Enterprise Edition, including the Advanced Compression and Partitioning options, is strongly recommended in all other situations.

Refer to My Oracle Support for additional details.

Support for Software Patches and Upgrades

Due to the ongoing nature of software improvement, vendors will issue patches and service packs for the operating systems, application servers and database servers on top of specific versions that Oracle Utilities Smart Grid Gateway has been tested with.

If it is necessary to apply an upgrade, please do so in a test environment that is running on the same platform as your production environment prior to updating the Oracle Utilities Smart Grid Gateway production environment.

The exception from this rule is Hibernate software version 3.3.2 ga. This version should not be upgraded.

Always contact Oracle Utilities Smart Grid Gateway support prior to applying vendor updates that do not guarantee backward compatibility.

Database Maintenance Rules

The database supplied with the product consists of the following elements:

- A set of users to administrate, execute and read the database schema provided.
- A set of database roles to implement security for each of the users provided.
- A tablespace and a schema containing the base database objects used by the product.

The installation of these components is outlined in the installation section of this document.

What Changes Are Permitted

During and after installation of the product the following changes may be performed by the database administrator personnel on site:

- Users supplied by product may be changed according to the site standards.
- Database objects may be added to the schema according to database naming standards outlined later in this document.
- Database views and indexes may be created against base database objects.
- Database storage attributes for base indexes and base tables may be changed according to site standards and hardware used.
- Tablespace names, attributes and locations may be changed according to site standards.
- Database topology (that is, base table/index to tablespace, tablespace to data file, data file to location) may be altered according to tuning and/or site standards.
- Database triggers may be created against base database objects unless they attempt to contravene base data integrity rules.
- Database initialization and parameter settings may be altered according to site standards unless otherwise advised by Oracle Support or outlined in this document.

What Changes Are Not Permitted

In order to maintain operability and upgradeability of the product, during and after the installation of the product the following changes may *not* be performed by the database administration personnel on site:

- Base objects must not be removed or altered in the following ways:
  - Columns in base tables must not be altered in anyway (altered, removed or added).
  - Columns in Indexes must not be altered or removed.
  - Tables must not be renamed or removed.
  - Base views must not be renamed or removed.
  - Base Triggers and Sequences must not be renamed or removed.
  - Base indexes must not be altered or removed.

Chapter 2

Base Installation for Version 2.0.0 Database

This section provides the instructions for installing the Oracle Utilities Smart Grid Gateway version 2.0.0 database. This section includes:

- **Installation Overview**
- **Initial Install**
- **Demo Install**
- **Populating Language Data**
- **Installing Service Packs and Patches**

  Note: This service pack is intended to be installed on top of an existing Oracle Utilities Smart Grid Gateway. Please refer to the **Readme.txt** file included with the release package for information about installing the database for this service pack.

Installation Overview

Refer to **Supported Database Platforms** on page 1-2 for information about the supported platforms on which Oracle Utilities Smart Grid Gateway is verified to operate.

The following types of installation is available for Oracle Utilities Smart Grid Gateway:

- **Initial Install** — a database with no demo data.
- **Demo Install** — a database populated with demo data.

Initial Install

This section describes how to install the database components of Oracle Utilities Smart Grid Gateway, including:

- **Copying and Decompressing Install Media**
- **Creating the Database**
- **Installing the CISADM Schema**
- **Generating Database Statistics**

Copying and Decompressing Install Media

To copy and decompress the Oracle Utilities Smart Grid Gateway database:

1. Download the Oracle Utilities Smart Grid Gateway v2.0.0. Oracle database from the Oracle Software Delivery Cloud for the following adapters:
    - Oracle Utilities Smart Grid Gateway Adapter for Landis+Gyr
    - Oracle Utilities Smart Grid Gateway Adapter Echelon
    - Oracle Utilities Smart Grid Gateway Adapter MV-90 Adapter for Itron
    - Oracle Utilities Smart Grid Gateway Adapter Sensus RNI
    - Oracle Utilities Smart Grid Gateway Adapter for Silver Spring Networks
2. Download the Oracle Utilities Smart Grid Gateway v2.0.0.8.0 Oracle database from the Oracle Software Delivery Cloud for the following adapters:
    - Oracle Utilities Smart Grid Gateway Adapter for Itron OpenWay
    - Oracle Utilities Smart Grid Gateway Adapter Development Kit
3. Unzip the SGG Database MultiPlatform.zip file to a temporary folder. This file contains the database components required to install the Oracle Utilities Smart Grid Gateway database.

Creating the Database

> **Note:** You must have Oracle Database Server 11.2.0.1 installed on your machine in order to create the database.

You can create a database using the database creation tool (cdxdba.plx for UNIX or CDXDBA.exe for Windows) that is packaged with product.

The UNIX and Windows database creation utilities create an empty database with AL32UTF8 character set and at least one tablespace for storing the application objects before running the installation. The default name of the application tablespace is CISTS_01.

- **Creating the Database on Unix**
- **Creating the Database on Windows**

Creating the Database on Unix

The files for creating the database are located in the ../SGG/DatabaseCreation/Unix directory.

Follow these steps to create a database:

1. FTP the contents of the DatabaseCreation folder to a temporary directory on the UNIX server.
2. Set the ORACLE_HOME and ORACLE_BASE variables.
3. Run the utility cdxdba.plx by executing the following command:

   ```
   perl cdxdba.plx
   ```

4. Provide the following parameter values when prompted:

   - Instance name (DEMO):
   - ORACLE_BASE: the directory where the setup files for the database will be created (/orasw/app/oracle):
   - ORACLE_HOME: the folder where the current version of Oracle software is installed (/orasw/app/oracle/product/):
   - ORACLE_DATA: the directory where the data files for the database will be created (/db05/oradata):
   - Character set for the database (AL32UTF8):

   Enter the parameter values based on the settings of your database server. You can also accept the default values displayed if they match your database server settings. You will be prompted to confirm the settings and then to select Y or N to create the database.

   ```
   ORACLE_SID: DEMO
   ORACLE_HOME: /orasw/app/oracle/product/
   ORACLE_BASE: /orasw/app/oracle
   ORACLE_DATA: /db05/oradata
   Character Set: AL32UTF8
   Do you want to continue (Y/N)?
   ```

5. When the database has been created, you will be prompted with the following question:

   ```
   Do you want to import a demo database dump into this database (Y/N)?
   ```

   Select N to exit the database utility.

Creating the Database on Windows

The files for creating the database are located in the ..\SGG\DatabaseCreation\Windows directory.

You should be logged in as a user who is a member of the local ORA_DBA group on that server. The ORA_DBA group should have "administrator" privileges assigned to it.

Follow these steps to create the database:

1. From a command prompt, run the utility CDXDBA.exe, located in the Windows folder.

   The utility displays the following options:

   ```
   E - Export a schema from the database
   R - Refresh a schema with a database dump
   C - Create/Recreate a local database
   H - See help for the command line options
   Q - Quit
   ```

2. Select option C to create an empty database on your machine.

Provide the following values.

- Provide the instance name (DEMO): <DB Name> For example, SGG_DB
- Enter the character set of the database (AL32UTF8): AL32UTF8
- Enter ORACLE_BASE: the directory where the setup files for the database will be created (c:\oracle): <Oracle_Base> For example, c:\app\oracle
- Enter ORACLE_HOME: the folder where the current version of Oracle software is installed (c:\oracle\product\11.1.0.6\Db_1):< Oracle_Home> For example, c:\app\oracle\db_home
- Enter ORACLE_DATA: the directory where the data files for the database will be created (c:\app\oracle\oradata): <Directory where data files will be created>

3. Select option Q to exit the utility after the database is created.

Installing the CISADM Schema

You will install the Oracle Utilities Application Framework V4.1.0. prior to Oracle Utilities Smart Grid Gateway 2.0.0. The files for Oracle Utilities Application Framework installation are located in the FW410 folder. The installation process will prompt you for the following information:

- A database user that will own the application schema (for example, CISADM).
- A database user that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CISUSER).
- A database user with read-only privileges to the objects in the application schema. (for example, CISREAD).
- A database role that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CIS_USER).
- A database role with read-only privileges to the objects in the application schema. (for example, CIS_READ).
- Location for jar files. (The Jar files are bundled with the database package.)
- Java Home (For example, C:\Java\jdk1.6.0_20)

To install the CISADM schema for Oracle Utilities Smart Grid Gateway, follow these steps:

1. Install Oracle Utilities Application Framework.

   For the following adapters:

   - Oracle Utilities Smart Grid Gateway Adapter for Landis+Gyr
   - Oracle Utilities Smart Grid Gateway Adapter Echelon
   - Oracle Utilities Smart Grid Gateway Adapter MV-90 Adapter for Itron
   - Oracle Utilities Smart Grid Gateway Adapter Sensus RNI
   - Oracle Utilities Smart Grid Gateway Adapter for Silver Spring Networks

   Run CdxDBI.exe from the ..\FW410\Install-Upgrade directory. Please run the utility from the command prompt.

   Notes:

   Be sure to run CdxDBI.exe from a Window 32-bit desktop that has the Oracle 11.2.0.1 client and Java Development Kit Version 6.0 Update 20 or later. The database should already be listed in the local file tnsnames.ora

Apply prerequisite Framework DB single fixes if any. See the respective Oracle Utilities Smart Grid Gateway Installation Guide for more details.

For the following adapters:

- Oracle Utilities Smart Grid Gateway Adapter for Itron OpenWay
- Oracle Utilities Smart Grid Gateway Adapter Development Kit

Run CdxDBI.exe from the ..\FW41010\Install-Upgrade directory. Please run the utility from the command prompt.

Notes:

Be sure to run CdxDBI.exe from a Window 32-bit desktop that has the Oracle 11.2.0.1 client and Java Development Kit Version 6.0 Update 20 or later. The database should already be listed in the local file tnsnames.ora.

Apply prerequisite Framework DB single fixes if any. See the respective Oracle Utilities Smart Grid Gateway Installation Guide for more details.

The utility prompts you to enter values for the following parameters:

- Name of the target database:<DB NAME>
- Password for the SYSTEM user account in the database (in silent mode)
- Name of the owner of the Database Schema:<CISADM>
- Location of Java Home: <..\jdk1.6.0_20>
- Location of TUGBU Jar files: <..\FW41010\jarfiles> or < ..\FW410\jarfiles>
- Password for the user (in silent mode)
- Oracle user with read-write privileges to the Database Schema:<CISUSER>
- Oracle user with read-only privileges to the Database Schema:<CISREAD>
- Oracle database role with read-write privileges to the Database Schema:<CIS_USER>
- Oracle database role with read-only privileges to the Database Schema:<CIS_READ>

2. Run CdxDBI.exe from the ..\MDF\Install-Upgrade directory. The utility prompts you to enter values for the following parameters:
   - Name of the target database:<DB NAME>
   - Password for the SYSTEM user account in the database (in silent mode)
   - Name of the owner of the Database Schema:<CISADM>
   - Location of Java Home: <..\jdk1.6.0_20>
   - Location of TUGBU Jar files: <..\FW41010\jarfiles> or < ..\FW410\jarfiles>
   - Password for the user (in silent mode)
   - Oracle user with read-write privileges to the Database Schema:<CISUSER>
   - Oracle user with read-only privileges to the Database Schema:<CISREAD>
   - Oracle database role with read-write privileges to the Database Schema:<CIS_USER>
   - Oracle database role with read-only privileges to the Database Schema:<CIS_READ>
3. Oracle Utilities Smart Grid Gateway Adapter for Itron OpenWay 2.0.0.8.0 requires additional Oracle Utilities Meter Data Framework patches 14739746 and 14775734. Please download the patches from https://support.oracle.com.

4. Run CdxDBI.exe from the ..\SGG\Install-Upgrade directory. The utility prompts you to enter values for the following parameters:
    - Name of the target database:<DB NAME>
    - Password for the SYSTEM user account in the database (in silent mode)
    - Name of the owner of the Database Schema:<CISADM>
    - Location of Java Home: <..\jdk1.6.0_20>
    - Location of TUGBU Jar files: <..\FW41010\jarfiles> or < ..\FW410\jarfiles>
    - Password for the user (in silent mode)
    - Oracle user with read-write privileges to the Database Schema:<CISUSER>
    - Oracle user with read-only privileges to the Database Schema:<CISREAD>
    - Oracle database role with read-write privileges to the Database Schema:<CIS_USER>
    - Oracle database role with read-only privileges to the Database Schema:<CIS_READ>

If you chose to continue, CdxDBI first checks for the existence of each of the users specified and prompts for their password, default tablespace, and temporary tablespace.

After setting up roles and users, the utility continues upgrading schema and system data definitions. If an error occurs while executing an SQL or another utility, it logs and displays the error message and allows you to re-execute the current step.

CdxDBI Performs the Following Tasks

- Interacts with the user to collect information about the name of Oracle account that will own the application schema (for example, CISADM), password of this account, password of the SYSTEM account in the database, and the name of the Oracle account that the application user will use (for example, CISUSER), and the name of the Oracle account that will be assigned read-only privileges to the application schema (for example, CISREAD).
- Connects to the database as SYSTEM account, checks whether the user already has the application schema installed to verify whether this is an initial installation.
- Verifies whether tablespace names already exist in the Storage.xml file (if not, the process will abort).
- Installs the schema, installs the system data, and configures security.
- Maintains upgrade log tables in the database.
- Updates release ID when the upgrade is completed successfully.
- If an error occurs while executing a SQL script or another utility, it logs and displays the error message and allows you to re-execute the current step. Log files CdxDBI###.log are created in the same folder as CdxDBI and contains all the SQL commands executed against the database along with the results. The log files are incremental so that the results are never overwritten. If warning messages are generated during the upgrade, CdxDBI prompts the user at the end of the process. Users should check the log files to verify the warning messages. Warning messages are only alerts and do not necessary mean a problem exists.
- Stores the Schema owner and password in the feature configuration table. The password is stored in encrypted format.

Generating Database Statistics

During an install process new database objects may be added to the target database. Before starting to use the database, generate the complete statistics for these new objects by using the DBMS_STATS package.

Demo Install

This section describes how to install the demo database components for Oracle Utilities Smart Grid Gateway, including:

- **Copying and Decompressing Install Media**
- **Creating the Database and Importing Dump File**
- **Configuring Security**

Copying and Decompressing Install Media

To copy and decompress the Oracle Utilities Smart Grid Gateway database:

1. Download the Oracle Utilities Smart Grid Gateway v2.0.0 Oracle database from the Oracle Software Delivery Cloud for the following adapters:
   - Oracle Utilities Smart Grid Gateway Adapter for Landis+Gyr
   - Oracle Utilities Smart Grid Gateway Adapter Echelon
   - Oracle Utilities Smart Grid Gateway Adapter MV-90 Adapter for Itron
   - Oracle Utilities Smart Grid Gateway Adapter Sensus RNI
   - Oracle Utilities Smart Grid Gateway Adapter for Silver Spring Networks
2. Download the Oracle Utilities Smart Grid Gateway v2.0.0.8.0 Oracle database from the Oracle Software Delivery Cloud for the following adapters:
   - Oracle Utilities Smart Grid Gateway Adapter for Itron OpenWay
   - Oracle Utilities Smart Grid Gateway Adapter Development Kit
3. Unzip the SGG Database MultiPlatform.zip file to a temporary folder. This file contains the database components required to install the Oracle Utilities Smart Grid Gateway database.

Creating the Database and Importing Dump File

You can use the database creation tool (cdxdba.plx for UNIX or CDXDBA.exe for Windows) to create the demo database with AL32UTF8 character set.

The UNIX and Windows database creation utilities create an empty database with AL32UTF8 character set and at least one tablespace for storing the application objects before running the installation. The default name of the application tablespace is CISTS_01.

- **Creating the Demo Database on Unix**
- **Creating the Demo Database on Windows**

Creating the Demo Database on Unix

The files for creating the database are located in ../SGG/DatabaseCreation/Unix directory.

