Oracle Data Integrator

Knowledge Modules Reference Guide

10g Release 3 (10.1.3)

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Oracle Data Integrator Knowledge Modules Reference Guide, 10g Release 3 (10.1.3)

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Introduction

This document lists the Knowledge Modules included with Oracle Data Integrator 10g Release 3 (10.1.3)

After importing a Knowledge Module into your project, please make sure to refer to the specific description for details of usage. Every Knowledge Module may contain restrictions and operating system / database specific commands. Please refer to the appropriate technology documentation set for further details.

Oracle Data Integrator includes Knowledge Modules that are not technology dependant. Knowledge Modules listed in sections: **Generic SQL and JMS** are designed to work on most databases and most JMS compliant middleware. However, we recommend using specific pre-built Knowledge Modules for one technology whenever the Knowledge Module exists for that technology.

Oracle Data Integrator uses **JDBC Connectivity** to access the different database. We recommend using Type 4 JDBC drivers whenever possible. JDBC drivers should be defined in the Java Class Path of each machine running the Oracle Data Integrator UIs or Agents. For your convenience, you can copy your drivers jar files into the `/drivers` sub-directory of your Oracle Data Integrator installation folder. Please refer to the documentation provided with your JDBC Driver for more information.

The preceding comment also applies to JMS specific clients and, in general, to any API required by a Knowledge Modules. All required Java Archive files (jar files) should be defined in the Java Class Path or alternatively copied into the `/drivers` directory.

Knowledge Modules

Several Knowledge Modules are provided to export data to a target file or to read data from a source file. These Knowledge Modules are described in other sections. They are listed here for reference only.

Reading from a File:

- LKM File to SQL
- LKM File to DB2 UDB (LOAD)
- LKM File to MSSQL (BULK)
- LKM File to Netezza (EXTERNAL TABLE)
- LKM File to Netezza (NZLOAD)
- LKM File to Oracle (EXTERNAL TABLE)
- LKM File to Oracle (SQLLDR)
- LKM File to SalesForce (Upsert)
- LKM File to SAS
- LKM File to Sybase IQ (LOAD TABLE)
- IKM File to Teradata (TTUs)
- LKM File to Teradata (TTUs)

Writing to a File:

- IKM SQL to File Append
- IKM Netezza To File (EXTERNAL TABLE)
- IKM SalesForce to File (with filter)
- IKM SalesForce to File (without filter)
- IKM Teradata to File (TTUs)

Other Knowledge Modules for Files:

Type	Knowledge Module	Description
Reverse-Engineer	RKM File (FROM EXCEL)	Retrieves file metadata from a Microsoft Excel spreadsheet. Consider using this KM if you plan to maintain the definition of your files structure in a separate Excel spreadsheet.
Reverse-Engineer	RKM Oracle Data Quality	Retrieve file metadata from Oracle Data Quality DDX files. The DDX files are generated by Oracle Data Quality.

Knowledge Modules

Knowledge Modules in this section apply to most popular SQL compliant databases, including Oracle, Microsoft SQL Server, Sybase ASE, IBM DB2, Teradata, PostgreSQL, MySQL, Derby etc. Additional Knowledge Modules are also provided for some of these particular databases to leverage the specific SQL and powerful loader utilities to maximize performance.

Type	Knowledge Module	Description
Check	CKM SQL	Checks data integrity against constraints defined on a Datastore. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this KM if you plan to check data integrity on a SQL compliant database. Use specific CKMs instead if available for your database.
Integrate	IKM SQL Control Append	Integrates data in any SQL compliant target table in replace/append mode. When flow data needs to be checked using a CKM, this IKM creates a temporary staging table before invoking the CKM. Consider using this IKM if you plan to load your SQL compliant target table in replace mode, with or without data integrity check. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM SQL Incremental Update	Integrates data in any SQL compliant target table in incremental update mode. This KM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Because not all databases support the same bulk update syntax, updates are done row by row. This KM is therefore not recommended for large volumes of data. Consider using this KM if you plan to load your SQL compliant target table to insert missing records and to update existing ones. Use specific incremental update IKMs whenever possible as they are more optimized for performance. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM SQL Incremental Update (row by row)	Integrates data in any AINSI-SQL92 compliant database target table in incremental update mode with row by row logging. This KM is similar to the IKM SQL Incremental Update, and indicates in addition the state of each processed row. A log file can be created to record

		the processing activities. The following options are used for the logging mechanism: • LOG_LEVEL: This option is used to set the granularity of the data logged. The following log levels can be set: o 0: nothing to log o 1: any JDBC action will be indicated such as 'select action', 'delete action', 'insert action'… o 2: in addition to level 1, all records that generate an error will be logged o 3: in addition to level 2, all processed records will be logged • LOG_FILE_NAME: Full path to the log file used. • MAX_ERRORS:Specify the maximum number of errors. The IKM process stops when the maximum number of errors specified in this option is reached. Important Note: This Knowledge Module is NOT RECOMMENDED when using LARGE VOLUMES. Other specific modules using Bulk utilities (SQL*LOADER, BULK INSERT...) or direct links (DBLINKS, Linked Servers...) are usually more efficient.
Integrate	IKM SQL to File Append	Integrates data in a target file from any SQL compliant staging area in replace mode. Consider using this IKM if you plan to transform and export data to a target file. If your source datastores are located on the same data server, we recommend using this data server as staging area to avoid extra loading phases (LKMs) To use this IKM, the staging area must be different from the target.
Integrate	IKM SQL to SQL Append	Integrates data in a target SQL compliant table from any SQL compliant staging area in replace mode. Consider using this IKM if you plan to use a staging area different from the target. If most of your source datastores are located on the same data server, we recommend using this data server as staging area to avoid extra loading phases (LKMs) To use this IKM, the staging area must be different from the target.
Load	LKM File to SQL	Loads data from an ASCII or EBCDIC File to any SQL compliant database used as a staging area. This LKM uses the Agent to read selected data from the source file and write the result in the staging temporary table created dynamically. Consider using this LKM if one of your source datastores is an ASCII or EBCDIC file. Use specific LKMs for your target staging area whenever possible as they are more optimized for performance. For example, if you are loading to an Oracle database, use "LKM File to Oracle (SQLLDR)" or "LKM File to Oracle (EXTERNAL TABLE)" instead.

Load	LKM SQL to SQL	Loads data from a SQL compliant database to a SQL compliant staging area. This LKM uses the Agent to read selected data from the source database and write the result into the staging temporary table created dynamically. Consider using this LKM if your source datastores are located on a SQL compliant database different from your staging area. Use specific LKMs for your source and target staging area whenever possible as they are more optimized for performance. For example, if you are loading from an Oracle source server to an Oracle staging area, use “LKM Oracle to Oracle (dblink)” instead.
Load	LKM SQL to SQL (JYTHON)	Loads data from a SQL compliant database to a SQL compliant staging area. This LKM uses Jython scripting to read selected data from the source database and write the result into the staging temporary table created dynamically. This LKM allows you to modify the default JDBC data types binding between the source database and the target staging area by editing the underlying Jython code provided. Consider using this LKM if your source datastores are located on a SQL compliant database different from your staging area and if you plan to specify your own data type binding method. Use specific LKMs for your source and target staging area whenever possible as they are more optimized for performance. For example, if you are loading from an Oracle source server to an Oracle staging area, use “LKM Oracle to Oracle (dblink)” instead.
Load	LKM SQL to SQL (row by row)	Loads data from any ISO-92 database to any ISO-92 compliant target database. This LKM uses a Jython script to read selected data from the database and write the result into the target temporary table, which is created dynamically. It loads data from a staging area to a target and indicates the state of each processed row. The following options are used for the logging mechanism: • LOG_LEVEL: This option is used to set the granularity of the data logged. The following log levels can be set: o 0: nothing to log o 1: any JDBC action will be indicated such as ‘select action’, ‘delete action’, ‘insert action’… o 2: in addition to level 1, all records that generate an error will be logged o 3: in addition to level 2, all processed records will be logged • LOG_FILE_NAME: Full path to the log file used. • MAX_ERRORS:Specify the maximum number of errors. The IKM process stops when the maximum number of errors specified in this option is reached. Important Note: This Knowledge Module is NOT RECOMMENDED when using LARGE VOLUMES. Other specific modules using Bulk utilities (SQL*LOADER, BULK INSERT...) or direct links (DBLINKS, Linked Servers...) are