Follow these steps to create a database:

1. FTP the contents of the Database Creation folder to a temporary directory on the UNIX server.
2. Set the ORACLE_HOME and ORACLE_BASE variables.
3. Run the utility cdxdba.plx by executing the following command:

   ```
   perl cdxdba.plx
   ```

4. When prompted, provide the following parameter values:
   - Instance name (DEMO):

- ORACLE_BASE: the directory where the setup files for the database will be created (/orasw/app/oracle):
- ORACLE_HOME: the folder where the current version of Oracle software is installed (/orasw/app/oracle/product/):
- ORACLE_DATA: the directory where the data files for the database will be created (/db05/oradata):
- Character set for the database (AL32UTF8):

Enter the parameter values based on the settings of your database server. You can also accept the default values displayed if they match your database server settings. You will be prompted to confirm the settings and then to select Y or N to create the database.

```
ORACLE_SID: DEMO
ORACLE_HOME: /orasw/app/oracle/product/
ORACLE_BASE: /orasw/app/oracle
ORACLE_DATA: /db05/oradata
Character Set: AL32UTF8
Do you want to continue (Y/N)?
```

5. When the database has been created, you will be prompted with the following questions:

```
Do you want to import a demo database dump into this database (Y/
N)?
```

Select Y to import the Demo Install data.

For the demo installation use the dump file exp_demo.dmp.

Note: The data_pump_dir must exist in the database created above before continuing with the import. You should also copy the exp_demo.dmp file to the data_pump_dir. Decompress the exp_demo.dmp.gz file first to extract the exp_demo.dmp file. This file is in ..\SGG\Demo directory.

```
Do you want to import a demo database dump into this database (Y/
N)? Y

Enter the name of the dump file (exp_demo.dmp):
Enter the name of the dump file directory (data_pump_dir):
Enter the name of the log file (exp_demo.log):
```

6. Update the oratab file for the new database and then check the connectivity to this database from another server and from your desktop after updating local tnsnames.ora file.

After a successful database creation, demo data can also be imported by using by following these steps:

1. Set the correct ORACLE_SID and ORACLE_HOME.
2. Run following command to import demo dump:

```
impdp directory= data_pump_dir dumpfile= exp_demo.dmp
logfile=exp_demo.log schemas=CISADM
```

Creating the Demo Database on Windows

The files for creating the database are located in the ..\SGG\DatabaseCreation\Windows directory.

You should be logged in as a user who is a member of the local ORA_DBA group on that server. The ORA_DBA group should have "administrator" privileges assigned to it.

Follow these steps to create the database:

1. From a command prompt, run the utility CDXDBA.exe, located in the Windows folder.

The utility displays the following options:

```
E - Export a schema from the database
R - Refresh a schema with a database dump
C - Create/Recreate a local database
H - See help for the command line options
Q - Quit
```

2. Select option C to create an empty database on your machine.

   Provide the following values:

   - Provide the instance name (DEMO): <DB Name> For example, SGG_DB
   - Enter the character set of the database (AL32UTF8): AL32UTF8
   - Enter ORACLE_BASE: the directory where the setup files for the database will be created (c:\oracle): <Oracle_Base> For example, c:\app\oracle
   - Enter ORACLE_HOME: the folder where the current version of Oracle software is installed (c:\oracle\product\11.1.0.6\Db_1):< Oracle_Home> For example, c:\app\oracle\db_home
   - Enter ORACLE_DATA: the directory where the data files for the database will be created (c:\app\oracle\oradata): <Directory where data files will be created>

3. Once the database has been created, select the R - Refresh a schema option with a database dump file to load the Demo Install data.

   - Select an option: R
   - Enter the instance name (DEMO): <DB name>
   - Is it a LOCAL database (exists on the same machine) (Y/N): <Please provide Y or N>
   - Enter the name of the Oracle account that owns that application schema (cisadm): CISADM
   - Enter password for CISADM (cisadm): CISADM
   - Enter the character set of the database (AL32UTF8): AL32UTF8
   - Enter the name of data pump directory (DATA_PUMP_DIR): DATA_PUMP_DIR
   - Enter the name of the dump file (exp_demo.dmp):exp_demo.dmp
   - Enter the name of the log file (imp_demo.log):exp_demo.log

For the DB user **system**, the password is **manager**. Option R causes the utility to drop all the objects from the schema and import the schema from a database dump file. For the Demo Installation, use the dump file exp_demo.dmp.

> **Note:** The data_pump_dir must exist in the database created above before continuing with the import. You should also copy the exp_demo.dmp file to the data_pump_dir. Decompress the exp_demo.dmp.gz file to extract the exp_demo.dmp file. This file is in the ..\SGG\Demo directory.

Check the connectivity to this database from another server and from your desktop after updating local tnsnames.ora file

Configuring Security

The configuration utility and scripts are located in the .\SGG\Security folder. To configure security, follow these steps to execute the OraGenSec.bat utility:

> **Note:** Database vault must be disabled before running.

1. Navigate to the ..\SGG\Security folder.
2. Edit the OraGenSec.bat file and replace the parameter *database-name* with the name of your database.This file is provided for your convenience and executes the Oragensec.exe utility based on the parameters passed into it.

   Note: Be sure to run OraGenSec.bat from a Windows 32-bit desktop that has the Oracle 11.2.0.1 client installed . Your database should already be listed in the local file tnsnames.ora.

   The script will execute as the following:

   ```
   oragensec -d CISADM,CISADM,database-name -r
   CIS_READ,CIS_USER -a A -u
   CISUSER,CISREAD
   ```
3. Execute the edited OraGenSec.bat file.

   The utility configures security for the CISADM schema objects

Populating Language Data

Please note that this database contains data in the ENGLISH language only. If you use any other supported language, you can run the F1-LANG batch program to duplicate the entries for new language records. For more information on running this batch program, refer to the user documentation section "Defining Background Processes."

You can also install the language specific demo data packages (if available) into the database. Please contact your Oracle representative to receive information on these packages

Installing Service Packs and Patches

Periodically, Oracle Utilities releases a service pack of single fixes for its products. A service pack is an update to an existing release that includes solutions to known problems and other product enhancements. A service pack is not a replacement for an installation, but a pack consisting of a collection of changes and additions for it. The service pack may include changes to be applied to the application server, the database, or both. The service pack includes all files necessary for installing the collection of changes, including installation instructions.

For more information about installing the current service pack, see **Chapter 2: Database Installation for Version 2.0.0 Service Pack 9**.

Between services packs, Oracle Utilities releases patches to fix individual bugs. For information on installing patches, see knowledge base article ID 974985.1 on My Oracle Support.

Service packs and patches can be downloaded from My Oracle Support (https://support.oracle.com/).

Chapter 3

Database Installation for Version 2.0.0 Service Pack 9

This section provides the steps required to install or upgrade the Oracle Utilities Smart Grid Gateway version 2.0.0.9 database, including:

- **Installation Overview**
- **Oracle Database Installation**

Installation Overview

> **Note:** Refer to the *Oracle Utilities Smart Grid Gateway Installation Guide* for the hardware and software versions required for the installation on Unix or Windows. This section contains steps for installing the database for Oracle Utilities Smart Grid Gateway version 2.0.0 service pack 9 and the upgrade of Oracle Utilities Smart Grid Gateway version 2.0.0.x database to version 2.0.0.9.0.

The following type of installation is available for Oracle Utilities Smart Grid Gateway:

- **Initial Install** - a database with no demo data.
- **Upgrade Install** - a database upgrade.
- **Demo Install** - a database populated with demo data.

The database installation requires a supported version of the Java Development Kit to be installed on the Windows desktop where the install package is staged and run from. Refer to the Supported Platform section of the *Oracle Utilities Smart Grid Gateway Installation Guide* for the required version of Java.

For an Initial Install or Demo Install you will create an empty database on the Unix or Windows server and then populate the database with data. For a database Upgrade Install you will upgrade your current Oracle Utilities Smart Grid Gateway database.

Review the Storage.xml file prior to an Initial Install or Upgrade Install. Information in this file is used by CDXDBI while installing and upgrading the Oracle Utilities Smart Grid Gateway database objects.

For optimum storage allocation, database administrators should create multiple tablespaces with extents sized to store different types of tables/indexes. They can then edit this file before each upgrade and install process, to spread tables and indexes across these tablespaces. Tables and indexes can be created in parallel by editing degree of parallelism.

Tablespace, storage options, securefile options, Advanced Compression, and parallel information are used only for new objects. Therefore, for initial installs, information for each object should be reviewed.For upgrades, only tablespace information for objects added in the current release needs to be reviewed. Be careful while editing this file. Make sure that tablespace names being used exist in the database. Do not change the basic format of this file.

> **Note:** Prior to the installation of the database schema for the product, please ensure that the Database Management System software is installed according to your site standards and the installation guide provided by the database vendor.

Oracle Database Installation

This section describes how to install the Oracle Database for Oracle Utilities Smart Grid Gateway V2.0.0 Service Pack 9. It contains the following topics:

- **Database Scripts and Utilities**
- **Initial Install, or Installing Version 2.0.0 Service Pack 9 for the First Time**
- **Upgrade Install**
- **Demo Install**

Note: The installation tools outlined in this guide run on Windows and UNIX/Linux only. Please refer to the supported platforms table in **Chapter 1: Database Overview** for more information on supported platforms.

Database Scripts and Utilities

Follow these steps before you begin installing the database:

1. Unzip the SGG-V2.0.0.9.0-Database.zip file to your local machine.The database folder contains several files that will be referred to in the installation process.
2. Set up a Microsoft Windows desktop with the Oracle Client installed.

Initial Install, or Installing Version 2.0.0 Service Pack 9 for the First Time

This section describes an initial installation of the database.

> **Note:** You must have a supported version of the Java Development Kit installed on the Windows desktop where you stage and run the database installation package. Refer to the *Oracle Utilities Smart Grid Gateway Installation Guide* for more information.

For customers who have not previously installed Oracle Utilities Smart Grid Gateway version 2.0.0, follow the install procedures in the sequence described below:

- Installing version 2.0.0
- Upgrading version 2.0.0 to version 2.0.0 Service Pack 9

Installing Version 2.0.0

Each of the following components should be installed during an initial installation.

- Oracle Utilities Application Framework version 4.1.0
- Apply prerequisite Framework DB single fixes
- Oracle Utilities Meter Data Framework version 2.0.1
- Oracle Utilities Smart Grid Gateway version 2.0.0

For details on how to install the above components, see **Chapter 2: Base Installation of Version 2.0.0 Database**.

Upgrading Version 2.0.0 to Version 2.0.0 Service Pack 9

Install Oracle Utilities Application Framework version 4.1.0.2.0 prior to Oracle Utilities Smart Grid Gateway 2.0.0.9.0.

The files for Oracle Utilities Application Framework installation are located in the FW410 folder:

- Install FW version 4.1.0.2.0 by running the CdxDBI.exe from under the FW410/Install-Upgrade folder.

The files for the Install of Oracle Utilities Smart Grid Gateway 2.0.0.9.0 are located in the Install-Upgrade folder under MDF and SGG.

The process prompts you for the names of three database users:

- A user that will own the application schema (for example, CISADM).
- A user that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CISUSER).
- A user with read-only privileges to the objects in the application schema. (for example, CISREAD).
- A database role that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CIS_USER).
- A database role with read-only privileges to the objects in the application schema. (for example, CIS_READ).
- Location for jar files. (The Jar files are bundled with the database package.)
- Java Home (For example, C:/Java/jdk1.6.0_18)

To install the Oracle Utilities Smart Grid Gateway database, follow these steps:

1. Run CDXDBI.exe from MDF/Install-Upgrade. The utility prompts you to enter values for the following parameters:
    - The name of the target database.
    - The password for the SYSTEM user account in the database (in silent mode).
    - The name of the owner of the Database Schema.
    - The location of Java Home.
    - The location of TUGBU JAR files.
    - The password for the user (in silent mode).
    - The Oracle user with read-write privileges to the Database Schema.
    - The Oracle user with read-only privileges to the Database Schema.
    - The Oracle database role with read-write privileges to the Database Schema.
    - The Oracle database role with read-only privileges to the Database Schema.
2. If you chose to continue, CDXDBI first checks for the existence of each of the users specified and prompts for their password, default tablespace, and temporary tablespace, if they do not exist.
3. After setting up roles and users, the utility continues upgrading schema and system data definitions. If an error occurs while executing an SQL or another utility, it logs and displays the error message and allows you to re-execute the current step.
4. Run CDXDBI.exe from SGG/Install-Upgrade. The utility prompts you to enter values for the following parameters:
    - The name of the target database.
    - The password for the SYSTEM user account in the database (in silent mode).
    - The name of the owner of the Database Schema.
    - The location of Java Home.
    - The location of TUGBU JAR files.

- The password for the user (in silent mode).
- The Oracle user with read-write privileges to the Database Schema.
- The Oracle user with read-only privileges to the Database Schema.
- The Oracle database role with read-write privileges to the Database Schema.
- The Oracle database role with read-only privileges to the Database Schema.

5. If you chose to continue, CDXDBI first checks for the existence of each of the users specified and prompts for their password, default tablespace, and temporary tablespace, if they do not exist.
6. After setting up roles and users, the utility continues upgrading schema and system data definitions. If an error occurs while executing an SQL or another utility, it logs and displays the error message and allows you to re-execute the current step.

CDXDBI performs the following tasks:

- Interacts with the user to collect information about the name of Oracle account that will own the application schema (for example, CISADM), password of this account, password of the SYSTEM account in the database, and the name of the Oracle account that the application user will use (for example, CISUSER), and the name of the Oracle account that will be assigned read-only privileges to the application schema (for example, CISREAD).
- Connects to the database as SYSTEM account, checks whether the user already has the application schema installed to verify whether this is an initial installation.
- Verifies whether tablespace names already exist in Storage.xml file (if not, the process will abort).
- Installs the schema, installs the system data, and configures security.
- Maintains upgrade log tables in the database.
- Updates release ID when the upgrade is completed successfully.
- If an error occurs while executing a SQL script or another utility, it logs and displays the error message and allows you to re-execute the current step. Log files CDXDBI###.log are created in the same folder as CDXDBI and contains all the SQL commands executed against the database along with the results. The log files are incremental so that the results are never overwritten. If warning messages are generated during the upgrade, CDXDBI prompts the user at the end of the process. Users should check the log files to verify the warning messages. Warning messages are only alerts and do not necessary mean a problem exists.
- Stores the Schema owner and password in the feature configuration table. The password is stored in encrypted format.

Post-Install Tasks

Refer to **Populating Language Data** on page 2-10 if the application is to run in another language other than English.

Database Statistics Generation

During an install process, new database objects may be added to the target database. Before starting to use the database, generate the complete statistics for these new objects using the DBMS_STATS package.

Upgrade Install

The following section assumes an existing Oracle Utilities Smart Grid Gateway version 2.0.0.x installation on top of an Oracle Utilities Application Framework version 4.1.0 installation.

Install

Install Oracle Utilities Application Framework version 4.1.0.2.0 prior to Oracle Utilities Smart Grid Gateway 2.0.0.9.0

The files for Oracle Utilities Application Framework installation are located in the FW410 folder.

- Install FW V4.1.0.2.0 by running the CdxDBI.exe from the Install-Upgrade folder under FW410.

The files for the Upgrade Install of Oracle Utilities Smart Grid Gateway 2.0.0.9.0 are located in the Install-Upgrade folder under MDF and SGG.

The installation process prompts you for the names of three database users during this process:

- A user that will own the application schema (for example, CISADM).
- A user that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CISUSER).
- A user with read-only privileges to the objects in the application schema. (for example, CISREAD).
- A database role that has read-write (select/update/insert/delete) privileges to the objects in the application schema. The application will access the database as this user. (for example, CIS_USER).
- A database role with read-only privileges to the objects in the application schema. (for example, CIS_READ).
- The location for jar files. (The Jar files are bundled with the database package.)
- Java Home (For example, C:/Java/jdk1.6.0_18) To upgrade the database, follow these steps:

1. Review and edit the Storage.xml file in the MDF/Install-Upgrade folder to set the various options discussed previously. The instructions for editing the file are included in the file itself.
2. Run CDXDBI.exe from the MDF/Install-Upgrade folder. The utility prompts you to enter values for the following parameters:
    - The name of the target database.
    - The password for the SYSTEM user account in the database (in silent mode).
    - The name of the owner of the Database Schema.
    - The location of Java Home
    - TUGBU JAR files location.
    - The password for the user (in silent mode).
    - The Oracle user with read-write privileges to the Database Schema.
    - The Oracle user with read-only privileges to the Database Schema.
    - The Oracle database role with read-write privileges to the Database Schema.
    - The Oracle database role with read-only privileges to the Database Schema.
3. The utility at this point is ready to perform the upgrade install and prompts you for permission to start the process.