		usually more efficient.
Reverse-Engineer	RKM SQL (JYTHON)	Retrieves JDBC metadata for tables, views, system tables and columns from any SQL compliant database. This RKM may be used to specify your own strategy to convert JDBC metadata into Oracle Data Integrator metadata. Consider using this RKM if you encounter problems with the standard JDBC reverse-engineering process due to some specificities of your JDBC driver. This RKM allows you to edit the underlying Jython code to make it match the specificities of your JDBC driver.
Web service	SKM SQL	Generates data access Web services for SQL compliant databases. Data access services include data manipulation operations such as adding, removing, updating or filtering records as well as changed data capture operations such as retrieving changed data. Data manipulation operations are subject to integrity check as defined by the constraints of your datastores. Consider using this SKM if you plan to generate and deploy data manipulation or changed data capture web services to your Service Oriented Architecture infrastructure. Use specific SKMs instead if available for your database

Hyperion Essbase

Knowledge Modules

Type	Knowledge Module	Description
Reverse-Engineer	RKM Hyperion Essbase	Reverse-engineers Essbase applications and creates data models to use as targets or sources in Oracle Data Integrator interfaces
Integrate	IKM SQL to Hyperion Essbase (DATA)	Integrates data into Essbase applications.
Integrate	IKM SQL to Hyperion Essbase (METADATA)	Integrates metadata into Essbase applications
Load	LKM Hyperion Essbase DATA to SQL	Loads data from an Essbase application to any SQL compliant database used as a staging area.
Load	LKM Hyperion Essbase METADATA to SQL	Loads metadata from an Essbase application to any SQL compliant database used as a staging area.

Platform Support

The Oracle Data Integrator Hyperion Essbase Knowledge Modeules are certified for Hyperion 11.1.1.

Specific Requirements

Please refer to the following documentation detailing the specific requirements for the Hyperion Essbase KMs:

- Oracle Data Integrator for Hyperion Essbase Readme
- Oracle Data Integrator for Hyperion Essbase Getting Started
- Oracle Data Integrator for Hyperion Essbase User's Guide

The sample files listed in the Oracle Data Integrator for Hyperion Essbase Getting Started Guide are available in the `/demo/hyperion/` sub-directory of the Oracle Data Integrator installation folder.

Hyperion Financial Management

Knowledge Modules

Type	Knowledge Module	Description
Reverse-Engineer	RKM Hyperion Financial Management	Reverse-engineers Financial Management applications and creates data models to use as targets or sources in Oracle Data Integrator interfaces.
Integrate	IKM SQL to Hyperion Financial Management Data	Integrates data into Financial Management applications.
Integrate	IKM SQL to Hyperion Financial Management Dimension	Integrates metadata into Financial Management applications.
Load	LKM Hyperion Financial Management Data to SQL	Loads data from a Financial Management application to any SQL compliant database used as a staging area. This Knowledge Module will not work if you change the column names of the HFMData data store reverse engineered by the RKM Hyperion Financial Management Knowledge Module.
Load	LKM Hyperion Financial Management Members To SQL	Loads member lists from a Financial Management application to any SQL compliant database used as a staging area.

Platform Support

The Oracle Data Integrator Hyperion Financial Management Knowledge Modeules are certified for Hyperion 11.1.1.

Specific Requirements

Please refer to the following documentation detailing the specific requirements for the Financial Management KMs:

- Oracle Data Integrator Adapter for Hyperion Financial Management Readme
- Oracle Data Integrator Adapter for Hyperion Financial Management Getting Started
- Oracle Data Integrator Adapter for Hyperion Financial Management User's Guide

The sample files listed in the Oracle Data Integrator Adapter for Hyperion Financial Management Getting Started Guide are available in the `/demo/hyperion/` sub-directory of the Oracle Data Integrator installation folder.

Hyperion Planning

Knowledge Modules

Type	Knowledge Module	Description
Reverse-Engineer	RKM Hyperion Planning	Reverse-engineers Planning applications and creates data models to use as targets in Oracle Data Integrator interfaces. Each dimension (standard dimension and attribute dimension) is reversed as a datastore with the same name as the dimension with appropriate columns. Creates a datastore named "UDA" for loading UDA's.
Integrate	IKM SQL to Hyperion Planning	Loads metadata and data into Planning applications.

Platform Support

The Oracle Data Integrator Hyperion Planning Knowledge Modeules are certified for Hyperion 11.1.1.

Specific Requirements

Please refer to the following documentation detailing the specific requirements for the Hyperion Planning KMs:

- Oracle Data Integrator Adapter for Hyperion Planning Readme
- Oracle Data Integrator Adapter for Hyperion Planning Getting Started
- Oracle Data Integrator Adapter for Hyperion Planning User's Guide

The sample files listed in the Oracle Data Integrator Adapter for Hyperion Planning Getting Started Guide are available in the `/demo/hyperion/` sub-directory of the Oracle Data Integrator installation folder.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Check	CKM HSQL	Checks data integrity against constraints defined on a Hypersonic SQL table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this CKM if you plan to check data integrity on a Hypersonic SQL database. This CKM is optimized for Hypersonic SQL.
Journalize	JKM HSQL Consistent	Creates the journalizing infrastructure for consistent journalizing on Hypersonic SQL tables using triggers. Enables consistent Changed Data Capture on Hypersonic SQL.
Journalize	JKM HSQL Simple	Creates the journalizing infrastructure for simple journalizing on Hypersonic SQL tables using triggers. Enables simple Changed Data Capture on Hypersonic SQL.
Web service	SKM HSQL	Generates data access Web services for Hypersonic SQL databases. Refer to “SKM SQL” in section “Generic SQL” for more details. This SKM is optimized for the Hypersonic SQL database

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM DB2 UDB Incremental Update	Integrates data in an IBM DB2 UDB target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your IBM DB2 UDB target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM DB2 UDB Slowly Changing Dimension	Integrates data in an IBM DB2 UDB target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your IBM DB2 UDB target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore.
Journalize	JKM DB2 UDB Consistent	Creates the journalizing infrastructure for consistent journalizing on IBM DB2 UDB tables using triggers. Enables consistent Changed Data Capture on IBM DB2 UDB.
Journalize	JKM DB2 UDB Simple	Creates the journalizing infrastructure for simple journalizing on IBM DB2 UDB tables using triggers. Enables simple Changed Data Capture on IBM DB2 UDB.

Load	LKM DB2 UDB to DB2 UDB (EXPORT_IMPORT)	Loads data from an IBM DB2 UDB source database to an IBM DB2 UDB staging area database using the native EXPORT / IMPORT commands. This module uses the EXPORT CLP command to extract data in a temporary file. Data is then loaded in the target staging DB2 UDB table using the IMPORT CLP command. This method if often more efficient than the standard “LKM SQL to SQL” when dealing with large volumes of data. Consider using this LKM if your source tables are located on a DB2 UDB database and your staging area is on a different DB2 UDB database.
Load	LKM File to DB2 UDB (LOAD)	Loads data from a File to a DB2 UDB staging area database using the native CLP LOAD Command. Depending on the file type (Fixed or Delimited) this LKM will generate the appropriate LOAD script in a temporary directory. This script is then executed by the CLP LOAD command and automatically deleted at the end of the execution. Because this method uses the native IBM DB2 loaders, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. Consider using this LKM if your source is a large flat file and your staging area is an IBM DB2 UDB database.
Load	LKM SQL to DB2 UDB	Loads data from any Generic SQL source database to an IBM DB2 UDB staging area. This LKM is similar to the standard “LKM SQL to SQL” described in section “Generic SQL” except that you can specify some additional specific IBM DB2 UDB parameters.
Load	LKM SQL to DB2 UDB (LOAD)	Loads data from any Generic SQL source database to an IBM DB2 UDB staging area using the CLP LOAD command. This LKM unloads the source data in a temporary file and calls the IBM DB2 native loader using the CLP LOAD command to populate the staging table. Because this method uses the native IBM DB2 loader, it is often more efficient than the “LKM SQL to SQL” or “LKM SQL to DB2 UDB” methods when dealing with large volumes of data. Consider using this LKM if your source data located on a generic database is large, and when your staging area is an IBM DB2 UDB database.
Web service	SKM IBM UDB	Generates data access Web services for IBM DB2 UDB databases. Refer to “SKM SQL” in section “Generic SQL” for more details. This SKM is optimized for the IBM DB2 UDB database.

Specific Requirements

Some of the Knowledge Modules for IBM DB2 UDB use operating system calls to invoke the IBM CLP command processor to perform efficient loads. The following restrictions apply when using such Knowledge Modules:

1. The IBM DB2 UDB Command Line Processor (CLP) as well as the DB2 UDB Connect Software must be installed on the machine running the Oracle Data Integrator Agent.
2. The server names defined in the Topology must match the IBM DB2 UDB connect strings used for these servers.

Refer to the IBM DB2 documentation for additional information on these topics.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM DB2 400 Incremental Update	Integrates data in an IBM DB2/400 target table in incremental update mode. This KM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based SQL processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your IBM DB2/400 target table to insert missing records and to update existing ones using SQL. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM DB2 400 Incremental Update (CPYF)	Integrates data in an IBM DB2/400 target table in incremental update mode. This IKM is similar to the “IKM DB2 400 Incremental Update” except that it uses the CPYF native OS/400 command to write to the target table, instead of set-based SQL operations. It can be more efficient in some particular cases. Consider using this IKM if you plan to load your IBM DB2/400 target table to insert missing records and to update existing ones using native OS/400 commands rather than set-based SQL.
Integrate	IKM DB2 400 Slowly Changing Dimension	Integrates data in an IBM DB2/400 target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your IBM DB2/400 target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target

		datastore.
Journalize	JKM DB2 400 Consistent	Creates the journalizing infrastructure for consistent journalizing on IBM DB2/400 tables using triggers. Enables consistent Changed Data Capture on IBM DB2/400.
Journalize	JKM DB2 400 Simple	Creates the journalizing infrastructure for consistent journalizing on IBM DB2/400 tables using triggers. Enables consistent Changed Data Capture on IBM DB2/400.
Load	LKM DB2 400 to DB2 400	Loads data from an IBM DB2/400 source database to an IBM DB2/400 staging area database using the native CRTDDMF and CPYF commands. This LKM uses CRTDDMF to create a DDM file on the target and transfers data from the source staging table to this DDM file using CPYF. This method if often more efficient than the standard “LKM SQL to SQL” when dealing with large volumes of data. Consider using this LKM if your source tables are located on a DB2/400 database and your staging area is on a different DB2/400 database.
Load	LKM SQL to DB2 400 (CPYFRMIMPF)	Loads data from any Generic SQL source database to an IBM DB2/400 staging area using the CPYFRMIMPF command. This LKM unloads the source data in a temporary file and calls the IBM DB2/400 native loader using the CPYFRMIMPF command to populate the staging table. Because this method uses the native IBM DB2/400 loader, it is often more efficient than the “LKM SQL to SQL” method when dealing with large volumes of data. Consider using this LKM if your source data located on a generic database is large, and when your staging area is an IBM DB2/400 database.
Reverse-Engineer	RKM DB2 400	Retrieves IBM DB2/400 specific metadata. This RKM can be used to extract metadata for physical files, database tables, database views and unique keys. It accesses the underlying DB2/400 catalog tables and can be used to retrieve the physical 10 digits resource names rather than the standard long SQL resource names. Consider using this RKM if your table names are longer than 10 digits and if you plan to use native commands on your OS/400.

Specific Requirements

Some of the Knowledge Modules for IBM DB2/400 use operating system calls to invoke the IBM iSeries commands to perform efficient loads. The following restrictions apply when using such Knowledge Modules:

1. OS/400 commands accept only 10 digits table names. Make sure to use the specific “RKM DB2/400” to retrieve the physical table names for your datastores rather than the SQL table names.
2. Oracle Data Integrator agent must be installed on the target iSeries machine. Refer to the installation guide for the appropriate procedure.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM Informix Incremental Update	Integrates data in an IBM Informix target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your IBM Informix target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Journalize	JKM Informix Consistent	Creates the journalizing infrastructure for consistent journalizing on IBM Informix tables using triggers. Enables consistent Changed Data Capture on IBM Informix.
Journalize	JKM Informix Simple	Creates the journalizing infrastructure for simple journalizing on IBM Informix tables using triggers. Enables simple Changed Data Capture on IBM Informix.
Load	LKM Informix to Informix (SAME SERVER)	Loads data from a source Informix database to a target Informix staging area located inside the same server. This LKM creates a view in the source database and a synonym in the staging area database. This method if often more efficient than the standard “LKM SQL to SQL” when dealing with large volumes of data. Consider using this LKM if your source tables are located on an IBM Informix database and your staging area is on an IBM Informix database located in the same Informix server.
Reverse-Engineer	RKM Informix	Retrieves IBM Informix specific metadata for tables, views, columns, primary keys and non unique indexes. This RKM accesses the underlying Informix catalog tables to retrieve metadata. Consider using this RKM if you plan to extract additional metadata from your Informix catalog when it is not provided by the default JDBC reverse-engineering process.

Reverse-Engineer	RKM Informix SE	Retrieves IBM Informix SE specific metadata for tables, views, columns, primary keys and non unique indexes. This RKM accesses the underlying Informix SE catalog tables to retrieve metadata. Consider using this RKM if you plan to extract additional metadata from your Informix SE catalog when it is not provided by the default JDBC reverse-engineering process.
Web service	SKM Informix	Generates data access Web services for IBM Informix databases. Refer to “SKM SQL” in section “Generic SQL” for more details. This SKM is optimized for the IBM Informix database.

JD Edwards EnterpriseOne

Introduction

JD Edwards (JDE) EnterpriseOne is an integrated applications suite of comprehensive ERP software that combines business value, standards-based technology, and deep industry experience into a business solution. This section provides an introduction and the methodology to work with the **JD Edwards EnterpriseOne** Knowledge Modules in Oracle Data Integrator.

The Knowledge Modules for JD Edwards EnterpriseOne are part of the Application Adapters for Data Integration for JD Edwards.