4. If you chose to continue, CDXDBI first checks for the existence of each of the users specified earlier and prompts for their password, default tablespace, and temporary tablespace, if they do not exist.
5. After setting up the roles and users, the utility continues upgrading schema and system data definitions. If an error occurs while executing an SQL or another utility, it logs and displays the error message and allows you to re-execute the current step.
6. Run CDXDBI.exe from under the SGG/Install-Upgrade folder. The utility prompts you to enter values for the following parameters:
    - The name of the target database.
    - The password for the SYSTEM user account in the database (in silent mode).
    - The name of the owner of the Database Schema.
    - The location of Java Home
    - TUGBU JAR files location.
    - The password for the user (in silent mode).
    - The Oracle user with read-write privileges to the Database Schema.
    - The Oracle user with read-only privileges to the Database Schema.
    - The Oracle database role with read-write privileges to the Database Schema.
    - The Oracle database role with read-only privileges to the Database Schema.
7. The utility at this point is ready to perform the upgrade install and prompts you for permission to start the process.
8. If you chose to continue, CDXDBI first checks for the existence of each of the users specified earlier and prompts for their password, default tablespace, and temporary tablespace, if they do not exist.
9. After setting up the roles and users, the utility continues upgrading schema and system data definitions. If an error occurs while executing an SQL or another utility, it logs and displays the error message and allows you to re-execute the current step.

CDXDBI performs the following tasks:

- Interacts with the user to collect information about the name of Oracle account that will own the application schema (for example, CISADM), password of this account, password of the SYSTEM account in the database, and the name of the Oracle account that the application user will use (for example, CISUSER), and the name of the Oracle account that will be assigned read-only privileges to the application schema (for example, CISREAD).
- Connects to the database as SYSTEM account, checks whether the user already has the application schema installed to verify whether this is an upgrade installation.
- Verifies whether the upgrade path from the current release id to the target release id is supported by the upgrade.
- Verifies whether the tablespace names already exist in Storage.xml file (the process aborts, if not).
- Upgrades the schema, upgrades the system data, and configures security.
- Maintains upgrade log tables in the database.
- Updates release id when the upgrade is completed successfully.
- If an error occurs while executing a SQL script or another utility, it logs and displays the error message and allows you to re-execute the current step. Log files CDXDBI###.log are created in the same folder as CDXDBI and contains all the SQL commands executed

against the database along with the results. The log files are incremental so that the results are never overwritten. If warning messages are generated during the upgrade, CDXDBI prompts the user at the end of the process. Users should check the log files to verify the warning messages. Warning messages are only alerts and do not necessary mean a problem exists.

- Stores the Schema owner and password in feature configuration table. The password will be stored in encrypted format.

Post-Install

Refer to the **Populating Language Data** on page 2-10 if the application is to run in another language other than English.

Database Statistics Generation

During an install process, new database objects may be added to the target database. Before starting to use the database, generate the complete statistics for these new objects using the DBMS_STATS package.

Environment Registration

Note: If the target database is registered as a configuration laboratory or archiving database in another database, or another database has been registered as a configuration laboratory or archiving database in this database, it is required that you upgrade the registration at this stage.

The detailed instructions for environment registration can be found in the Oracle Utilities Smart Grid Gateway user documentation. Please refer to this documentation before executing the environment registration utility EnvSetup.exe included in the post-install folder.

Demo Install

This section describes how to install the demo component of Oracle Utilities Smart Grid Gateway.

Refer to **Demo Install** on page 2-7 for details. Use the SGG-V2.0.0.9.0-Database.zip database package instead of SGG-V2.0.0-Database.zip database package.

Notes:

Ensure that you use the SGG v2.0.0 Service Pack 9 installer for demo installation and not the SGG 2.0.0 installers.

The Demo dump file import will end with one error (Job "SYSTEM"."SYS_IMPORT_SCHEMA_01" completed with 1 error(s)). You can ignore the error message.

Chapter 4

Database Design

This section provides a standard for database objects such as tables, columns, and indexes, for products using the Oracle Utilities Application Framework. This standard helps smooth integration and upgrade processes by ensuring clean database design, promoting communications, and reducing errors. Just as Oracle Utilities Application Framework goes through innovation in every release of the software, it is also inevitable that the product will take advantage of various database vendors' new features in each release. The recommendations in the database installation section include only the ones that have been proved by vigorous QA processes, field tests and benchmarks. This section includes:

- **Database Object Standard**
- **Column Data Type and Constraints**
- **Standard Columns**

Database Object Standard

This section discusses the rules applied to naming database objects and the attributes that are associated with these objects.

Categories of Data

A table can belong to one of the three categories:

- Control (admin)
- Master
- Transaction

For purposes of physical table space design, metadata and control tables can belong to the same category.

Example of tables in each category:

- **Control:** SC_USER, CI_ADJ_TYPE, F1_BUS_OBJ
- **Master:** CI_PER, CI_PREM,
- **Transaction:** F1_FACT, CI_FT

All tables have the category information in their index name. The second letter of the index carries this information. See **Indexes** on page 4-3 for more information.

Naming Standards

The following naming standards must be applied to database objects.

Table

Table names are prefixed with the owner flag value of the product. For customer modification **CM** must prefix the table name. The length of the table names must be less than or equal to 30 characters. A language table should be named by suffixing **_L** to the main table. The key table name should be named by suffixing **_K** to the main table.

It is recommended to start a table name with the 2-3 letter acronym of the subsystem name that the table belongs to. For example, **MD** stands for metadata subsystem and all metadata table names start with **CI_MD**.

Some examples are:

- CI_ADJ_TYPE
- CI_ADJ_TYPE_L

A language table stores language sensitive columns such as a description of a code. The primary key of a language table consists of the primary key of the code table plus language code (LANGAGUE_CD).

A key table accompanies a table with a surrogate key column. A key value is stored with the environment id that the key value resides in the key table.

The tables prior to V2.0.0 are prefixed with CI_ or SC_.

Columns

The length of a column name must be less than or equal to 30 characters. The following conventions apply when you define special types of columns in the database.

- Use the suffix **FLG** to define a lookup table field. Flag columns must be CHAR(4). Choose lookup field names carefully as these column names are defined in the lookup table (CI_LOOKUP_FLD) and must be prefixed by the product owner flag value.
- Use the suffix **CD** to define user-defined codes. User-defined codes are primarily found as the key column of the admin tables.
- Use the suffix **ID** to define system assigned key columns.
- Use the suffix **SW** to define Boolean columns. The valid values of the switches are 'Y' or 'N'. The switch columns must be CHAR(1)
- Use the suffix **DT** to define Date columns.
- Use the suffix **DTTM** to define Date Time columns.
- Use the suffix **TM** to define Time columns.

Some examples are:

- ADJ_STATUS_FLG
- CAN_RSN_CD

Indexes

Index names are composed of the following parts:

[OF][*application specific prefix***][C/M/T]NNN[P/S]n**

- **OF**- Owner Flag. Prior to Version 4.1.0 of the framework the leading character of the base Owner Flag was used. From 4.1.0 on the first two characters of product's owner flag value should be used. For client specific implementation of index, use CM for Owner Flag.
- Application specific prefix could be C, F, T or another letter.
- **C/M/T** - The second character can be either C or M or T. C is used for control tables (Admin tables). M is for the master tables. T is reserved for the transaction tables.
- **NNN** - A three-digit number that uniquely identifies the table on which the index is defined.
- **P/S** - P indicates that this index is the primary key index. S is used for indexes other than primary keys.
- **n** is the index number, unique across all indexes on a given table (0 for primary and 1, 2, etc., for the secondary indexes).

Some examples are:

- F1C066P0
- F1C066S1
- CMT206S2

> Warning! Do not use index names in the application as the names can change due to unforeseeable reasons.

Updating Storage.xml

The storage.xml file that comes with the product allocates all base tables and indexes to the default tablespace CISTS_01. If you decide to allocate some tables or indexes outside of the default tablespace, then this has to be reflected in the storage.xml file by changing the tablespace name from the default value to a custom value, according to the format shown below:

Format:

```
<Table_Name>
  <TABLESPACE>CISTS_01</TABLESPACE>
  <PARALLEL>1</PARALLEL>
```

```
- <LOB>
- <Column Name>
  <TABLESPACE>CISTS_01</TABLESPACE>
  <SECUREFILE>Y</SECUREFILE>
  <CHUNK>8192</CHUNK>
  <CACHE>N</CACHE>
  <LOGGING>Y</LOGGING>
  <INROW>Y</INROW>
  <COMPRESS>N</COMPRESS>
  </Column Name>
  </LOB>
  </Table_Name>
```

Where Parallel defines the number of threads, that Oracle DB Server will use to access a table or create an index.

For instance, if a DBA decided to allocate table CI_ACCT in a tablespace MyTablespace, then they would have to change the storage.xml as follows:

```
<CI_ACCT>
<TABLESPACE>MyTablespace</TABLESPACE>
</CI_ACCT>
```

The cdxdbi process uses the storage.xml file to place the new database objects into defined tablespaces. A tablespace referenced in the storage.xml file must exist in the database.

The storage.xml file has to be adjusted before each upgrade and/or new installation as required to allocate the tables and indexes across those tablespaces.

Table name is included as a comment for each of the indexes for clarity.

For initial installs, information for each object should be reviewed by a DBA. For upgrades, only tablespace information for the objects added in the new release needs to be reviewed by a DBA.

Be careful while editing this file. Make sure that the tablespace names being used exist in the database. Do not change the basic format of this file.

Sequence

The base sequence name must be prefixed with the owner flag value of the product.

The sequence numbers should be named as below

1. If the Sequence is used for a specific Table then use the following sequence name:

   [OF][C/M/T]NNN_SEQ

- OF stands for Owner Flag. For example, Framework its F1. Other examples are M1,C1,D1,D2, etc.
- C/M/T stands for Control (Admin)/Master/Transaction Tables.
- NNN is a three digit unique Identifier for a Table on which the Sequence is defined.

  For Example: F1T220_SEQ

2. If more than one Sequence is used for a specific Table then use the following Sequence Name:

   [OF][C/M/T]NNN_Column_Name_SEQ

- OF stands for Owner Flag. For example, the framework is F1. Other examples are M1,C1,D1,D2, etc.
- C/M/T stands for Control (Admin)/Master/Transaction tables.
- NNN is a three digit unique identifier for a table on which the sequence is defined.

For Example: F1T220_BO_STATUS_CD_SEQ and F1T220_BUS_OBJ_CD_SEQ

3. If sequence is used for a generic requirement and not specific to a table, then use the following sequence name.

   [OF]Column_Name_SEQ

- OF stands for Owner Flag. For example, the framework is F1. Other examples are M1,C1,D1,D2, etc.

  For Example: F1FKVALID_SEQ

Trigger

The base trigger name must be prefixed with the owner flag value of the product.

When implementers add database objects, such as tables, triggers and sequences, the name of the objects should be prefixed by CM.

Column Data Type and Constraints

This section discusses the rules applied to column data type and constraints, and the attributes that are associated with these objects.

User Defined Code

User Defined Codes are defined as CHAR type. The length can vary by the business requirements but a minimum of eight characters is recommended. You will find columns defined in less than eight characters but with internationalization in mind new columns should be defined as CHAR(10) or CHAR(12). Also note that when the code is referenced in the application the descriptions are shown to users in most cases.

System Assigned Identifier

System assigned random numbers are defined as CHAR type. The length of the column varies to meet the business requirements. Number type key columns are used when a sequential key assignment is allowed or number type is required to interface with external software. For example, Notification Upload Staging ID is a Number type because most EDI software uses a sequential key assignment mechanism. For sequential key assignment implementation, the DBMS sequence generator is used in conjunction with Number Type ID columns.

Date/Time/Timestamp

Date, Time and Timestamp columns are defined physically as DATE in Oracle. Non-null constraints are implemented only for the required columns.

Number

Numeric columns are implemented as NUMBER type in Oracle. The precision of the number should always be defined. The scale of the number might be defined. Non-null constraints are implemented for all number columns.

Fixed Length/Variable Length Character Columns

When a character column is a part of the primary key of a table define the column in CHAR type. For the non-key character columns, the length should be the defining factor. If the column length should be greater than 10, use VARCHAR2 type in Oracle.

Null Column Support

Oracle Utilities Application Framework 4.1.0, Group Fix 2, supports Nullable columns. This means that the application can write NULLs instead of a blank space or zero (for numeric columns) by using NULLABLE_SW on CI_MD_TBL_FLD. If REQUIRED_SW is set to 'N' and the NULLABLE_SW is set to 'Y', the application will write a NULL in that column. The artifact generator will create hibernate mapping files with appropriate parameters so that the framework hibernate mapping types will know if a given property supports a null value.

NULLABLE_SW is not new, but has previously been used for certain fields such as dates, and some string and number foreign-key columns. Because of this, there is the possibility that there is incorrect metadata for some columns, and that turning on this new feature could result in incorrect behavior when using that metadata. The upgrade script added to FW410 Group Fix 2 fixes the metadata to make sure that the existing tables will not be affected.

This new feature only supports tables maintained by Java. Thus, enhancing any existing tables to use null columns must be done only after making sure that the tables are maintained by Java, and not COBOL.

Cache and Key Validation Flags

By default, the Cache Flag is set to NONE. For most of the admin tables the CACHE Flag should be 'Cached for Batch'. This specifies that the table is cached as L2 cache to reduce database trips.

By default the Key Validation Flag is set to ALL. For tables which have the user defined keys, the KEY_VALIDATION_FLG should be set as 'ALL'. This checks the existence of the key before inserting a new one.

Default Value Setting

The rules for setting the database default values are as follows:

- When a predefined default value is not available, set the default value of Non-null CHAR or VARCHAR columns to blank except the primary key columns.
- When a predefined default value is not available, set the default value Non-null Number columns to 0 (zero) except the primary key columns.
- No database default values should be assigned to the Non Null Date, Time, and Timestamp columns.

Foreign Key Constraints

Referential integrity is enforced by the application. In the database do not define FK constraints. Indexes are created on most of Foreign Key columns to increase performance.

Standard Columns

This section discusses the rules applied to standard columns and the attributes that are associated with these objects.

Owner Flag

Owner Flag (OWNER_FLG) columns exist on the system tables that are shared by multiple products. Oracle Utilities Application Framework limits the data modification of the tables that have owner flag to the data owned by the product.

Version

The Version column is used to for optimistic concurrency control in the application code. Add the Version column to all tables that are maintained by a Row Maintenance program irrespective of the language used (COBOL or JAVA).

Chapter 5

Database Implementation Guidelines

The following section outlines the general implementation guidelines for the database components, including:

- **Configuration Guidelines**

  Note: Refer to My Oracle Support for more information.

See **Appendix C: Partitioning Recommendations for Oracle Utilities Smart Grid Gateway** for additional information about configuring the Oracle Utilities Smart Grid Gateway database.

Configuration Guidelines

This section includes general recommendations for configuring various database objects and includes a brief syntax overview. It covers the general aspects of the database objects and does not cover any specific implementation requirements.

Index

Index recommendations specify points that need to be considered when creating indexes on a table.

1. Indexes on a table should be created according to the functional requirements of the table and not in order to perform SQL tuning.
2. The foreign keys on a table should be indexes.

In an Oracle Utilities Application Framework environment, always make sure that the optimization parameters are set as follows:

```
optimizer_index_cost_adj=1
optimizer_index_caching=100
```

This will make sure that the optimizer gives a higher priority to index scans.

Table Partitioning Recommendations

Oracle Utilities recommends using a minimum of 'n' partitions for selective database objects, where 'n' is number of RAC nodes.

Transparent Data Encryption Recommendations

Oracle Utilities supports Oracle Transparent Data Encryption (TDE). Oracle 11gR1 supports tablespace level encryption. The application supports tablespace level encryption for all Application data. Make sure that the hardware resources are sufficiently sized for this as TDE uses additional hardware resources. The Oracle Advanced Security license is a prerequisite for using TDE.