JDE EnterpriseOne Knowledge Modules

The **Oracle Data Integrator Knowledge Modules for JDE EnterpriseOne (JDE KMs)** provide connectivity and integration of the JDE EnterpriseOne platform with any database application through Oracle Data Integrator.

The JDE KMs use mature database-level integration methods for JDE EnterpriseOne, in order to:

- Reverse-Engineer JDE EnterpriseOne data structures
- Read data from JDE EnterpriseOne (Direct Database Integration)
- Write data through the Z-tables to an JDE Application (Interface Table Integration)

ODI provides two Knowledge Modules for handling JDE EnterpriseOne data:

Type	Knowledge Module	Description
Reverse-Engineer	RKM JDE Enterprise One Oracle	Provides support to create datastore definitions by retrieving the metadata of the applications' objects such as tables and interface tables from JDE EnterpriseOne installed on an Oracle database.
Integrate	IKM JDE Enterprise One Control Append (UBE)	Provides support to load data from any source to JDE EnterpriseOne. Integrates data in EnterpriseOne Z-table in control append mode. • Data can be controlled: invalid data is isolated in the Error Table and can be recycled • The KM performs integration into JDE enterprise One with a RunUBE batch command

Platform Support

The JDE KMs are certified on the following platforms and versions:

- JDE EnterpriseOne 8.12, installed on an Oracle Database

Installation and Configuration

There is no specific Oracle Data Integrator configuration for using the JDE KMs.

Working with Oracle Data Integrator JDE EnterpriseOne KMs

To use JDE EnterpriseOne with the Oracle Data Integrator JDE KMs, you must:

1. Define the Topology
2. Set up the Project
3. Reverse-Engineer JDE tables
4. Use JDE datastores as sources or target in an integration interface

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using Oracle Data Integrator JDE KMs, are the following:

1. Connect to your master repository using Topology Manager.
2. Create a data server using the Oracle Server technology. This data server should point to the Oracle database instance that stores the JDE data.
3. Create a physical schema under this data server. This schema points to the Oracle schema database that contains the JDE tables you want to reverse-engineer.
4. Create a logical schema for this physical schema in the appropriate context.

You can now perform a JDE Reverse-Engineering.

Note: The Oracle schema storing the JDE tables should never be defined as a work schema in the physical schema definition. Moreover, this schema or database must not be used as staging area for an interface.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project:

- IKM JDE Enterprise One Control Append (UBE)
- RKM JDE Enterprise One Oracle
- Import in addition the standard Oracle LKMs and CKMs to perform data extraction and data quality checks with an Oracle database. See the Oracle Database section of this guide for a list of available KMs.

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Reverse-Engineering JDE Tables

The **RKM JDE Enterprise One Oracle** is able to reverse-engineer JDE tables. This RKM retrieves metadata from JDE objects such as tables and interface tables.

To perform a JDE Reverse-Engineering:

1. Create a model based on the Oracle Technology, and on the logical schema created when configuring the JDE Connection.
2. In this Model, select the Reverse tab and:
    1. Select **Customized**
    2. Select the **RKM JDE Enterprise One Oracle** from the KM list.

3. Set the RKM options as follows:
    - JDE_CENTRAL_OBJECTS: Specify the Oracle Schema storing the JDE Central objects
    - JDE_DATA_DICTIONARY: Specify the Oracle Schema storing the JDE data dictionary
    - JDE_OBJECT_LIBRARIAN: Specify the Oracle schema storing the JDE Object librarian
    - JDE_CONTROL_TABLES: Specify the Control Tables schema

    Note: To find the schema required in the options **JDE_CENTRAL_OBJECTS**, **JDE_DATA_DICTIONARY**, **JDE_OBJECT_LIBRARIAN**, and **JDE_CONTROL_TABLES** you can either ask your application manager or query the table F98611(Data Source Master).

    - JDE_DATA_TABLES: Set this option to YES to reverse-engineer data tables
    - JDE_Z_TABLES: Set this option to YES to reverse-engineer interface tables (Z-tables)
    - JDE_MODULES: Indicate the JDE System Short Name, for example 00 for Foundation Environment, 01 for Address Book, and 02 for Electronic Mail.
    - JDE_LANGUAGE: Indicate the language used for retrieving object descriptions, for example E for English, F for French, and S for Spanish.
4. Specify the reverse mask in the **Mask** field in order to select the tables to reverse. The **Mask** field, in the Reverse tab, filters reverse-engineered objects based on their name. The **Mask** field must not be empty and must contain at least the percentage symbol (%).
5. Click **Apply**, and then click **Reverse**.
6. You can follow the reverse-engineering process in the Execution Log.

Note: The reverse-engineering process may take several minutes. Please wait until the reversed datastores appear under the reversed module in the tree of the execution Log.

The reverse-engineering process returns the datastores grouped per module. You can then use these datastores as a source or a target of your interfaces.

Using JDE as a Source in an Integration Interface

After performing a reverse-engineering using the **RKM JDE Enterprise One Oracle**, you can use JDE data tables as a source of an interface to extract data from the JDE application and integrate them into another system (Data warehouse, other database...). Using JDE as a source in these conditions is the same as using Oracle database as a source in an interface. The standard Oracle KMs can be used for this purpose.

Using JDE Z-Tables as a Target in an Integration Interface

After performing a reverse-engineering using the **RKM JDE Enterprise One Oracle**, you can use JDE Z-tables as a target of an interface to load data from any system to the JDE application with the **IKM JDE Enterprise One Control Append (UBE).**

Integrating Data into JDE with the IKM JDE Enterprise One Control Append (UBE)

The integration of data into JDE Enterprise One is performed in two steps: during the first step a set of Z-tables (staging table) is loaded, and during the second step the RunUBE command is launched to integrate the data from these Z-tables into JDE Enterprise One.

Oracle Data Integrator can automatically call the RunUBE command to write to JDE. The RunUBE call should be activated in the IKM only after loading the appropriate Z-table for populating JDE. The capability to load the Z-Tables, as well as the call of the RunUBE command is provided by the **IKM JDE Enterprise One Control Append (UBE).**

To integrate data into JDE with Oracle Data Integrator:

1. Create an integration interface with Z-tables as target datastores.
2. Create joins, filters, and mappings as usual.
3. In the Flow tab select the **IKM JDE Enterprise One Control Append (UBE)**.
4. Specify the KM options as follows to run the RunUBE command:
    1. Set the JDE_RUNUBE option to Yes.
    2. Specify the JDE_DIRECTORY in which the RunUBE command is executed.
    3. If you want to create a password file, set the password related options as follows:
        - JDE_CREATE_PWD_FILE: Set to Yes.

          Note: To enhance RunUBE security in a Unix or iSeries environment, when the RunUBE command is submitted, the system reads the text file specified in the JDE_PWD_FILE option and uses the JD Edwards EnterpriseOne user ID and password as indicated in the text file.

        - JDE_PWD_FILE: Specify the absolute path of the password security file. This file contains the user id and password specified in the JDE_USER_ID and JDE_PWD options.
        - JDE_DELETE_PWD_FILE: Enter `D` to delete the password file. Enter `F` to keep the password file.

          Note: Even if the password file is removed after the execution of the command, the file should be kept in a secure location on the file system

        - JDE_USER_ID: An JDE EnterpriseOne user ID. The user must have permissions to run the report.
        - JDE_PWD: The EnterpriseOne password that corresponds to the user ID.
5. You also need to specify the following parameters for the RunUBE command:
    - JDE_ENVIRONMENT: The JDE EnterpriseOne environment
    - JDE_ROLE: The JDE EnterpriseOne role
    - JDE_REPORT: The system name of the report that you want to process, such as the APS Outbound Processor (`R34A400`) and APS Inbound Processor (`R34A410`) for flat files, and the APS SCBM 2.0 Outbound Processor (`R34A700`) and APS Master Inbound Processor (`R34A820`) for XML files.
    - JDE_VERSION: The name of the version of the report that you want to process, such as `XJDE0001`. You must enter a version name; you cannot submit the template of a report.
    - JDE_JOB_QUEUE: The name of the job queue to which the system should route the batch job, such as `QBATCH`.
    - JDE_PROCESSING_MODE: The processing mode: Enter `B` to use batch processing. In this case, the system uses the Job Control Status Master table (F986110) to assign the report a place in the queue. Enter `I` to use the interactive mode. This mode runs the report immediately outside of the JDE EnterpriseOne queuing mechanism.
    - JDE_HOLD_CODE: The hold code: Enter `P` to send the output to a printer immediately after the job completes. Enter `H` to hold the processed file without printing. You can print the job later

using the *Work With Servers program* (P986116), which is accessible from the System Administration Tools menu (GH9011).

- JDE_SAVE_CODE: The save code: Enter S to save the file after processing is complete. The delete option (D) is reserved for future use. Currently, the delete option is disabled.

Limitations of the IKM JDE Enterprise One Control Append (UBE)

- The TRUNCATE option cannot work if the target table is referenced by another table (foreign key).
- When using the RECYCLE_ERRORS option, an Update Key must be set for your interface.
- When using this module with a journalized source table, data is automatically filtered to not include source deletions.
- The FLOW_CONTROL and STATIC_CONTROL options call the Check Knowledge Module to isolate invalid data (if no CKM is set, an error occurs). Both options must be set to No when an integration interface populates a TEMPORARY target datastore.
- The RunUBE command must be executed on the JDE server.
- The Oracle Data Integrator run-time agent must be installed on this server.
- Besides the information whether the RunUBE command has been started or not, the RunUBE command does not give any further details about the execution of the program. To know more about the execution of the program you can either view the log file created by the JDE server or connect to your JDE application and look for the application *View Job Status* (Application = P986110, Form = W986116A).

Knowledge Module Options Reference

RKM JDE Enterprise One Oracle

Option	Values	Mandatory	Description
JDE_CENTRAL_OBJECTS	PD812	Yes	Oracle Schema storing the JDE Central objects
JDE_DATA_DICTIONARY	DD812	Yes	Oracle Schema storing the JDE data dictionary
JDE_OBJECT_LIBRARIAN	OL812	Yes	Oracle schema storing the JDE Object librarian
JDE_CONTROL_TABLES	PRODCTL	Yes	Control Tables schema
JDE_DATA_TABLES	Yes|No	Yes	Flag to reverse data tables. If this option is set to Yes, data tables are reversed
JDE_Z_TABLES	Yes|No	Yes	Flag to reverse interface tables. If this option is set to Yes, interface tables (Z-tables) are reversed.
JDE_MODULES	01	Yes	Specify the JDE System Short Name of the JDE module based on the following mappings :

			<table><tr><th>Short Name</th><th>Full Name</th></tr><tr><td>00</td><td>Foundation Environment</td></tr><tr><td>01</td><td>Adress Book</td></tr><tr><td>02</td><td>Electronic Mail</td></tr><tr><td>03</td><td>Accounts Receivable</td></tr><tr><td>etc</td><td>…</td></tr></table> Specify the percent sign (%) to reverse all JDE modules.You can also specify a list of modules. These modules must be between quotes and separated by commas, for example: '01','02','03'
JDE_LANGUAGE	E|F|S	Yes	Language of the object descriptions and comments. Supported languages are for example : <table><tr><td>E</td><td>English</td></tr><tr><td>F</td><td>French</td></tr><tr><td>S</td><td>Spanish</td></tr></table>

IKM JDE Enterprise One Control Append (UBE)

Option	Values	Mandatory	Description
INSERT	Yes|No	Yes	Automatically attempts to insert data into the Target Datastore of the Interface
COMMIT	Yes|No	Yes	Post Integration Commit Commit all data inserted in the target datastore.
FLOW_CONTROL	Yes|No	Yes	Activate Flow control Set this option to Yes to perform flow control.
RECYCLE_ERRORS	Yes|No	Yes	Recycle previous errors Set this option to Yes to recycle data rejected from a previous control.
STATIC_CONTROL	Yes|No	Yes	Post Integration Control Set this option to Yes to control the target table after having inserted or updated target data.
TRUNCATE	Yes|No	Yes	Truncate the target datastore Set thi soption to Yes to truncate the target

			datastore.
DELETE_ALL	Yes|No	Yes	Set this option to YES to delete all the rows of the target datastore.
CREATE_TARG_TABLE	Yes|No	Yes	Set this option to Yes to create the target table
ODI_ERR_FILE	c:\temp\err.txt	No	Entire path of the error file, generated by ODI
JDE_RUNUBE	Yes|No	Yes	Set to YES to run the RunUBE command.
JDE_DIRECTORY	C:\JDEdwards\DDP\812\system\bin32	Yes, if JDE_RUNUBE is set to YEs	The directory in which the command RunUBE is executed.
JDE_CREATE_PWD_FILE	Yes|No	Yes, if JDE_RUNUBE is set to Yes	Set to Yes if you want ODI to generate the password file.
JDE_PWD_FILE	C:\JDEdwards\DDP\812\pwd.txt	Yes, if JDE_CREATE_PWD_FILE is set to Yes	Security file for connection Entire path of the password security file containing the user id and password
JDE_DELETE_PWD_FILE	d|D|f|F	Yes, if JDE_RUNUBE is set to Yes	Delete or not the password file d|D indicates the automatic removal of the password file f|F do not remove the password File
JDE_USER_ID	JDE	Yes, if JDE_CREATE_PWD_FILE is set to Yes	JD Edwards EnterpriseOne user ID. You must have permissions to run the report.
JDE_PWD	password	Yes, if JDE_CREATE_PWD_FILE is set to Yes	The JD Edwards EnterpriseOne password corresponding to the JD Edwards EnterpriseOne user ID
JDE_ENVIRONMENT	PD812	Yes, if JDE_RUNUBE is set to Yes	The JD Edwards EnterpriseOne environment.
JDE_ROLE	*ALL	Yes, if JDE_RUNUBE is set to Yes	The JD Edwards EnterpriseOne role
JDE_REPORT	R014021	Yes, if JDE_RUNUBE is set to Yes	The system name of the JDE E1 reports to be processed
JDE_VERSION	XJDE0001	Yes, if JDE_RUNUBE is set to Yes	The name of the JDE E1 batch version of the report to be processed, such as XJDE0001. You must enter a version name; you cannot submit a report template.

JDE_JOB_QUEUE	QBATCH	Yes, if JDE_RUNUBE is set to Yes	The name of the JDE E1 job queue to which the system should route the batch job, such as QBATCH
JDE_PROCESSING_MODE	B|I	Yes, if JDE_RUNUBE is set to Yes	The JDE E1 Interactive or batch processing mode. Enter B to use batch processing. In this case, the system assigns the report a place in the queue. Enter I for interactive mode, which runs the report immediately outside of the JD Edwards EnterpriseOne queuing mechanism.
JDE_HOLD_CODE	H|P	Yes, if JDE_RUNUBE is set to Yes	JDE E1 execute mode The hold code. Enter P to send the output to a printer immediately after the job completes. Enter H to hold the processed file without printing. You can print the job later using *the Work With Servers program* (P986116), which is accessible from the System Administration Tools menu (GH9011).
JDE_SAVE_CODE	D|S	Yes, if JDE_RUNUBE is set to Yes	JDE E1 Save or delete option The save code. Enter S to save the file after processing is complete. Enter D to delete the file.