Please consider the following when implementing TDE:

- Create a wallet folder to store the master key. By default, the wallet folder should be created under $ORACLE_BASE/admin/<sid>.
- The wallet containing the master key can be created using the following command:

  ```
  alter system set encryption key authenticated by "keypasswd"
  ```

- The wallet can be closed or opened using the following commands:

  ```
  alter system set wallet open identified by "keypasswd";
  alter system set wallet close;
  ```

- Column level encryption can be achieved using the following commands:

  ```
  create table <table_name>
  (name varchar2(200) default ' ' not null,
  bo_data_area CLOB encrypt using 'AES128',
  bo_status_cd char(12)    encrypt using 'AES128')
  lob (bo_data_area) store as securefile (cache compress)
  tablespace <tablespace_name>;
  ```

- AES128 is the default encryption algorithm.
- Tablespace level encryption is also supported using the following command:

```
Create tablespace <tablespace_name> logging datafile '<datafile
location>' size <initial size> reuse autoextend on next <next size>
maxsize unlimited extent management local uniform size
<uniform size> encryption using 'AES128' default storage(encrypt) ;
```

- Indexed columns can only be encrypted using the NO SALT Option. Salt is a way to strengthen the security of encrypted data. It is a random string added to the data before it is encrypted, causing repetition of text in the clear to appear different when encrypted.

Data Compression Recommendations

Oracle Utilities supports Advanced Data Compression, available with Oracle 11gR1 onwards, to reduce the database storage footprint. Make sure that your resources are sufficiently sized for this as it uses additional system resources. Compression can be enabled at the Tablespace level or at the Table level.

For Exadata hardware the compression recommendations are:

- For the Final Measurement table (D1_MSRMT), keep the current table partition uncompressed. All of the older partitions will be compressed based on QUERY HIGH compression.
- For the Initial Measurement Data table (D1_INIT_MSMRT_DATA), always keep CLOBs in securefile and medium compressed. Also keep the current table partition uncompressed. All of the older partitions will be compressed based on QUERY HIGH compression.
- Load data into the uncompressed table partitions using a conventional load and then, once data is loaded using a CTAS operation, load into a temporary heap table. Then truncate the original partition. Alter the original partition into HCC compressed and then partition exchange this with the temporary heap table.
- All multi column Indexes (primary as well as secondary) will be compressed using the default compression. HCC or OLTP compression is not applicable on the top of compressed Indexes.

For non-Exadata hardware the recommendations are the same as above, except that you cannot use HCC compression (it is only available in Exadata database machine). Instead of HCC you can use any other compression tool available to you for non-Exadata hardware.

All CLOB fields should be stored as SecureFiles and Medium compressed. This requires a separate license for Advanced Data Compression. As a part of the schema, we create the product-owned tables with compression turned OFF at the LOB level . If you have the license for Advanced Data Compression, you can enable compression by updating the storage.xml.

Database Vault Recommendations

We support Database Vault from the Oracle Utilities Application Framework 4.1.0. All non-application User IDs can be prevented from using DDL or DML statements against the application schema. So SYS and SYSTEM cannot issue DDL or DML statements against CISADM schema.

The application-specific administration account can issue DDL statements but should not be able to perform any DML or DCL statements.

Application user must be given DML only permissions.

Database Vault can be used to control access during patch process and Install/Upgrade process. Configuration is also supported beginning with the Oracle Utilities Application Framework 4.1.0 patch application with Database Vault.

Storage Recommendations

This section specifies recommended options for storing the database objects.

SecureFile for Storing LOBs

Beginning with Oracle 11g, tables having fields with data type of CLOB or BLOBS should have the LOB Columns stored as SecureFiles.

- The storage options with SecureFiles for Heap Tables should be ENABLE STORAGE IN ROW, CACHE and COMPRESS.
- For the IOT Table the PCTTHRESHOLD 50 OVERFLOW clause should be specified and the storage options with SecureFiles should be ENABLE STORAGE IN ROW, CACHE and COMPRESS.
- The PCTTHRESHOLD should be specified as a percentage of the block size. This value defines the maximum size of the portion of the row that is stored in the Index block when an overflow segment is used.
- The CHUNK option for storage, which is the data size used when accessing or modifying LOB values, can be set to higher than one database block size if big LOBs are used in the IO Operation.
- For SecureFiles, make sure that the initialization parameter db_securefile is set to ALWAYS.
- The Tablespace where you are creating the SecureFiles should be enabled with Automatic Segment Space Management (ASSM). In Oracle Database 11g, the default mode of Tablespace creation is ASSM so it may already be set for the Tablespace. If it's not, then you have to create the SecureFiles on a new ASSM Tablespace.

  Note: To enable compression on SecureFiles, you must have an Oracle Advanced Compression license in addition to Oracle Database Enterprise Edition. This feature is not available for the standard edition of the Oracle database.

  If you are using Oracle Database Enterprise Edition, please ensure that the "COMPRESS" flag is turned on by setting it to "Y" in Storage.xml.

See **Database Syntax** on page 5-5 for more information on SecureFiles.

Database Configuration Recommendations

This section specifies the recommended methods for configuring the database with a focus on specific functional area.

Large Redo Log File Sizes

The Redo Log files are written by the Log Writer Background process. These Log files are written in a serial manner. Once a Log File is full, a Log Switch occurs and the next Log file starts getting populated.

It is recommended that the size of the Redo Log files should be sufficiently high so that you do not see frequent Log Switches in the Alert logs of the database. Frequent Log Switches impact the IO performance and can be avoided by having a larger Redo log File size.

Frequent Log Switches impacts the IO performance and can be avoided by having a bigger Redo log File Size.

Database Syntax

SecureFile

```
CREATE TABLE <Table_Name>
     ( COLUMN1 ….,
       COLUMN2 (CLOB)
     )
LOB(COLUMN2) STORE AS SECUREFILE (CACHE COMPRESS);

CREATE TABLE <Table_Name>
     ( COLUMN1 ….,
       COLUMN2 (CLOB)
       CONTRAINT <> PRIMARY KEY(…)
     )
ORGANIZATION INDEX PCTTHRESHOLD 50 OVERFLOW
LOB(COLUMN2) STORE AS SECUREFILE (ENABLE STORAGE IN ROW CHUNK CACHE
COMPRESS);
```

Database Initialization Parameters

The recommended Initialization Parameters are given below. These parameters are a starting point for database tuning. An optimal value for a production environment may differ from one customer deployment to another.

db_block_size=8192

log_checkpoint_interval=0

db_file_multiblock_read_count=8

transactions=3000

open_cursors=3000

db_writer_processes=12

optimizer_index_cost_adj=1

optimizer_index_caching=100

db_files=1024

dbwr_io_slaves=10 (Only if Asynchronous IO is not Supported)

sessions=4500

memory_target=0

memory_max_target=0

sec_case_sensitive_logon=FALSE

processes=3000

dml_locks=4860

_b_tree_bitmap_plans=FALSE

Appendix A

Upgrades to the Oracle Utilities Application Framework Database

This document describes the database upgrade process for the Oracle Utilities Application Framework database from the last released blueprint version of V4.1.0 Group Fix-2 to V4.1.0 Group Fix-3 It highlights changes made to the administrative tables and how those changes should be applied to the data in order for your current database to work with the V4.1.0 Group Fix-2 application, and to preserve the business logic implemented in the previous version of the application. The changes that do not require data upgrade are not described in this section. The tasks that need to be performed after running the upgrade scripts are included.

The added functionality of V4.1.0 Group Fix-3 is not the scope of this documentation. The upgrade scripts do not turn on the newly added functionality by default. For new functionality, refer the V4.1.0 Group Fix-3 User Guides. In the last section of this document you will find a list of the new tables that are added in V4.1.0 Group Fix-2.

This section includes:

- **Automatic Data Upgrade**
- **Schema Change**

Automatic Data Upgrade

This section describes what the upgrade script will populate in new tables and columns to preserve the existing base product application functions of the previous version of Oracle Utilities Application Framework.

Configurable Conversion of OUAF Datetime Format

Currently all outbound messages are sent out in OUAF datetime format. This format is ambiguous in that it does not convey to the external system the respective time zone the date/time value is in. While XAI can accept the unambiguous xsd:dateTime format, the system cannot currently produce date/times in that format. This design will make sure you send outbound messages in xsd:dateTime format. A new required field DTTM_FORMAT_FLG is added to F1_EXTSYS_OUTMSG_PROF table. The valid values for datetime format flag are ouaf (F1OU) and xsd (XSD). As a part of the upgrade Process DTTM_FORMAT_FLG is set to 'F1OU'. This will make sure that existing OUAF datetime format is supported.

Allow CM to Add Char Values to Base Owned Char Types

Currently both Char Type and Char Type Value have owner flag. However, the UI does not currently grant the 'CM' user the ability to extend product delivered Char Types with their own Char Type Values. This effectively locks us out from shipping Char Types (of the Char Type Value subclass). This new feature adds a field named CUSTOM_SW on CI_CHAR_TYPE table. If the custom switch is set then the char type is customizable and CM can add char values on the product owner char types. As a part of the upgrade Process CUSTOM_SW is set to 'N'. This will make sure that existing char types will be not be Cmable.

Schema Change

New Tables

None

New Views

Views	Description
F1_ATTACHMENT_VW	Attachment View

Dropped Tables

None

Unsupported Tables

None

Added Columns

The following Table Columns are added to Oracle Utilities Application Framework V4.1.0.

Table	Column	Required	Upgrade Note
F1_SVC_TASK	BO_STATUS_REASON_CD	N	
F1_SVC_TASK_LOG	BO_STATUS_REASON_CD	N	
F1_EXTSYS_OUTMSG_PROF	DTTM_FORMAT_FLG	N	Configurable conversion of OUAF datetime format

Dropped Columns

None

Unsupported Table Columns

None

Column Format Change

Table Name	Column Name	From	To
F1_BNDL	EXT_REFERENCE_ID	CHAR: 30	CHAR: 36
F1_OBJ_REV	EXT_REFERENCE_ID	CHAR: 30	CHAR: 36
F1_SYNC_REQ_IN	EXT_REFERENCE_ID	CHAR: 30	CHAR: 36

Appendix B

Oracle Application Framework System Table Guide

This section lists the system tables owned by the Oracle Utilities Application Framework V4.1.0.3 and explains the data standards of the system tables. The data standards are required for the installation of Oracle Utilities Application Framework, development within the Oracle Utilities Application Framework, and the configuration and customization of Oracle Utilities products. Adhering to the data standards is a prerequisite for seamless upgrade to future releases.

This section includes:

- **About the Application Framework System Tables**
- **System Table Standards**
- **Guidelines for System Table Updates**
- **System Table List**

About the Application Framework System Tables

System tables are a subset of the tables that must be populated at the time the product is installed. They include Metadata and configuration tables. The data stored in the system tables are the information that Oracle Utilities Application Framework product operations are based on.

As the product adds more functionality, the list of system tables can grow. The complete list of the system tables can be found in the **System Table List** section.

System Table Standards

System table standards must be observed for the following reasons:

- The product installation and upgrade process and customer modification data extract processes depend on the data prefix and owner flag values to determine the system data owned by each product.
- The standards ensure that there will be no data conflict in the product being developed and the future Oracle Utilities Application Framework release.
- The standards ensure that there will be no data conflict between customer modifications and future Oracle Utilities product releases.
- The data prefix is used to prevent test data from being released to production.

  Developer's Note: All test data added to the system data tables must be prefixed by ZZ (all upper case) in order for the installation and upgrade utility to recognize them as test data.

Guidelines for System Table Updates

This section describes guidelines regarding the updating of the system table properties.

Business Configuration Tables

The majority of data in the tables in this group belongs to the customer. But these tables are shipped with some initial data in order for the customer to login to the system and begin configuring the product. Unless specified otherwise, the initial data is maintained by Oracle Utilities Application Framework and subject to subsequent upgrade.

Application Security and User Profile

These tables define the access rights of a User Group to Application Services and Application Users.

Properties	Description
Tables	SC_ACCESS_CNTL, SC USER, SC_USR_GRP_PROF, SC_USR_GRP_USR, SC_USER_GROUP, SC_USER_GROUP_L
Initial Data	User Group All SERVICES and default system user SYSUSER. Upon installation the system default User Group All SERVICES is given unrestricted accesses to all services defined in Oracle Utilities Application Framework.

Developer's Note: When a new service is added to the system, all actions defined for the service must be made available to the User Group All SERVICES.

Currency Code

The ISO 4217 three-letter codes are taken as the standard code for the representation of each currency.

Properties	Description
Tables	CI_CURRENCY_CD, CI_CURRENCY_CD_L
Initial Data	United States Dollar (USD).

DB Process

Properties	Description
Tables	CI_DB_PROC, CI_DB_PROC_L, CI_DB_INSTR, CI_DB_INSTR_L, L, CI_DB_INSTR_OVRD
Initial Data	Copy DB Process (CL-COPDB). This DB process allows users to copy a DB process from one database to another using Config Lab utility.

Display Profile

The Display Profile Code is referenced in the User (SC_USER) table.

Properties	Description
Tables	CI_DISP_PROF, CI_DISP_PROF_L
Initial Data	North America (NORTHAM) and Europe (EURO).

Installation Options

Installation Option has only one row that is shipped with the initial installation of the Oracle Utilities Application Framework. The updatable columns in these tables are customer data and will not be overridden by the upgrade process unless a special script is written and included in the upgrade process.

Properties	Description
Tables	F1_INSTALLATION, CI_INSTALL_ALG, CI_INSTALL_MSG, CI_INSTALL_MSG_L, CI_INSTALL_PROD
Initial Data	Option 11111.

Developer's Note: The system data owner of an environment is defined in the Installation Option. This Owner Flag value is stamped on all system data that is added to this environment. The installation default value is Customer Modification (CM). This value must be changed in the base product development environments.

Language Code

Language Code must be a valid code defined in ISO 639-2 Alpha-3. Adding a new language code to the table without translating all language dependent objects in the system can cause errors when a user chooses the language.

Properties	Description
Tables	CI_LANGUAGE
Initial Data	English (ENG).

To Do Priority and Role

New To Do Types released will be linked to the default To Do Role and set to the product assigned priority value initially. These initial settings can be overridden by the implementation.

Properties	Description
Tables	CI_ROLE(L), CI_TD_VAL_ROLE
Initial Data	F1_DFLT

Development and Implementation System Tables

This section defines the standards for the system tables that contain data for application development. The data in these tables implement business logic and UI functions shared by various products and product extensions in the same database.

Standards

When adding new data, the owner flag value of the environment must prefix certain fields of these tables. For example, when a developer adds a new algorithm type to an Oracle Utilities Customer Care and Billing environment, C1 should prefix the new Algorithm Type code. The fields that are subject to this rule are listed in Standard Data Fields property.

The data that is already in these tables cannot be modified if the data owner is different than the environment owner. This prevents the developers from accidentally modifying system data that belongs to the Oracle Utilities application framework or the base products. However, some fields are exempt from this rule and can be modified by Customer Modification. These fields are listed in the Customer Modification Fields property.