Knowledge Modules

Knowledge Modules in this section apply to most popular JMS compliant middleware, including Oracle JMS, Sonic MQ, IBM Websphere MQ and others. Most of these Knowledge Modules include transaction handling to ensure message delivery. All of them use the Oracle Data Integrator JDBC Driver for JMS. This JDBC driver includes a simplified SQL syntax to query message queues and topics. Therefore, a SQL select statement is translated by the driver into getting a set of JMS messages, and a SQL insert statement is translated into putting a set of JMS messages.

Type	Knowledge Module	Description
Integrate	IKM SQL to JMS Append	Integrates data into a JMS compliant message queue or topic in text or binary format from any SQL compliant staging area. Consider using this IKM if you plan to transform and export data to a target JMS queue or topic. If most of your source datastores are located on the same data server, we recommend using this data server as staging area to avoid extra loading phases (LKMs) To use this IKM, the staging area must be different from the target.
Integrate	IKM SQL to JMS XML Append	Integrated data into a JMS compliant message queue or topic in XML format from any SQL compliant staging area. Consider using this IKM if you plan to transform and export data to a target JMS queue or topic in XML format. If most of your source datastores are located on the same data server, we recommend using this data server as staging area to avoid extra loading phases (LKMs) To use this IKM, the staging area must be different from the target.
Load	LKM JMS to SQL	Loads data from a text or binary JMS compliant message queue or topic to any SQL compliant database used as a staging area. This LKM uses the Agent to read selected messages from the source queue/topic and write the result in the staging temporary table created dynamically. To ensure message delivery, the message consumer (or subscriber) does not commit the read until the data is actually integrated in the target by the IKM. Consider using this LKM if one of your source datastores is a text or binary JMS message.
Load	LKM JMS XML to SQL	Loads data from a JMS compliant message queue or topic in XML to any SQL compliant database used as a staging area. This LKM uses the Agent to read selected messages

		from the source queue/topic and write the result in the staging temporary table created dynamically. To ensure message delivery, the message consumer (or subscriber) does not commit the read until the data is actually integrated in the target by the IKM. Consider using this LKM if one of your source datastores is an XML JMS message.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM Access Incremental Update	Integrates data in a Microsoft Access target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Consider using this KM if you plan to load your Micrsoft Access target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM MSSQL Incremental Update	Integrates data in a Microsoft SQL Server target table in incremental update mode. This KM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Microsoft SQL Server target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM MSSQL Slowly Changing Dimension	Integrates data in a Microsoft SQL Server target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Microsoft SQL Server target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore.
Journalize	JKM MSSQL Consistent	Creates the journalizing infrastructure for consistent journalizing on Microsoft SQL Server tables using triggers. Enables consistent Changed Data Capture on Microsoft SQL Server.
Journalize	JKM MSSQL Simple	Creates the journalizing infrastructure for simple journalizing on Microsoft SQL Server tables using triggers. Enables simple Changed Data Capture on Microsoft SQL Server.

Load	LKM File to MSSQL (BULK)	Loads data from a File to a Microsoft SQL Server staging area database using the BULK INSERT SQL command. Because this method uses the native BULK INSERT command, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. However, the loaded file must be accessible from the Microsoft SQL Server machine. Consider using this LKM if your source is a large flat file and your staging area is a Microsoft SQL Server database.
Load	LKM MSSQL to MSSQL (BCP)	Loads data from a Microsoft SQL Server source database to a Microsoft SQL Server staging area database using the native BCP out/BCP in commands. This module uses the native BCP (Bulk Copy Program) command to extract data in a temporary file. Data is then loaded in the target staging Microsoft SQL Server table using the native BCP command again. This method if often more efficient than the standard “LKM SQL to SQL” when dealing with large volumes of data. Consider using this LKM if your source tables are located on a Microsoft SQL Server instance and your staging area is on a different Microsoft SQL Server instance.
Load	LKM MSSQL to MSSQL (LINKED SERVERS)	Loads data from a Microsoft SQL Server source database to a Microsoft SQL Server staging area database using the native linked servers feature. This module uses the native linked servers feature to access the source data from the target Microsoft SQL server staging area. It doesn't create a staging file in the middle as with the BCP method. It relies on the MSDTC mechanism. It can be appropriate for large volumes of data. Consider using this LKM if your source tables are located on a Microsoft SQL Server instance and your staging area is on a different Microsoft SQL Server instance.
Load	LKM MSSQL to Oracle (BCP/SQLLDR)	Loads data from a Microsoft SQL Server source database to an Oracle staging area using the MS SQL Server BCP tool and the native SQL*LOADER command line utility. This LKM uses the MS SQL Server BCP tool to extract a user-defined data set to a flat file. The data from this flat file is then loaded with Oracle SQL*Loader (SQLLDR) into a temporary table (C$) within the stating area of target Oracle data server. Other Oracle IKMs can then be used to finalize the loading of data into target data store.
Load	LKM SQL to MSSQL	Loads data from any Generic SQL source database to a Microsoft SQL Server staging area. This LKM is similar to the standard “LKM SQL to SQL” described in section “Generic SQL” except that you can specify some additional specific Microsoft SQL Server parameters.

Load	LKM SQL to MSSQL (BULK)	Loads data from any Generic SQL source database to a Microsoft SQL Server staging area database using the native BULK INSERT SQL command. This LKM unloads the source data in a temporary file and calls the Microsoft SQL Server BULK INSERT SQL command to populate the staging table. Because this method uses the native BULK INSERT, it is often more efficient than the “LKM SQL to SQL” or “LKM SQL to MSSQL” methods when dealing with large volumes of data. Consider using this LKM if your source data located on a generic database is large, and when your staging area is a Microsoft SQL Server database.
Reverse-Engineer	RKM MSSQL	Retrieves metadata for MSSQL objects: tables, views and synonyms, as well as columns and constraints. This RKM reverse-engineers columns that have a user defined data type and translates the user defined data type to the native data type.

Specific Requirements

Some of the Knowledge Modules for Microsoft SQL Server use specific features of this database. The following restrictions apply when using such Knowledge Modules. Refer to the Microsoft SQL Server documentation for additional information on these topics.

Using the BULK INSERT command

1. The file to be loaded by the BULK INSERT command needs to be accessible from the Microsoft SQL Server instance machine. It could be located on the file system of the server or reachable from a UNC (Unique Naming Convention) path.
2. UNC file paths are supported but not recommended as they may decrease performance.
3. For performance reasons, it is often recommended to install Oracle Data Integrator Agent on the target server machine.

Using the BCP command

1. The BCP utility as well as the Microsoft SQL Server Client Network Utility must be installed on the machine running the Oracle Data Integrator Agent.
2. The server names defined in the Topology must match the Microsoft SQL Server Client connect strings used for these servers.
3. White spaces in server names defined in the Client Utility are not supported.
4. UNC file paths are supported but not recommended as they may decrease performance.
5. The target staging area database must have option "select into/bulk copy"
6. Execution can remain pending if the file generated by the BCP program is empty.
7. For performance reasons, it is often recommended to install Oracle Data Integrator Agent on the target server machine.