Starting with version 2.2 of the framework a new system data upgrade rule was introduced - Override Owner flag. If duplicate data rows (data row with same primary key values) are found at the time of upgrade, the owner flag values will get overridden. The lower level application system data will override the upper level system data. For example, F1 overrides C1, F1&C1 override CM, and so on. This rule will be applied to the following tables: CI_CHAR_ENTITY, CI_MD_MO_ALG, F1_BUS_OBJ_ALG, F1_BUS_OBJ_STATUS_ALG, CI_MD_MO_OPT, F1_BUS_OBJ_OPT, F1_BUS_OBJ_STATUS_OPT, F1_BUS_OBJ_STATUS, F1_BUS_OBJ_STATUS_L

Algorithm Type

Properties	Description
Tables	CI_ALG_TYPE, CI_ALG_TYPE_L, CI_ALG_TYPE_PRM, CI_ALG_TYPE_PRM_L
Standard Data Fields	Algorithm Type (ALG_TYPE_CD)
Customer Modification	None

Algorithm

Properties	Description
Tables	CI_ALG, CI_ALG_L, CI_ALG_PARM, CI_ALG_VER
Standard Data Fields	Algorithm (ALG_CD)
Customer Modification	None

Application Security

Properties	Description
Tables	SC_APP_SERVICE, SC_APP_SERVICE_L, CI_APP_SVC_ACC
Standard Data Fields	Application Service ID (APP_SVC_ID). Customer care and billing products prior to version 2.0 will continue to use CI as a prefix for the application service.
Customer Modification	None

Batch Control

Properties	Description
Tables	CI_BATCH_CTRL, CI_BATCH_CTRL_L, CI_BATCH_CTRL_P, CI_BATCH_CTRL_P_L
Standard Data Fields	Batch Process (BATCH_CD), Program Name (PROGRAM_NAME)
Customer Modification	Next Batch Number (NEXT_BATCH_NBR), Last Update Instance (LAST_UPDATE_INST), Last Update Date time (LAST_UPDATE_DTTM) and the batch process update these columns. Time Interval (TIMER_INTERVAL), Thread Count (BATCH_THREAD_CNT), Maximum Commit Records (MAX_COMMIT_RECS), User (USER_ID), Language (LANGUAGE_CD), Email Address (EMAILID), Start program debug tracing (TRC_PGM_STRT_SW), End Program Debug trace (TRC_PGM_END_SW), SQL debug tracing (TRC_SQL_SW) and Standard debug tracing (TRC_STD_SW) on CI_BATCH_CTRL Table. Batch Parameter Value (BATCH_PARM_VAL) on Batch Control Parameters Table (CI_BATCH_CTRL_P)

Business Object

Properties	Description
Tables	F1_BUS_OBJ, F1_BUS_OBJ_L, F1_BUS_OBJ_ALG, F1_BUS_OBJ_OPT, F1_BUS_OBJ_STATUS, F1_BUS_OBJ_STATUS_L, F1_BUS_OBJ_STATUS_ALG, F1_BUS_OBJ_STATUS_OPT, F1_BUS_OBJ_STATUS_RSN, F1_BUS_OBJ_STATUS_RSN_L, F1_BUS_OBJ_STATUS_RSN_CHAR F1_BUS_OBJ_TR_RULE, F1_BUS_OBJ_TR_RULE_L
Standard Data Fields	Business Object (BUS_OBJ_CD)
Customer Modification	Batch Control (BATCH_CD), Alert (BO_ALERT_FLG), Sequence (SORT_SEQ5), Status Reason (STATUS_REASON_FLG) fields on Business Object Status Table (F1_BUS_OBJ_STATUS). Instance Control (INSTANCE_CTRL_FLG), Application Service (APP_SVC_ID) on Business Object Table (F1_BUS_OBJ). Status Reason Selection (STATUS_REASON_SELECT_FLG) on Status Reason Table (F1_BUS_OBJ_STATUS_RSN)

Business Service

Properties	Description
Tables	F1_BUS_SVC, F1_BUS_SVC_L
Standard Data Fields	Business Service (BUS_SVC_CD)
Customer Modification	Application Service (APP_SVC_ID)

Characteristics

Properties	Description
Tables	CI_CHAR_TYPE, CI_CHAR_TYPE_L, CI_CHAR_ENTITY, CI_CHAR_VAL, CI_CHAR_VAL_L
Standard Data Fields	Characteristic Type (CHAR_TYPE_CD)

Properties	Description
Customer Modification	Adhoc Characteristic Value Validation Rule (ADHOC_VAL_ALG_CD) on Characteristic Entity Table (CI_CHAR_ENTITY)

Data Area

Properties	Description
Tables	F1_DATA_AREA, F1_DATA_AREA_L
Standard Data Fields	Data Area Code (DATA_AREA_CD)
Customer Modification	None

Display Icon

Properties	Description
Tables	CI_DISP_ICON, CI_DISP_ICON_L
Standard Data Fields	Display Icon Code (DISP_ICON_CD)
Customer Modification	None

Foreign Key Reference

Properties	Description
Tables	CI_FK_REF, CI_FK_REF_L
Standard Data Fields	FK reference code (FK_REF_CD)
Customer Modification	Info Program Name (INFO_PRG), Zone (ZONE_CD)

Lookup

Properties	Description
Tables	CI_LOOKUP_FIELD, CI_LOOKUP_VAL, CI_LOOKUP_VAL_L, F1_EXT_LOOKUP_VAL, F1_EXT_LOOKUP_VAL_L

Properties	Description
Standard Data Fields	Field Name (FIELD_NAME) • A lookup field name must have corresponding field metadata. The name of the lookup field column must be assigned to avoid conflicts among different products. If you follow the standards for database field names, a Customer Modification lookup field name will be automatically Customer Modification prefixed. Field Value (FIELD_VALUE) • If a lookup field is customizable, Customer Modification can insert new lookup values. X or Y must prefix when implementers introduce a new lookup value. • Product development can extend the Oracle Utilities Application Framework owned lookup field's value with caution. When it needs to be extended, prefix the first letter of the Owner Flag to the value. For example, when adding a new value to the algorithm entity flag (ALG_ENTITY_FLG), prefix with C1 if you are developing an Oracle Utilities Customer Care and Billing product. Introduced in V 4.0.1: Value (F1_EXT_LOOKUP_VALUE) • This will allow storing longer value keys rather than the normal 4byte lookup values.
Customer Modification	Override Description (DESCR_OVRD) on Lookup Field Value Language Table (CI_LOOKUP_VAL_L)

A new Feature option is defined through adding a value to EXT_SYS_TYP_FLG. The field value for this look up field must be prefixed by the Owner flag value.

Map

Properties	Description
Tables	F1_MAP, F1_MAP_L
Standard Data Fields	UI Map (MAP_CD)
Customer Modification	None

Managed Content

Properties	Description
Tables	F1_MANAG_CONTENT, F1_MANAG_CONTENT_L
Standard Data Fields	Managed Content (MANAG_CONTENT_CD)
Customer Modification	None

Messages

Properties	Description
Tables	CI_MSG_CATEGORY, CI_MSG_CATEGORY_L, CI_MSG, CI_MSG_L

Properties	Description
Standard Data Fields	Message Category (MESSAGE_CAT_NBR) • Messages are grouped in categories and each category has message numbers between 1 and 99999. A range of message categories is assigned to a product. You must use only the assigned category for your product. • Oracle Utilities Customer Care and Billing and Oracle Utilities Business Intelligence - 00001 thru 00100 • Oracle Utilities Application Framework Java - 11001 thru 11100 • Oracle Utilities Customer Care and Billing Java - 11101 thru 11200 • Oracle Utilities Business Intelligence Java - 11201 thru 11300 • Implementer COBOL - 90000 • Implementer WSS - 90001 • Implementer Java - 90002 • Reserved for Tests - 99999 Message Number (MESSAGE_NBR) for COBOL message categories • Message numbers below 1000 are reserved for common messages. Implementers must not use message numbers below 1000. Message Number (MESSAGE_NBR) for Java message categories • Subsystem Standard Messages - 00001 thru 02000 • Reserved - 02001 thru 09999 • Published Messages - 10001 thru 11000 • Package Messages - 10001 thru 90000 • Reserved - 90001 thru 99999 • Each package is allocated 100 message numbers, each starting from 101. • Published Messages are messages that are special-interest messages that implementations need to know about and are therefore published in the user docs. Examples of these include messages that are highly likely to be changed for an implementation, or messages that are embedded into other texts/messages and therefore the message number is never shown • Reserved message number ranges are for future use and therefore must not be used by all products.

Properties	Description
Customer Modification	Override Description (DESCRLONG_OVRD), Message Text Override (MESSAGE_TEXT_OVRD)

Meta Data - Table and Field

Properties	Description
Tables	CI_MD_TBL, CI_MD_TBL_FLD, CI_MD_TBL_L, CI_MD_TBL_FLD_L, CI_MD_FLD, CI_MD_FLD_L, F1_DB_OBJECTS_REPO
Standard Data Fields	Table Name (TBL_NAME) • Table names must match with the physical table name or view name in the database. • Field Name (FLD_NAME)Field name must match with the physical column name in the database unless the field is a work field. Field name does not have to follow the prefixing standard unless the field is a work field or customer modification field. • F1_DB_OBJECTS_REPO Table stores information about Indexes, Sequences, Triggers and other database objects excluding Tables and Fields (as they are already stored in the other Metadata tables)
Customer Modification	Audit Switches (AUDIT_INSERT_SW, AUDIT_UPDATE_SW, AUDIT_DELETE_SW), Override label (OVRD_LABEL) on MD Table Field Table (CI_MD_TBL_FLD). Audit Program Name (AUDIT_PGM_NAME), Audit Table Name (AUDIT_TBL_NAME), Audit Program Type (AUDIT_PGM_TYPE_FLG), Key Validation (KEY_VALIDATION_FLG) and Caching strategy (CACHE_FLG) on MD Table (CI_MD_TBL). Override Label (OVRD_LABEL) and Customer Specific Description (DESCRLONG_OVRD) on Field Table.

Meta Data - Constraints

Properties	Description
Tables	CI_MD_CONST, CI_MD_CONST_FLD
Standard Data Fields	Constraint Id (CONST_ID) • Index Name for Primary Constraints • <Index Name>Rnn for Foreign Key Constraints Where • nn: integer, 01 through 99
Customer Modification	None

Meta Data - Menu

Menus can be extended to support multiple products by adding a new menu line to an existing menu. The sequence number on the menu line language table (CI_MD_MENU_LINE_L) determines the order the menu lines appear. Within the same sequence, alphabetic sorting is used.

Properties	Description
Tables	CI_MD_MENU, CI_MD_MENU_L, CI_MD_MENU_ITEM, CI_MD_MENU_ITEM_L, CI_MD_MENU_LINE, CI_MD_MENU_LINE_L
Standard Data Fields	Menu Name (MENU_NAME), Menu Item Id (MENU_ITEM_ID), Menu Line Id (MENU_LINE_ID)
Customer Modification	Override Label (OVRD_LABEL) on Menu Line Language Table (CI_MD_MENU_LINE_L)

Meta Data - Program, Location and Services

Properties	Description
Tables	CI_MD_PRG_COM, CI_MD_PRG_LOC, CI_MD_SVC, CI_MD_SVC_L, CI_MD_SVC_PRG, CI_MD_PRG_REF, CI_MD_PRG_MOD, CI_MD_PRG_EL_AT, CI_MD_PRG_ELEM, CI_MD_PRG_SEC, CI_MD_PRG_SQL, CI_MD_PRG_VAR, CI_MD_PRG_TAB

Properties	Description
Standard Data Fields	Program Component Id (PROG_COM_ID), Location Id (LOC_ID), Program Component Name (PROG_COM_NAME), Service Name (SVC_NAME), Navigation Key (NAVIGATION_KEY)
Customer Modification	User Exit Program Name (USER_EXIT_PGM_NAME) on Program Components Table (CI_MD_PRG_COM),

Meta Data - Maintenance Object

Properties	Description
Tables	CI_MD_MO, CI_MD_MO_L, CI_MD_MO_TBL, CI_MD_MO_OPT, CI_MD_MO_ALG
Standard Data Fields	Maintenance Object (MAINT_OBJ_CD)
Customer Modification	None

Meta Data - Work Tables

Properties	Description
Tables	CI_MD_WRK_TBL, CI_MD_WRK_TBL_L, CI_MD_WRK_TBLFLD, CI_MD_MO_WRK
Standard Data Fields	Work Table Name (WRK_TBL_NAME)
Customer Modification	None

Meta Data - Search Object

Properties	Description
Tables	CI_MD_SO, CI_MD_SO_L, CI_MD_SO_RSFLD, CI_MD_SO_RSFLDAT, CI_MD_SOCG, CI_MD_SOCG_FLD, CI_MD_SOCG_FLDAT, CI_MD_SOCG_L, CI_MD_SOCG_SORT
Standard Data Fields	Search Object (SO_CD)
Customer Modification	None

Navigation Option

Properties	Description
Tables	CI_NAV_OPT, CI_NAV_OPT_L, CI_NAV_OPT_CTXT, CI_NAV_OPT_USG, CI_MD_NAV
Standard Data Fields	Navigation Option Code (NAV_OPT_CD), Navigation Key (NAVIGATION_KEY)
Customer Modification	None

Portal and Zone

Properties	Description
Tables	CI_PORTAL, CI_PORTAL_L, CI_PORTAL_ZONE, CI_ZONE, CI_ZONE_L, CI_ZONE_PRM, CI_ZONE_HDL, CI_ZONE_HDL_L, CI_ZONE_HDL_PRM, CI_ZONE_HDL_PRM_L, CI_UI_ZONE
Standard Data Fields	Portal Code (PORTAL_CD), Zone Code (ZONE_CD), Zone Type Code (ZONE_HDL_CD) • A new Zone can be added to the Product owned Portal Pages. • The existing Zones cannot be removed from the Product owned Portal Pages.
Customer Modification	Sort Sequence (SORT_SEQ) on Context Sensitive Zone Table (CI_UI_ZONE). Show on Portal Preferences (USER_CONFIG_FLG) on Portal Table (CI_PORTAL). Override Sequence (SORT_SEQ_OVRD) on Portal Zone Table (CI_PORTAL_ZONE). Customer Specific Description (DESCRLONG_OVRD) on Zone Language Table (CI_ZONE_L). Override Parameter Value (ZONE_HDL_PARM_OVRD) on Zone Type Parameters Table (CI_ZONE_HDL_PRM). Override Parameter Value (ZONE_PARM_VAL_OVRD) on Zone Parameters Table (CI_ZONE_PRM).

Sequence

Properties	Description
Tables	CI_SEQ
Standard Data Fields	Sequence Name (SEQ_NAME)
Customer Modification	Sequence Number (SEQ_NBR) This field is updated by the application process and must be set to 1 initially.

Schema

Properties	Description
Tables	F1_SCHEMA
Standard Data Fields	Schema Name (SCHEMA_NAME)
Customer Modification	None

Script

Properties	Description
Tables	CI_SCR, CI_SCR_L, CI_SCR_CRT, CI_SCR_CRT_GRP, CI_SCR_CRT_GRP_L, CI_SCR_DA, CI_SCR_FLD_MAP, CI_SCR_PRMPT, CI_SCR_PRMPT_L, CI_SCR_STEP, CI_SCR_STEP_L
Standard Data Fields	Script (SCR_CD)
Customer Modification	None

To Do Type

Properties	Description
Tables	CI_TD_TYPE, CI_TD_TYPE_L, CI_TD_SRTKEY_TY, CI_TD_DRLKEY_TY, CI_TD_SRTKEY_TY_L
Standard Data Fields	To Do Type Code (TD_TYPE_CD)
Customer Modification	Creation Batch Code (CRE_BATCH_CD), Route Batch Code (RTE_BATCH_CD), Priority Flag (TD_PRIORITY_FLG) on To Do Type Table (CI_TD_TYPE)

XAI configuration

Properties	Description
Tables	CI_XAI_ADAPTER, CI_XAI_ADAPTER_L, CI_XAI_CLASS, CI_XAI_CLASS_L, CI_XAI_ENV_HNDL, CI_XAI_ENV_HNDL_L, CI_XAI_FORMAT, CI_XAI_FORMAT_L, CI_XAI_RCVR, CI_XAI_RCVR_L, CI_XAI_RCVR_CTX, CI_XAI_RCVR_RSP, CI_XAI_RCVR_RGRP, CI_XAI_SENDER, CI_XAI_SERNDER_L, CI_XAI_SNDR_CTX, CI_XAI_OPTION
Standard Data Fields	Adapter Id (XAI_ADAPTER_ID), Class Id (XAI_CLASS_ID), Envelope Handler Id (XAI_ENV_HNDL_ID), XAI Format Id (XAI_FORMAT_ID), Receiver Id (XAI_RCVR_ID), Sender Id (XAI_SENDER_ID)
Customer Modification	Option Value (OPTION_VALUE on XAI Option Table (CI_XAI_OPTION)

The following XAI tables might have system data installed upon the initial installation but a subsequence system data upgrade process will not update the content of these table unless the change is documented in the database upgrade guide : CI_XAI_RCVR, CI_XAI_RCVR_L, CI_XAI_RCVR_CTX, CI_XAI_RCVR_RSP, CI_XAI_RCVR_RGRP, CI_XAI_SENDER, CI_XAI_SERNDER_L, CI_XAI_SNDR_CTX

XAI Services

Properties	Description
Tables	CI_XAI_IN_SVC, CI_XAI_IN_SVC_L, CI_XAI_SVC_PARM
Standard Data Fields	XAI Inbound Service Id (XAI_IN_SVC_ID), XAI Inbound Service Name (XAI_IN_SVC_NAME)
Customer Modification	XAI Version (XAI_VERSION_ID), Trace (TRACE_SW), Debug (DEBUG_SW), Request XSL (INPUT_XSL), Response XSL (RESPONSE_XSL), Record XSL (RECORD_XSL and Post Error (POST_ERROR_SW) on XAI Inbound Service Table (CI_XAI_IN_SVC)

Oracle Utilities Application Framework Only Tables

All data of the tables in this group belong to the Oracle Utilities Application Framework. No data modification or addition is allowed for these tables by base product development and customer modification. When an environment is upgraded to the next release of the Oracle Utilities Application Framework, the upgrade process will refresh the data in these tables.