Using Linked Servers

1. The user defined in the Topology to connect to the Microsoft SQL Server instances must have the following privileges:
    - It must be the 'db_owner' of the staging area databases
    - It must have 'db_ddladmin' role
    - For automatic link server creation, it must have 'sysdamin' privileges
2. The MSDTC Service must be started on both SQL Server instances (source and target). The following hints may help you configure this service:
    - the 'Log On As' account for the MSDTC Service is a Network Service account (and not the 'LocalSystem' account)
    - MSDTC should be enabled for network transactions
    - Windows Firewall should be configured to allow the MSDTC service on the network. By default, the Windows Firewall blocks the MSDTC program.
    - The Microsoft SQL Server must be started after MSDTC has completed its startup
    - The links below can help you further configure you MSDTC Service: http://support.microsoft.com/?kbid=816701 and http://support.microsoft.com/?kbid=839279

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Check	CKM Netezza	Checks data integrity against constraints defined on a Netezza table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this KM if you plan to check data integrity on a Netezza database. This CKM is optimized for Netezza.
Integrate	IKM Netezza Control Append	Integrates data in a Netezza target table in replace/append mode. When flow data needs to be checked using a CKM, this IKM creates a temporary staging table before invoking the CKM. Consider using this IKM if you plan to load your Netezza target table in replace mode, with or without data integrity check. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Netezza Incremental Update	Integrates data in a Netezza target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Netezza target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Netezza To File (EXTERNAL TABLE)	Integrates data in a target file from a Netezza staging area in replace mode. This IKM requires the staging area to be on Netezza It uses the native EXTERNAL TABLE feature of Netezza. Consider using this IKM if you plan to transform and export data to a target file from your Netezza server. To use this IKM, the staging area must be different from the

		target. It should be set to a Netezza location.
Load	LKM File to Netezza (EXTERNAL TABLE)	Loads data from a File to a Netezza Server staging area database using the EXTERNAL TABLE feature (dataobject). Because this method uses the native EXTERNAL TABLE command, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. However, the loaded file must be accessible from the Netezza server machine. Consider using this LKM if your source is a large flat file and your staging area is a Netezza server.
Load	LKM File to Netezza (NZLOAD)	Loads data from a File to a Netezza Server staging area database using the native NZLoad utility. The nzload commmand is a wrapper to the nzsql CREATE EXTERNAL TABLE/INSERT INTO commands. It allows you to load data from the local host or a remote client. Consider using this LKM if you want to manipulate the data prior to loading it.
Reverse-Engineer	RKM Netezza (JYTHON)	Retrieves JDBC metadata from a Netezza database. This RKM may be used to specify your own strategy to convert Netezza JDBC metadata into Oracle Data Integrator metadata. Consider using this RKM if you encounter problems with the standard JDBC reverse-engineering process due to some specificities of the Netezza JDBC driver.

Oracle Changed Data Capture Adapters

Introduction

This section provides an introduction and the methodology to work with the **Oracle Changed Data Capture Adapters version 10.1.3.4** and above, as well as with **Attunity Stream** in order to integrate changes captured on legacy sources using Oracle Data Integrator.

Overview

Oracle Changed Data Capture Adapters offer log-based change data capture (CDC) for enterprise data sources such as CICS, VSAM, Tuxedo, IMS DB, and IMS TM. Captured changes are stored in a storage called *Staging Area* (which is different from the Oracle Data Integrator interfaces' staging areas).

Attunity Stream is part of the **Attunity Integration Suite** (AIS) and provides the same features as the Oracle Changed Data Capture Adapters. In this section, we will refer to both products as **Attunity Stream**.

The Attunity Stream *Staging Area* contains the *Change Tables* used by Attunity Stream to store changes captured from the sources. It maintains the last position read by Oracle Data Integrator (This is the *Attunity Stream Context*, which is different from the Oracle Data Integrator Context concept) and starts at this point the next time a request from Oracle Data Integrator is received. The *Change Tables* are accessed through *Attunity Stream Datasources*.

The Attunity Stream concepts are mapped in Oracle Data Integrator as follows:

- One *Workspace* within an Attunity Agent (or Daemon) listening on a port corresponds to one ODI Data Server.
- Within this Daemon, each *Datasource* (or Datasource/Owner pair) corresponds to one ODI Physical Schema.
- In each datasource, the *Change Tables* appear as ODI Datastores in an ODI model based on the Attunity technology.

Oracle CDC Knowledge Modules

The Oracle Data Integrator CDC Knowledge Module provides integration from Attunity Stream Staging Areas via a JDBC interface. It is able to:

- Read Attunity Stream data from Attunity Stream Data Sources.
- Load this Attunity Stream data into an Oracle Data Integrator staging area.
- Handle the Attunity Stream Context to ensure consistent consumption of the changes read.

Using the data provided in the Attunity staging area, the Oracle CDC KM cleans the working environment (dropping temporary tables), determines and saves Attunity Stream Context information, loads the journalized data into the collect table and purges the loaded data from the journal.

ODI provides one Knowledge Module (KM) for handling Attunity Stream data:

Type	Knowledge Module	Description
Load	LKM Attunity to SQL	Loads Attunity Stream data to any SQL compliant database used as a staging area.

Note: Although Attunity Stream is used to capture changes in source systems, it is used as a regular JDBC source (only an LKM is used). The Oracle Data Integrator journalizing framework (JKM) is not used for this technology.

Platform Support

The Oracle Data Integrator CDC knowledge module is certified on the following platforms and versions:

- Oracle Change Data Capture Adapters version 10.1.3.4 and higher.
- Attunity Stream version 5.0.1 and higher.

Installation and Configuration

In order to use the Attunity Stream technology, you must first install the drivers for Attunity Stream/Oracle Changed Data Capture Adapaters in the `oracledi/drivers/` directory of your Oracle Data Integrator installation and restart ODI. The driver files include the following: `Navutil.class`, `nvjdbc2.jar`, `nvapispy2.jar`, `nvlog2.jar`.

For more information on installing Attunity Stream/Oracle Changed Data Capture Adapters, please refer to the *Oracle® Application Server - Changed Data Capture Adapter Installation Guide*.

Working with the Oracle CDC KM

The Oracle Data Integrator CDC KM enables read access to Attunity Stream captured changes.

To use Attunity Stream data in your Oracle Data Integrator integration projects, you must:

1. Define the Topology.
2. Create an Attunity Stream model
3. Set up the project
4. Design an Interface using the Oracle Data Integrator CDC KM.

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using the Attunity Stream KM, are the following:

1. Connect to your master repository using Topology Manager.
2. If the Attunity technology is not in Topology Manager, import the Attunity technology using Synonym Insert-Update mode.
3. Create a data server using the Attunity technology. This data server represents the server and workspace storing the Attunity Stream datasources. Set the parameters for this data server as follows:
    - **JDBC Driver**: `com.attunity.jdbc.NvDriver`
    - **JDBC URL**: `jdbc:attconnect://<host_name>:<port>/<workspace>[;AddDefaultSchema=1][;<parameter>=<value>]`

      The details of the JDBC URL are shown in the following table:

`<host_name>`	Name of the machine running the Attunity daemon
`<port>`	Port that the daemon listens to

<workspace>	Daemon's workspace (default is "Navigator")
AddDefaultSchema=1	This parameter specifies that a schema shows a default owner name ("public") if the data source does not natively support owners. It may be needed in some cases as Oracle Data Integrator makes use of the owner value.
<parameter>=<value>	Any parameter available for the JDBC driver. Note that it is not needed to specify the datasource using the **DefTdpName** driver parameter, as Oracle Data Integrator accesses the change tables using the full qualified syntax: DATASOURCE:OWNER.TABLE_NAME.