- CI_MD_AT_DTL / CI_MD_AT_DTL_L
- CI_MD_ATT_TY
- CI_MD_CTL / CI_MD_CTL_L
- CI_MD_CTL_TMPL
- CI_MD_ELTY / CI_MD_ELTY_L
- CI_MD_ELTY_AT
- CI_MD_LOOKUP / CI_MD_LOOKUP_F
- CI_MD_PDF / CI_MD_PDF_VAL
- CI_MD_MSG / CI_MD_MSG_L
- CI_MD_SRC_TYPE / CI_MD_SRC_TYPE_L
- CI_MD_TMPL / CI_MD_TMPL_L
- CI_MD_TMPL_ELTY
- CI_MD_TMPL_VAR / CI_MD_TMPL_VAR_L
- CI_MD_VAR / CI_MD_VAR_DTL / CI_MD_VAR_DTL_L
- CI_XAI_EXECUTER / CI_XAI_EXECUTER_L

System Table List

This section contains names of system tables, upgrade actions, and a brief description of tables. The upgrade actions are explained below.

Keep (KP): The data in the table in the customer's database is kept untouched. No insert or delete is performed to this table by the upgrade process. The initial installation will add necessary data for the system

Merge (MG): The non-base product data in the table in the database is kept untouched. If the data belongs to the base product, any changes pertaining to the new version of the software are performed.

Refresh (RF): The existing data in the table is replaced with the data from the base product table.

> **Note.** New product data is also inserted into tables marked as 'Merge'. If implementers add rows for a customer specific enhancement, it can cause duplication when the system data gets upgraded to the next version. We strongly recommend following the guidelines on how to use designated range of values or prefixes to segregate the implementation data from the base product data.

Table Name	Upgrade Action	Description
CI_ALG	MG	Algorithm
CI_ALG_L	MG	Algorithm Language
CI_ALG_PARM	MG	Algorithm Parameters
CI_ALG_TYPE	MG	Algorithm Type
CI_ALG_TYPE_L	MG	Algorithm Type Language
CI_ALG_TYPE_PRM	MG	Algorithm Type Parameter
CI_ALG_TYPE_PRM_L	MG	Algorithm Type Parameter Language
CI_ALG_VER	MG	Algorithm Version
CI_APP_SVC_ACC	MG	Application Service Access Mode
CI_BATCH_CTRL	MG	Batch Control
CI_BATCH_CTRL_ALG	KP	Batch Control Algorithm
CI_BATCH_CTRL_L	MG	Batch Control Language
CI_BATCH_CTRL_P	MG	Batch Control Parameters
CI_BATCH_CTRL_P_L	MG	Batch Control Parameters Language
CI_CHAR_ENTITY	MG	Characteristic Type Entity
CI_CHAR_TYPE	MG	Characteristic Type
CI_CHAR_TYPE_L	MG	Characteristic Type Language
CI_CHAR_VAL	MG	Characteristic Type Value
CI_CHAR_VAL_L	MG	Characteristic Type Value Language

Table Name	Upgrade Action	Description
CI_CURRENCY_CD	KP	Currency Code
CI_CURRENCY_CD_L	KP	Currency Code Language
CI_DB_INSTR	KP	DB Process Instruction
CI_DB_INSTR_ALG	KP	DB Process Instruction Algorithm
CI_DB_INSTR_L	KP	DB Process Instruction Language
CI_DB_INST_OVRD	KP	DB Process Instruction Override
CI_DB_PROC	KP	DB Process
CI_DB_PROC_L	KP	DB Process Language
CI_DISP_ICON	MG	Display Icon
CI_DISP_ICON_L	MG	Display Icon Language
CI_DISP_PROF	KP	Display Profile
CI_DISP_PROF_L	KP	Display Profile Language
CI_FK_REF	MG	Foreign Key Reference
CI_FK_REF_L	MG	Foreign Key Reference Language
CI_LANGUAGE	MG	Language Code
CI_LOOKUP_FIELD	MG	Lookup Field
CI_LOOKUP_VAL	MG	Lookup Field Value
CI_LOOKUP_VAL_L	MG	Lookup Field Value Language
CI_MD_ATT_TY	RF	MD Element Attribute Type
CI_MD_AT_DTL	RF	MD Element Attribute Type Detail
CI_MD_AT_DTL_L	RF	MD Element Attribute Type Detail Language
CI_MD_CONST	MG	Constraints
CI_MD_CONST_FLD	MG	Constraint Fields
CI_MD_CTL	RF	Generator Control
CI_MD_CTL_L	RF	Generator Control Language
CI_MD_CTL_TMPL	RF	Generator Control Template
CI_MD_ELTY	RF	MD Element Type
CI_MD_ELTY_AT	RF	Element Type Attributes
CI_MD_ELTY_L	RF	Element Type Language
CI_MD_FLD	MG	Field
CI_MD_FLD_L	MG	Field Language

Table Name	Upgrade Action	Description
CI_MD_LOOKUP	RF	MD Lookup Field Value
CI_MD_LOOKUP_F	RF	MD Lookup Field
CI_MD_MENU	MG	Menu Information
CI_MD_MENU_IMOD	MG	Menu Item Module Maint
CI_MD_MENU_ITEM	MG	Menu Item
CI_MD_MENU_ITEM_L	MG	Menu Item Language
CI_MD_MENU_L	MG	Menu Language
CI_MD_MENU_LINE	MG	Menu Line
CI_MD_MENU_LINE_L	MG	Menu Line Language
CI_MD_MENU_MOD	MG	Menu Product Components
CI_MD_MO	MG	Maintenance Object
CI_MD_MO_ALG	MG	Maintenance Object Algorithm
CI_MD_MO_L	MG	Maintenance Object Language
CI_MD_MO_OPT	MG	Maintenance Object Option
CI_MD_MO_TBL	MG	Maintenance Object Table
CI_MD_MO_WRK	MG	Maintenance Object Work Tables
CI_MD_MSG	RF	MD Message
CI_MD_MSG_L	RF	MD Message Language
CI_MD_NAV	MG	Navigation Key
CI_MD_PDF	RF	Predefined Fields
CI_MD_PDF_VAL	RF	Predefined Values
CI_MD_PRG_COM	MG	Program Components
CI_MD_PRG_ELEM	MG	UI Page Elements
CI_MD_PRG_EL_AT	MG	UI Page Element Attributes
CI_MD_PRG_LOC	MG	Program Location
CI_MD_PRG_MOD	MG	Program Module
CI_MD_PRG_SEC	MG	UI Page Sections
CI_MD_PRG_SQL	MG	MD SQL Meta Data
CI_MD_PRG_TAB	MG	UI Tab Meta Data
CI_MD_PRG_VAR	MG	Program Variable
CI_MD_SO	MG	Search Object
CI_MD_SOCG	MG	Search Object Criteria Group

Table Name	Upgrade Action	Description
CI_MD_SOCG_FLD	MG	Search Object Criteria Group Field
CI_MD_SOCG_FLDAT	MG	Search Criteria Group Field Attribute
CI_MD_SOCG_L	MG	Search Object Criteria Group Language
CI_MD_SOCG_SORT	MG	Search Criteria Group Result Sort Order
CI_MD_SO_L	MG	Search Object Language
CI_MD_SO_RSFLD	MG	Search Object Result Field
CI_MD_SO_RSFLDAT	MG	Search Object Result Field Attribute
CI_MD_SRC_TYPE	RF	Source Type
CI_MD_SRC_TYPE_L	RF	Source Type Language
CI_MD_SVC	MG	MD Service
CI_MD_SVC_L	MG	MD Service Language
CI_MD_SVC_PRG	MG	MD Service Program
CI_MD_TAB_MOD	MG	UI Tab Module
CI_MD_TBL	MG	MD Table
CI_MD_TBL_FLD	MG	MD Table Field
CI_MD_TBL_FLD_L	MG	MD Table Field Language
CI_MD_TBL_L	MG	MD Table Language
CI_MD_TMPL	RF	Template
CI_MD_TMPL_ELTY	RF	Template Element Types
CI_MD_TMPL_L	RF	Template Language
CI_MD_TMPL_VAR	RF	Template Variable
CI_MD_TMPL_VAR_L	RF	Template Variable Language
CI_MD_VAR	RF	Variable
CI_MD_VAR_DTL	RF	Variable Detail
CI_MD_VAR_DTL_L	RF	Variable Detail Language
CI_MD_WRK_TBL	MG	Work Table
CI_MD_WRK_TBLFLD	MG	Work Table Field
CI_MD_WRK_TBL_L	MG	Work Table Language
CI_MSG	MG	Message
CI_MSG_CATEGORY	MG	Message Category

Table Name	Upgrade Action	Description
CI_MSG_CATEGORY_L	MG	Message Category Language
CI_MSG_L	MG	Message Language
CI_NAV_OPT	MG	Navigation Option
CI_NAV_OPT_CTXT	MG	Navigation Option Context
CI_NAV_OPT_L	MG	Navigation Option Language
CI_NAV_OPT_USG	MG	Navigation Option Usage
CI_PORTAL	MG	Portal
CI_PORTAL_L	MG	Portal Language
CI_PORTAL_ZONE	MG	Portal Zone
CI_SCR	MG	Script
CI_SCR_CRT	MG	Script Criteria
CI_SCR_CRT_GRP	MG	Script Criteria Group
CI_SCR_CRT_GRP_L	MG	Script Criteria Group Language
CI_SCR_DA	MG	Script Data Area
CI_SCR_FLD_MAP	MG	Script Field Mapping
CI_SCR_L	MG	Script Language
CI_SCR_PRMPT	MG	Script Prompt
CI_SCR_PRMPT_L	MG	Script Prompt Language
CI_SCR_STEP	MG	Script Step
CI_SCR_STEP_L	MG	Script Step Language
CI_SEQ	MG	Sequence
CI_TD_DRLKEY_TY	MG	To Do Type Drill Key
CI_TD_SRTKEY_TY	MG	To Do Type Sort Key
CI_TD_SRTKEY_TY_L	MG	To Do Type Sort Key Language
CI_TD_TYPE	MG	To Do Type
CI_TD_TYPE_L	MG	To Do Type Language
CI_USR_NAV_LINK	MG	User Favorite Links
CI_USR_PORTAL	KP	User Portal
CI_USR_ZONE	KP	User Zone
CI_XAI_ADAPTER	MG	XAI Adapter
CI_XAI_ADAPTER_L	MG	XAI Adapter Lang
CI_XAI_CLASS	MG	XAI Class
CI_XAI_CLASS_L	MG	XAI Class Language

Table Name	Upgrade Action	Description
CI_XAI_ENV_HNDL	MG	XAI Envelope Handler
CI_XAI_ENV_HNDL_L	MG	XAI Envelope Handler Language
CI_XAI_EXECUTER	RF	XAI Executer
CI_XAI_EXECUTER_L	RF	XAI Executer Language
CI_XAI_FORMAT	RF	XAI Format
CI_XAI_FORMAT_L	RF	XAI Format Language
CI_XAI_IN_SVC	MG	XAI Inbound Service
CI_XAI_IN_SVC_L	MG	XAI Inbound Service Language
CI_XAI_JNDI_SVR	KP	XAI JNDI Server
CI_XAI_JNDI_SVR_L	KP	XAI JNDI Server Language
CI_XAI_OPTION	KP	XAI Option
CI_XAI_RCVR	KP	XAI Receiver
CI_XAI_RCVR_CTX	KP	XAI Receiver Context
CI_XAI_RCVR_L	KP	XAI Receiver Language
CI_XAI_RCVR_RGRP	KP	XAI Receiver Rule Group
CI_XAI_RCVR_RSP	KP	XAI Receiver Response
CI_XAI_SENDER	KP	XAI Sender
CI_XAI_SENDER_L	KP	XAI Sender Language
CI_XAI_SNDR_CTX	KP	XAI Sender Context
CI_XAI_SVC_PARM	MG	XAI Inbound Service Parameters
CI_ZONE	MG	Zone
CI_ZONE_HDL	MG	Zone Type
CI_ZONE_HDL_L	MG	Zone Type Language
CI_ZONE_HDL_PRM	MG	Zone Type Parameters
CI_ZONE_HDL_PRM_L	MG	Zone Type Parameters Language
CI_ZONE_L	MG	Zone Language
CI_ZONE_PRM	MG	Zone Parameters
F1_BUS_OBJ	MG	Business Object
F1_BUS_OBJ_ALG	MG	Business Object Algorithm
F1_BUS_OBJ_L	MG	Business Object Language
F1_BUS_OBJ_OPT	MG	Business Object Option
F1_BUS_OBJ_STATUS	MG	Business Object Status

Table Name	Upgrade Action	Description
F1_BUS_OBJ_STATUS_ALG	MG	Business Object Status Algorithm
F1_BUS_OBJ_STATUS_L	MG	Business Object Status Language
F1_BUS_OBJ_STATUS_OPT	MG	Business Object Status Option
F1_BUS_OBJ_STATUS_RSN	MG	Status Reason
F1_BUS_OBJ_STATUS_RSN_CHAR	KP	Status Reason Characteristic
F1_BUS_OBJ_STATUS_RSN_L	MG	Status Reason Language
F1_BUS_OBJ_TR_RULE	MG	Business Object Transition Rule
F1_BUS_OBJ_TR_RULE_L	MG	Business Object Transition Rule Language
F1_BUS_SVC	MG	Business Service
F1_BUS_SVC_L	MG	Business Service Language
F1_DATA_AREA	MG	Data Area
F1_DATA_AREA_L	MG	Data Area Language
F1_DB_OBJECTS_REPO	MG	Database Objects Repository
F1_EXT_LOOKUP_VAL	MG	Extendable Lookup
F1_EXT_LOOKUP_VAL_L	MG	Extendable Lookup Language
F1_INSTALLATION	KP	Installation Option - Framework
F1_MANAG_CONTENT	MG	Managed Content
F1_MANAG_CONTENT_L	MG	Managed Content Language
F1_MAP	MG	UI Map
F1_MAP_L	MG	UI Map Language
F1_SCHEMA	MG	Schema
SC_ACCESS_CNTL	MG	User Group Access Control
SC_APP_SERVICE	MG	Application Service
SC_APP_SERVICE_L	MG	Application Service Language
SC_USER	KP	User
SC_USER_GROUP	KP	User Group
SC_USER_GROUP_L	KP	User Group Language
SC_USR_GRP_PROF	MG	User Group Profile

Table Name	Upgrade Action	Description
SC_USR_GRP_USR	KP	User Group User

Appendix C

Partitioning Recommendations for Oracle Utilities Smart Grid Gateway

This section specifies the partitioning and compression strategies recommended for an initial Oracle Utilities Smart Grid Gateway database configuration on Exadata. It includes the following topics:

- **Partitioning Recommendations**
- **Compression Recommendations**

Partitioning Recommendations

In general, the recommendation is for a minimum of 'n' partitions for selective database objects, where 'n' is number of RAC nodes. The specific table level partitioning recommendations are as follows:

- The Table Partitioning scheme for Transaction tables is focused primarily on tables associated with Measurement MO, Measurement Log MO and Initial-Measurement-Data MO.
- D1_MSRMT, D1_MSRMT_CHAR, D1_MSRMT_LOG, D1_MSRMT_LOG_PARM tables can be partitioned by MSRMT_DTTM (smaller partition better performance). Bi-weekly partitions is a good start. Subpartition these tables by MEASR_COMP_ID (8 subpartitions should be a good number to start with).
- D1_INIT_MSRMT_DATA table can be partitioned by D1_TO_DTTM (smaller partition better performance). Bi-weekly partitions is a good start. Subpartition D1_INIT_MSRMT_DATA table by MEASR_COMP_ID (8 subpartitions should be a good number to start with).
- D1_INIT_MSRMT_DATA_CHAR,D1_INIT_MSRMT_DATA_K,D1_INIT_MSRMT_DATA_LOG,D1_INIT_MSRMT_DATA_LOG_PARM tables can be partitioned by INIT_MSRMT_DATA_ID (8 sub partitions should be a good number to start with).

The following sections gives partition recommendation and can be used as reference. It includes the following:

- **D1_MSRMT**
- **D1_MSRMT_CHAR**
- **D1_MSRMT_LOG**
- **D1_MSRMT_LOG_PARM**
- **D1_INIT_MSRMT_DATA**
- **D1_INIT_MSRMT_DATA_CHAR**

- **D1_INIT_MSRMT_DATA_K**
- **D1_INIT_MSRMT_DATA_LOG**
- **D1_INIT_MSRMT_DATA_LOG_PARM**

D1_MSRMT

```
CREATE TABLE D1_MSRMT
  (
    MEASR_COMP_ID CHAR(12 BYTE) NOT NULL ENABLE,
    MSRMT_DTTM DATE NOT NULL ENABLE,
    BO_STATUS_CD   CHAR(12 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MSRMT_COND_FLG CHAR(6 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MSRMT_USE_FLG  CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MSRMT_LOCAL_DTTM DATE NOT NULL ENABLE,
    MSRMT_VAL          NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    ORIG_INIT_MSRMT_ID CHAR(14 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    PREV_MSRMT_DTTM DATE,
    MSRMT_VAL1  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL2  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL3  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL4  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL5  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL6  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL7  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL8  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL9  NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    MSRMT_VAL10 NUMBER(16,6) DEFAULT 0 NOT NULL ENABLE,
    BUS_OBJ_CD  CHAR(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CRE_DTTM DATE NOT NULL ENABLE,
    STATUS_UPD_DTTM DATE NOT NULL ENABLE,
    USER_EDITED_FLG CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    VERSION         NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE
  ) TABLESPACE <Tablespace Name>
ENABLE ROW MOVEMENT
  PARTITION BY RANGE (MSRMT_DTTM)
INTERVAL(NUMTOYMINTERVAL(1, 'MONTH'))
SUBPARTITION BY range (MEASR_COMP_ID)
SUBPARTITION TEMPLATE(
subpartition SUB1 values less than (124999999999),
subpartition SUB2 values less than (249999999999),
subpartition SUB3 values less than (374999999999),
subpartition SUB4 values less than (499999999999),
subpartition SUB5 values less than (624999999999),
subpartition SUB6 values less than (744999999999),
subpartition SUB7 values less than (874999999999),
subpartition SUB8 values less than (maxvalue)
)
(PARTITION P1 VALUES LESS THAN(TO_DATE('01/01/2009','DD/MM/YYYY')),
 PARTITION P2 VALUES LESS THAN(TO_DATE('01/02/2009','DD/MM/YYYY')),
PARTITION P3 VALUES LESS THAN(TO_DATE('01/03/2009','DD/MM/YYYY')) ,
PARTITION P4 VALUES LESS THAN(TO_DATE('01/04/2009','DD/MM/YYYY')) ,
PARTITION P5 VALUES LESS THAN(TO_DATE('01/05/2009','DD/MM/YYYY')) ,
PARTITION P6 VALUES LESS THAN(TO_DATE('01/06/2009','DD/MM/YYYY')) ,
PARTITION P7 VALUES LESS THAN(TO_DATE('01/07/2009','DD/MM/YYYY')) ,
PARTITION P8 VALUES LESS THAN(TO_DATE('01/08/2009','DD/MM/YYYY')) ,
PARTITION P9 VALUES LESS THAN(TO_DATE('01/09/2009','DD/MM/YYYY')) ,
PARTITION P10 VALUES LESS THAN(TO_DATE('01/10/2009','DD/MM/YYYY')),
PARTITION P11 VALUES LESS THAN(TO_DATE('01/11/2009','DD/MM/YYYY')) ,
PARTITION P12 VALUES LESS THAN(TO_DATE('01/12/2009','DD/MM/YYYY')) ,
PARTITION P13 VALUES LESS THAN(TO_DATE('01/01/2010','DD/MM/YYYY')) ,
```

```
PARTITION P14 VALUES LESS THAN(TO_DATE('01/02/2010','DD/MM/YYYY')) ,
PARTITION P15 VALUES LESS THAN(TO_DATE('01/03/2010','DD/MM/YYYY')) ,
PARTITION P16 VALUES LESS THAN(TO_DATE('01/04/2010','DD/MM/YYYY')) ,
PARTITION P17 VALUES LESS THAN(TO_DATE('01/05/2010','DD/MM/YYYY')) ,
PARTITION P18 VALUES LESS THAN(TO_DATE('01/06/2010','DD/MM/YYYY')) ,
PARTITION P19 VALUES LESS THAN(TO_DATE('01/07/2010','DD/MM/YYYY'))
);

CREATE UNIQUE INDEX D1T298P0 on D1_MSRMT (MEASR_COMP_ID, MSRMT_DTTM)
TABLESPACE <Tablespace_Name>  local COMPRESS 1;

alter table D1_MSRMT ADD CONSTRAINT D1T298P0 PRIMARY
KEY(MEASR_COMP_ID, MSRMT_DTTM) USING INDEX TABLESPACE
<Tablespace_Name> ;

CREATE INDEX D1T298S2 ON D1_MSRMT   ( ORIG_INIT_MSRMT_ID  )
TABLESPACE<Tablespace_Name>   COMPRESS 1;

For implementations on Exadata the following D1T298S1 Index is not
required-

CREATE UNIQUE INDEX D1T298S1 on D1_MSRMT (MEASR_COMP_ID,
MSRMT_DTTM,MSRMT_COND_FLG,MSRMT_USE_FLG,MSRMT_LOCAL_DTTM,MSRMT_VAL,MSR
MT_VAL1,MSRMT_VAL2,USER_EDITED_FLG)  TABLESPACE <Tablespace_Name>
local COMPRESS 1;
```

D1_MSRMT_CHAR

```
CREATE TABLE D1_MSRMT_CHAR
  (
    MEASR_COMP_ID CHAR(12 BYTE) NOT NULL ENABLE,
    MSRMT_DTTM DATE NOT NULL ENABLE,
    CHAR_TYPE_CD   CHAR(8 BYTE) NOT NULL ENABLE,
    SEQ_NUM        NUMBER(3,0) NOT NULL ENABLE,
    CHAR_VAL       CHAR(16 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    ADHOC_CHAR_VAL VARCHAR2(254 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK1   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK2   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK3   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK4   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK5   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    SRCH_CHAR_VAL  VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    VERSION        NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE
    )  TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
      PARTITION BY RANGE (MSRMT_DTTM)
INTERVAL(NUMTOYMINTERVAL(1, 'MONTH'))
SUBPARTITION BY range (MEASR_COMP_ID)
SUBPARTITION TEMPLATE(
subpartition SUB1 values less than (124999999999),
subpartition SUB2 values less than (249999999999),
subpartition SUB3 values less than (374999999999),
subpartition SUB4 values less than (499999999999),
subpartition SUB5 values less than (624999999999),
subpartition SUB6 values less than (744999999999),
subpartition SUB7 values less than (874999999999),
subpartition SUB8 values less than (maxvalue)
)
(PARTITION P1 VALUES LESS THAN(TO_DATE('01/01/2009','DD/MM/YYYY')),
PARTITION P2 VALUES LESS THAN(TO_DATE('01/02/2009','DD/MM/YYYY')),
PARTITION P3 VALUES LESS THAN(TO_DATE('01/03/2009','DD/MM/YYYY')),
PARTITION P4 VALUES LESS THAN(TO_DATE('01/04/2009','DD/MM/YYYY')),
PARTITION P5 VALUES LESS THAN(TO_DATE('01/05/2009','DD/MM/YYYY')),
PARTITION P6 VALUES LESS THAN(TO_DATE('01/06/2009','DD/MM/YYYY')),
PARTITION P7 VALUES LESS THAN(TO_DATE('01/07/2009','DD/MM/YYYY')),
PARTITION P8 VALUES LESS THAN(TO_DATE('01/08/2009','DD/MM/YYYY')),
PARTITION P9 VALUES LESS THAN(TO_DATE('01/09/2009','DD/MM/YYYY')),
PARTITION P10 VALUES LESS THAN(TO_DATE('01/10/2009','DD/MM/YYYY')),
PARTITION P11 VALUES LESS THAN(TO_DATE('01/11/2009','DD/MM/YYYY')),
PARTITION P12 VALUES LESS THAN(TO_DATE('01/12/2009','DD/MM/YYYY')),
PARTITION P13 VALUES LESS THAN(TO_DATE('01/01/2010','DD/MM/YYYY')),
PARTITION P14 VALUES LESS THAN(TO_DATE('01/02/2010','DD/MM/YYYY')),
PARTITION P15 VALUES LESS THAN(TO_DATE('01/03/2010','DD/MM/YYYY')),
PARTITION P16 VALUES LESS THAN(TO_DATE('01/04/2010','DD/MM/YYYY')),
PARTITION P17 VALUES LESS THAN(TO_DATE('01/05/2010','DD/MM/YYYY')),
PARTITION P18 VALUES LESS THAN(TO_DATE('01/06/2010','DD/MM/YYYY')),
PARTITION P19 VALUES LESS THAN(TO_DATE('01/07/2010','DD/MM/YYYY'))
);

CREATE UNIQUE INDEX  D1T299P0 ON D1_MSRMT_CHAR
  (
    MEASR_COMP_ID, MSRMT_DTTM, CHAR_TYPE_CD, SEQ_NUM
  ) TABLESPACE <Tablespace_Name> local COMPRESS 1;

ALTER TABLE D1_MSRMT_CHAR  ADD CONSTRAINT D1T299P0 PRIMARY KEY
(MEASR_COMP_ID, MSRMT_DTTM, CHAR_TYPE_CD, SEQ_NUM) USING INDEX
TABLESPACE <Tablespace_Name>;
```

```
CREATE INDEX D1T299S1 ON D1_MSRMT_CHAR (SRCH_CHAR_VAL) TABLESPACE
<Tablespace_Name>  COMPRESS 1;
```

D1_MSRMT_LOG

```
CREATE TABLE D1_MSRMT_LOG
  (
    MEASR_COMP_ID CHAR(12 BYTE),
    MSRMT_DTTM DATE,
    SEQNO              NUMBER(5,0),
    ORIG_INIT_MSRMT_ID CHAR(14 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BUS_OBJ_CD         CHAR(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BO_DATA_AREA CLOB,
    CHAR_TYPE_CD   CHAR(8 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL       CHAR(16 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    ADHOC_CHAR_VAL VARCHAR2(254 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK1   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK2   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK3   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK4   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK5   VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    DESCRLONG      VARCHAR2(4000 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    LOG_DTTM DATE NOT NULL ENABLE,
    MESSAGE_CAT_NBR          NUMBER(5,0) DEFAULT 0 NOT NULL ENABLE,
    MESSAGE_NBR                 NUMBER(5,0) DEFAULT 0 NOT NULL ENABLE,
    USER_ID                              CHAR(8 BYTE) DEFAULT ' ' NOT
NULL ENABLE,
    VERSION                            NUMBER(5,0) DEFAULT 1 NOT NULL
ENABLE,
    MSRMT_LOG_ENTRY_TYPE_FLG CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE
    )
TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT   LOB   (  BO_DATA_AREA  )
  STORE AS SECUREFILE (  ENABLE STORAGE IN ROW CHUNK 8192 CACHE
<COMPRESS  depending on Advanced Data Compression license > )
      PARTITION BY RANGE (MSRMT_DTTM)
INTERVAL(NUMTOYMINTERVAL(1, 'MONTH'))
SUBPARTITION BY range (MEASR_COMP_ID)
SUBPARTITION TEMPLATE(
subpartition SUB1 values less than (124999999999),
subpartition SUB2 values less than (249999999999),
subpartition SUB3 values less than (374999999999),
subpartition SUB4 values less than (499999999999),
subpartition SUB5 values less than (624999999999),
subpartition SUB6 values less than (744999999999),
subpartition SUB7 values less than (874999999999),
subpartition SUB8 values less than (maxvalue)
)
(PARTITION P1 VALUES LESS THAN(TO_DATE('01/01/2009','DD/MM/YYYY')),
PARTITION P2 VALUES LESS THAN(TO_DATE('01/02/2009','DD/MM/YYYY')),
PARTITION P3 VALUES LESS THAN(TO_DATE('01/03/2009','DD/MM/YYYY')),
PARTITION P4 VALUES LESS THAN(TO_DATE('01/04/2009','DD/MM/YYYY')),
PARTITION P5 VALUES LESS THAN(TO_DATE('01/05/2009','DD/MM/YYYY')),
PARTITION P6 VALUES LESS THAN(TO_DATE('01/06/2009','DD/MM/YYYY')),
PARTITION P7 VALUES LESS THAN(TO_DATE('01/07/2009','DD/MM/YYYY')),
PARTITION P8 VALUES LESS THAN(TO_DATE('01/08/2009','DD/MM/YYYY')),
PARTITION P9 VALUES LESS THAN(TO_DATE('01/09/2009','DD/MM/YYYY')),
PARTITION P10 VALUES LESS THAN(TO_DATE('01/10/2009','DD/MM/YYYY')),
PARTITION P11 VALUES LESS THAN(TO_DATE('01/11/2009','DD/MM/YYYY')),
```

```
PARTITION P12 VALUES LESS THAN(TO_DATE('01/12/2009','DD/MM/YYYY')),
PARTITION P13 VALUES LESS THAN(TO_DATE('01/01/2010','DD/MM/YYYY')),
PARTITION P14 VALUES LESS THAN(TO_DATE('01/02/2010','DD/MM/YYYY')),
PARTITION P15 VALUES LESS THAN(TO_DATE('01/03/2010','DD/MM/YYYY')),
PARTITION P16 VALUES LESS THAN(TO_DATE('01/04/2010','DD/MM/YYYY')),
PARTITION P17 VALUES LESS THAN(TO_DATE('01/05/2010','DD/MM/YYYY')),
PARTITION P18 VALUES LESS THAN(TO_DATE('01/06/2010','DD/MM/YYYY')),
PARTITION P19 VALUES LESS THAN(TO_DATE('01/07/2010','DD/MM/YYYY'))
);

CREATE UNIQUE INDEX D1T300P0 ON D1_MSRMT_LOG
(
    MEASR_COMP_ID, MSRMT_DTTM, SEQNO
)  TABLESPACE <Tablespace_Name> local COMPRESS 1;

ALTER TABLE D1_MSRMT_LOG ADD CONSTRAINT D1T300P0 PRIMARY KEY
(MEASR_COMP_ID, MSRMT_DTTM, SEQNO) USING INDEX  TABLESPACE
<Tablespace_Name>;

CREATE INDEX D1T300S3 ON D1_MSRMT_LOG ( ORIG_INIT_MSRMT_ID  )
TABLESPACE<Tablespace_Name>  COMPRESS 1;
```

D1_MSRMT_LOG_PARM

```
CREATE TABLE D1_MSRMT_LOG_PARM
  (
    MEASR_COMP_ID CHAR(12 BYTE),
    MSRMT_DTTM DATE,
    SEQNO                NUMBER(5,0),
    PARM_SEQ         NUMBER(3,0),
    MSG_PARM_VAL     VARCHAR2(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MSG_PARM_TYP_FLG CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    VERSION                  NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE
    )
TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
PARTITION BY RANGE (MSRMT_DTTM)
INTERVAL(NUMTOYMINTERVAL(1, 'MONTH'))
SUBPARTITION BY range (MEASR_COMP_ID)
SUBPARTITION TEMPLATE(
subpartition SUB1 values less than (124999999999),
subpartition SUB2 values less than (249999999999),
subpartition SUB3 values less than (374999999999),
subpartition SUB4 values less than (499999999999),
subpartition SUB5 values less than (624999999999),
subpartition SUB6 values less than (744999999999),
subpartition SUB7 values less than (874999999999),
subpartition SUB8 values less than (maxvalue)
)
(PARTITION P1 VALUES LESS THAN(TO_DATE('01/01/2009','DD/MM/YYYY')),
PARTITION P2 VALUES LESS THAN(TO_DATE('01/02/2009','DD/MM/YYYY')),
PARTITION P3 VALUES LESS THAN(TO_DATE('01/03/2009','DD/MM/YYYY')),
PARTITION P4 VALUES LESS THAN(TO_DATE('01/04/2009','DD/MM/YYYY')),
PARTITION P5 VALUES LESS THAN(TO_DATE('01/05/2009','DD/MM/YYYY')),
PARTITION P6 VALUES LESS THAN(TO_DATE('01/06/2009','DD/MM/YYYY')),
PARTITION P7 VALUES LESS THAN(TO_DATE('01/07/2009','DD/MM/YYYY')),
PARTITION P8 VALUES LESS THAN(TO_DATE('01/08/2009','DD/MM/YYYY')),
PARTITION P9 VALUES LESS THAN(TO_DATE('01/09/2009','DD/MM/YYYY')),
```

```
PARTITION P10 VALUES LESS THAN(TO_DATE('01/10/2009','DD/MM/YYYY')),
PARTITION P11 VALUES LESS THAN(TO_DATE('01/11/2009','DD/MM/YYYY')),
PARTITION P12 VALUES LESS THAN(TO_DATE('01/12/2009','DD/MM/YYYY')),
PARTITION P13 VALUES LESS THAN(TO_DATE('01/01/2010','DD/MM/YYYY')),
PARTITION P14 VALUES LESS THAN(TO_DATE('01/02/2010','DD/MM/YYYY')),
PARTITION P15 VALUES LESS THAN(TO_DATE('01/03/2010','DD/MM/YYYY')),
PARTITION P16 VALUES LESS THAN(TO_DATE('01/04/2010','DD/MM/YYYY')),
PARTITION P17 VALUES LESS THAN(TO_DATE('01/05/2010','DD/MM/YYYY')),
PARTITION P18 VALUES LESS THAN(TO_DATE('01/06/2010','DD/MM/YYYY')),
PARTITION P19 VALUES LESS THAN(TO_DATE('01/07/2010','DD/MM/YYYY'))
);

CREATE UNIQUE INDEX D1T301P0 ON D1_MSRMT_LOG_PARM
(    MEASR_COMP_ID, MSRMT_DTTM, SEQNO, PARM_SEQ
)  INDEX  TABLESPACE <Tablespace_Name> local COMPRESS 1;

ALTER TABLE D1_MSRMT_LOG_PARM ADD CONSTRAINT D1T301P0 PRIMARY KEY
(MEASR_COMP_ID, MSRMT_DTTM, SEQNO, PARM_SEQ) USING INDEX  TABLESPACE
<Tablespace_Name>;
```

D1_INIT_MSRMT_DATA

```
CREATE TABLE D1_INIT_MSRMT_DATA
  (
    INIT_MSRMT_DATA_ID CHAR(14 BYTE) NOT NULL ENABLE,
    MEASR_COMP_ID      CHAR(12 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    D1_FROM_DTTM DATE,
    D1_TO_DTTM DATE,
    DATA_SRC_FLG        CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    TIME_ZONE_CD        CHAR(10 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BUS_OBJ_CD          CHAR(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BO_STATUS_CD        CHAR(12 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BO_STATUS_REASON_CD VARCHAR2(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    STATUS_UPD_DTTM DATE NOT NULL ENABLE,
    CRE_DTTM DATE NOT NULL ENABLE,
    VERSION    NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE,
    IMD_EXT_ID VARCHAR2(120 BYTE),
    PREVEE_BO_DATA_AREA CLOB,
    POSTVEE_BO_DATA_AREA CLOB,
    TRACE_BO_DATA_AREA CLOB,
    RAW_BO_DATA_AREA CLOB,
     IMD_BO_DATA_AREA CLOB
  ) TABLESPACE  <Tablespace_Name>
ENABLE ROW MOVEMENT
  LOB  (PREVEE_BO_DATA_AREA)
  STORE AS SECUREFILE (ENABLE STORAGE IN ROW COMPRESS CACHE)
  LOB  ( POSTVEE_BO_DATA_AREA )
  STORE AS SECUREFILE (ENABLE STORAGE IN ROW COMPRESS CACHE)
  LOB (TRACE_BO_DATA_AREA)
  STORE AS SECUREFILE (ENABLE STORAGE IN ROW COMPRESS CACHE)
  LOB (RAW_BO_DATA_AREA)
  STORE AS SECUREFILE (ENABLE STORAGE IN ROW COMPRESS CACHE)
  LOB (IMD_BO_DATA_AREA)
  STORE AS SECUREFILE (ENABLE STORAGE IN ROW COMPRESS CACHE)
PARTITION BY RANGE (D1_TO_DTTM)
SUBPARTITION BY range (MEASR_COMP_ID)
SUBPARTITION TEMPLATE(
subpartition SUB1 values less than (124999999999),
```

```
subpartition SUB2 values less than (249999999999),
subpartition SUB3 values less than (374999999999),
subpartition SUB4 values less than (499999999999),
subpartition SUB5 values less than (624999999999),
subpartition SUB6 values less than (744999999999),
subpartition SUB7 values less than (874999999999),
subpartition SUB8 values less than (maxvalue)
)
(PARTITION P1 VALUES LESS THAN(TO_DATE('15/12/2010 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P2 VALUES LESS THAN(TO_DATE('01/01/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P3 VALUES LESS THAN(TO_DATE('15/01/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P4 VALUES LESS THAN(TO_DATE('01/02/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P5 VALUES LESS THAN(TO_DATE('15/02/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P6 VALUES LESS THAN(TO_DATE('01/03/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P7 VALUES LESS THAN(TO_DATE('15/03/2011 00:00:01','DD/MM/
YYYY HH24:MI:SS')),
 PARTITION P8  VALUES LESS THAN (maxvalue)
);
CREATE UNIQUE INDEX D1T304P0 ON D1_INIT_MSRMT_DATA
  (
    INIT_MSRMT_DATA_ID
  ) TABLESPACE <Tablespace_Name>
 GLOBAL PARTITION BY RANGE (INIT_MSRMT_DATA_ID)
  (PARTITION PART1 values less than (12499999999999),
  PARTITION PART2 values less than (24999999999999),
  PARTITION PART3 values less than (37499999999999),
  PARTITION PART4 values less than (49999999999999),
  PARTITION PART5 values less than (62499999999999),
  PARTITION PART6 values less than (74999999999999),
  PARTITION PART7 values less than (87499999999999),
  PARTITION PART8 values less than (maxvalue));

ALTER TABLE D1_INIT_MSRMT_DATA ADD CONSTRAINT D1T304P0 PRIMARY KEY
(INIT_MSRMT_DATA_ID) USING INDEX TABLESPACE <Tablespace_Name>;

CREATE INDEX D1T304S1 ON D1_INIT_MSRMT_DATA
  ( MEASR_COMP_ID
    ,BO_STATUS_CD
    ,BUS_OBJ_CD
    ,D1_TO_DTTM
    ,D1_FROM_DTTM
   ) TABLESPACE <Tablespace_Name> LOCAL COMPRESS 1;

CREATE UNIQUE INDEX D1T304S2 ON D1_INIT_MSRMT_DATA
  (  INIT_MSRMT_DATA_ID
    ,BO_STATUS_CD
    ,BUS_OBJ_CD
   ) TABLESPACE <Tablespace_Name> COMPRESS 1;

CREATE UNIQUE INDEX D1T304S3 ON D1_INIT_MSRMT_DATA
 (IMD_EXT_ID,
   INIT_MSRMT_DATA_ID
  ) TABLESPACE <Tablespace_Name> COMPRESS 1;
```

D1_INIT_MSRMT_DATA_CHAR

```
CREATE TABLE D1_INIT_MSRMT_DATA_CHAR
  (
    INIT_MSRMT_DATA_ID CHAR(14 BYTE),
    CHAR_TYPE_CD       CHAR(8 BYTE),
    SEQ_NUM            NUMBER(3,0),
    CHAR_VAL           CHAR(16 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    ADHOC_CHAR_VAL     VARCHAR2(254 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK1       VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK2       VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK3       VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK4       VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK5       VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    SRCH_CHAR_VAL      VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    VERSION            NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE)
   TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
  PARTITION BY RANGE (INIT_MSRMT_DATA_ID)
  (PARTITION PART1 values less than (12499999999999),
  PARTITION PART2 values less than (24999999999999),
  PARTITION PART3 values less than (37499999999999),
  PARTITION PART4 values less than (49999999999999),
  PARTITION PART5 values less than (62499999999999),
  PARTITION PART6 values less than (74499999999999),
  PARTITION PART7 values less than (87499999999999),
  PARTITION PART8 values less than (maxvalue));



CREATE UNIQUE INDEX D1T305P0 ON D1_INIT_MSRMT_DATA_CHAR
  (
    INIT_MSRMT_DATA_ID, CHAR_TYPE_CD, SEQ_NUM
  ) TABLESPACE <Tablespace_Name> LOCAL COMPRESS 1;


ALTER TABLE D1_INIT_MSRMT_DATA_CHAR ADD CONSTRAINT D1T305P0 PRIMARY
KEY (INIT_MSRMT_DATA_ID, CHAR_TYPE_CD, SEQ_NUM) USING INDEX
TABLESPACE <Tablespace_Name>;

CREATE INDEX D1T305S1 ON D1_INIT_MSRMT_DATA_CHAR
    (      SRCH_CHAR_VAL
    ) TABLESPACE <Tablespace_Name>  COMPRESS 1;
```

D1_INIT_MSRMT_DATA_K

```
CREATE TABLE D1_INIT_MSRMT_DATA_K
  (
    INIT_MSRMT_DATA_ID CHAR(14 BYTE),
    ENV_ID             NUMBER(6,0) NOT NULL ENABLE,
   CONSTRAINT D1T314P0 PRIMARY KEY (INIT_MSRMT_DATA_ID, ENV_ID) ENABLE
  )
  ORGANIZATION INDEX  TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
  PARTITION BY RANGE (INIT_MSRMT_DATA_ID)
  (PARTITION PART1 values less than (12499999999999),
  PARTITION PART2 values less than (24999999999999),
  PARTITION PART3 values less than (37499999999999),
  PARTITION PART4 values less than (49999999999999),
  PARTITION PART5 values less than (62499999999999),
```

```
  PARTITION PART6 values less than (74499999999999),
  PARTITION PART7 values less than (87499999999999),
  PARTITION PART8 values less than (maxvalue)) compress 1;
```

D1_INIT_MSRMT_DATA_LOG

```
CREATE TABLE D1_INIT_MSRMT_DATA_LOG
  (
    INIT_MSRMT_DATA_ID  CHAR(14 BYTE),
    SEQNO               NUMBER(5,0),
    BO_STATUS_CD        CHAR(12 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    BO_STATUS_REASON_CD VARCHAR2(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_TYPE_CD        CHAR(8 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL            CHAR(16 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    ADHOC_CHAR_VAL      VARCHAR2(254 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK1        VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK2        VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK3        VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK4        VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    CHAR_VAL_FK5        VARCHAR2(50 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    DESCRLONG          VARCHAR2(4000 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    LOG_DTTM DATE NOT NULL ENABLE,
    LOG_ENTRY_TYPE_FLG CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MESSAGE_CAT_NBR    NUMBER(5,0) DEFAULT 0 NOT NULL ENABLE,
    MESSAGE_NBR        NUMBER(5,0) DEFAULT 0 NOT NULL ENABLE,
    USER_ID            CHAR(8 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    VERSION            NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE
)  TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
  PARTITION BY RANGE (INIT_MSRMT_DATA_ID)
  (PARTITION PART1 values less than (12499999999999),
  PARTITION PART2 values less than (24999999999999),
  PARTITION PART3 values less than (37499999999999),
  PARTITION PART4 values less than (49999999999999),
  PARTITION PART5 values less than (62499999999999),
  PARTITION PART6 values less than (74499999999999),
  PARTITION PART7 values less than (87499999999999),
  PARTITION PART8 values less than (maxvalue)) ;

CREATE UNIQUE INDEX D1T306P0 ON D1_INIT_MSRMT_DATA_LOG
(
    INIT_MSRMT_DATA_ID, SEQNO
)  TABLESPACE <Tablespace_Name>LOCAL COMPRESS 1;


ALTER TABLE D1_INIT_MSRMT_DATA_LOG ADD CONSTRAINT D1T306P0 PRIMARY KEY
(INIT_MSRMT_DATA_ID, SEQNO) USING INDEX  TABLESPACE <Tablespace_Name>;
```

D1_INIT_MSRMT_DATA_LOG_PARM

```
CREATE TABLE D1_INIT_MSRMT_DATA_LOG_PARM
  (
    INIT_MSRMT_DATA_ID CHAR(14 BYTE),
    SEQNO              NUMBER(5,0),
    PARM_SEQ           NUMBER(3,0),
    MSG_PARM_VAL       VARCHAR2(30 BYTE) DEFAULT ' ' NOT NULL ENABLE,
    MSG_PARM_TYP_FLG   CHAR(4 BYTE) DEFAULT ' ' NOT NULL ENABLE,
```

```
    VERSION            NUMBER(5,0) DEFAULT 1 NOT NULL ENABLE
    )  TABLESPACE <Tablespace_Name>
ENABLE ROW MOVEMENT
  PARTITION BY RANGE (INIT_MSRMT_DATA_ID)
  (PARTITION PART1 values less than (12499999999999),
  PARTITION PART2 values less than (24999999999999),
  PARTITION PART3 values less than (37499999999999),
  PARTITION PART4 values less than (49999999999999),
  PARTITION PART5 values less than (62499999999999),
  PARTITION PART6 values less than (74999999999999),
  PARTITION PART7 values less than (87499999999999),
  PARTITION PART8 values less than (maxvalue)) ;

CREATE UNIQUE INDEX D1T307P0 ON D1_INIT_MSRMT_DATA_LOG_PARM
(   INIT_MSRMT_DATA_ID, SEQNO, PARM_SEQ)  TABLESPACE <Tablespace_Name>
LOCAL COMPRESS 1;

ALTER TABLE D1_INIT_MSRMT_DATA_LOG_PARM ADD CONSTRAINT D1T307P0
PRIMARY KEY (INIT_MSRMT_DATA_ID, SEQNO, PARM_SEQ) USING INDEX
TABLESPACE <Tablespace_Name>;
```

Compression Recommendations

In general the recommendation is to do QUERY HIGH compression (a part of hybrid columnar compression) on Exadata.

For Final Measurement table (D1_MSRMT) keep current table partition uncompressed. The rest of the older partitions will be compressed based on QUERY HIGH compression.

For Initial Measurement Data table (D1_INIT_MSMRT_DATA) keep CLOBs always in securefile and Medium Compressed. In addition, keep current table partition uncompressed. the rest of the older partitions will be compressed based on QUERY HIGH compression.

All multi column Indexes (primary as well as secondary) will be compressed using the default compression. HCC or OLTP compression is not applicable on the top of compressed Indexes.

Load data into the uncompressed table partitions using a conventional load and then when data is loaded use CTAS operation to load into a temporary heap table. Then truncate the original partition. Alter original partition into HCC compressed and then partition exchange this with the temporary heap table.

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5. cglib-2.2.jar
6. classycle.1.1.jar
7. commons-beanutils-core-1.8.1.jar
8. commons-cli-1.1.jar
9. commons-codec-1.4.jar
10. commons-collections-3.1.jar
11. commons-fileupload-1.2.1.jar
12. commons-httpclient-3.0.1.jar
13. commons-io-1.3.2.jar
14. commons-lang-2.2.jar
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16. log4j-1.2.15.jar
17. qdox.1.6.1.jar
18. serializer-2.7.1.jar
19. stax2.jar
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21. wstx-asl-3.2.1.jar
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