For more information on the JDBC URL connection details, refer to the Attunity Stream documentation.

- **JDBC User**: User profile to connect the workspace. If you are using anonymous access or specifying the user and password on the URL, leave this field and the JDBC Password field empty.
- **JDBC Password**: Master password for the user profile.

4. Create a physical schema under this data server corresponding to the Attunity Stream datasource from which you want to read the changed data. While defining the physical schema, the list of datasources and owners available for your workspace is displayed ("public" if none exist), provided that the data server is correctly configured.
5. Create a logical schema for this physical schema in the appropriate context.

Creating and Reverse-Engineering an Attunity Stream Model

To create an Attunity Stream model, use the ODI standard procedure for model creation. Standard reverse-engineering returns the change tables stored in the datasource as datastores. The change tables contain some CDC header columns in addition to the data columns used for integration. These columns include *timestamps, table_name, operation, transactionID, context*, etc. Refer to the Attunity Stream documentation for more information on the header columns content.

Setting up the Project

Import the **LKM Attunity to SQL** into your ODI project, if it is not already in your project. For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Designing an Interface Using the LKM Attunity to SQL

To create an integration interface, which loads Attunity Stream data into your Oracle Data Integrator integration project, run the following steps:

1. Create an integration interface with Attunity Stream source datastores and SQL compliant target datastores.
2. Create joins, filters and mappings as usual. Note that joins between change tables are not allowed on the source. They should be performed on the interface's staging area.
3. In the Flow tab of the interface, select the source set containing the source change table(s) and select the **LKM Attunity to SQL**.
4. Set the KM options as follows:
   - DELETE_TEMPORARY_OBJECTS - Set this option to No, if you wish to retain temporary objects (files and scripts) after integration.

- PK_LIST – Specify the list of source columns that holds the primary key of the journalized table. Use SQL syntax and separate with a comma (,) each column name without prefixing it by the table alias, for example `ORDER_ID, CUSTOMER_ID`

5. Click **OK** to save and close the interface.

Note: When running an interface using this LKM, the changes are consumed from the change table. This KM does not support reading twice the same change.

Knowledge Module Options Reference

LKM Attunity to SQL

Option	Values	Mandatory	Description
DELETE_TEMPORARY_OBJECTS	`Yes|No`	Yes	This option allows specifying if the temporary objects are deleted after processing. Useful for debugging.
PK_LIST	`String`	Yes	This option contains the list of columns used as Primary Key.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Check	CKM Oracle	Checks data integrity against constraints defined on an Oracle table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this CKM if you plan to check data integrity on an Oracle database. This CKM is optimized for Oracle.
Integrate	IKM Oracle Incremental Update	Integrates data in an Oracle target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Oracle target table to insert missing records and to update existing ones. If you plan to use this IKM with very large tables, you should consider enhancing this IKM by removing the MINUS set-based operator. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Oracle Spatial Incremental Update	Integrates data into an Oracle (9i or above) target table in incremental update mode using the MERGE dml statement. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inexistent rows are inserted; already existing rows are updated. Data can be controlled. Invalid data is isolated in the Error Table and can be recycled. When using this module with a journalized source table, it is possible to synchronize deletions. This module allows to handle SDO_GEOMETRY datatype which must be declared in the Topology.

		Restrictions: When working with journalized data, if the "Synchronize deletions from journal" is executed, the deleted rows on the target are committed. Compatible only with Oracle 9i database and above. Comparison of data is made using the Update Key defined in the interface. It has to be set. The TRUNCATE option cannot work if the target table is referenced by another table (foreign key). The FLOW_CONTROL and STATIC_CONTROL options call the Check Knowledge Module to isolate invalid data (if no CKM is set, an error occurs). Both options must be set to NO in the case when an Integration Interface populates a TEMPORARY target datastore. Deletes are commited regardless of the COMMIT option. The option ANALYZE_TARGET will evaluate correct statictics only if COMMIT is set to Yes. Otherwise, the IKM will gather statistics based upon the old data. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Oracle Incremental Update (MERGE)	Integrates data in an Oracle target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then uses the Oracle MERGE native SQL command to compares its content to the target table to load the records accordingly. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done by the bulk set-based MERGE operator to maximize performance. Therefore, this IKM is optimized for very large volumes of data. Consider using this IKM if you plan to load your Oracle target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Oracle Incremental Update (PL SQL)	Integrates data in an Oracle target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in row-by-row PL/SQL processing. Therefore, this IKM is not recommended for large volumes of data. Consider using this IKM if you plan to load your Oracle target table to insert missing records and to update existing ones and if your records contain long or binary long object (BLOB) data types.

		To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Oracle Slowly Changing Dimension	Integrates data in an Oracle target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Oracle target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore.
Journalize	JKM Oracle 10g Consistent (LOGMINER)	Creates the journalizing infrastructure for consistent journalizing on Oracle 10g tables. Changed data is captured by the Oracle 10g Log Miner specific utility. Enables consistent Changed Data Capture on Oracle.
Journalize	JKM Oracle 11g Consistent (LOGMINER)	Creates the journalizing infrastructure for consistent journalizing on Oracle 11g tables. Changed data is captured by the Oracle 11g Log Miner specific utility. Enables consistent Changed Data Capture on Oracle.
Journalize	JKM Oracle 9i Consistent (LOGMINER)	Creates the journalizing infrastructure for consistent journalizing on Oracle 9i tables. Changed data is captured by the Oracle 9i Log Miner specific utility. Enables consistent Changed Data Capture on Oracle
Journalize	JKM Oracle Consistent	Creates the journalizing infrastructure for consistent journalizing on Oracle tables using triggers. Enables consistent Changed Data Capture on Oracle.
Journalize	JKM Oracle Simple	Creates the journalizing infrastructure for simple journalizing on Oracle tables using triggers. Enables simple Changed Data Capture on Oracle.
Load	LKM File to Oracle (EXTERNAL TABLE)	Loads data from a File to an Oracle staging area using the EXTERNAL TABLE SQL Command. Because this method uses the native EXTERNAL TABLE command, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. However, the loaded file must be accessible from the Oracle server machine. Note that the data of the source file is not duplicated in the Oracle staging area table. This table acts only as a "synonym" of the file. This may sometimes lead to

		performance issues if the same file is joined with other large tables in your Interface. For optimization purpose, you can enhance this LKM by adding an extra step that copies the file content to an actual physical table in the Oracle staging area. Consider using this LKM if your source is a large flat file and your staging area is an Oracle database.
Load	LKM File to Oracle (SQLLDR)	Loads data from a File to an Oracle staging area using the native SQL*LOADER command line utility. Depending on the file type (Fixed or Delimited) this LKM will generate the appropriate control script (CTL) in a temporary directory. This script is then executed by the SQLLDR operating system command and automatically deleted at the end of the execution. Because this method uses the native Oracle loader, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. Consider using this LKM if your source is a large flat file and your staging area is an Oracle database.
Load	LKM Oracle to Oracle (DBLINK)	Loads data from an Oracle source database to an Oracle staging area database using the native database links feature. This module uses the native Oracle database links to access the source data from the target Oracle staging area. To make sure the source Oracle server properly executes all source joins and expressions, a view is created on the source in the source staging schema. The source data is not duplicated on the target staging area. It is simply referenced through an Oracle synonym. This LKM is appropriate for large volumes of data. For optimization purpose, you can enhance it by adding an extra step that copies the remote synonym's content to an actual physical table in the Oracle staging area. Consider using this LKM if your source tables are located on an Oracle database and your staging area is on a different Oracle database.
Load	LKM SQL to Oracle	Loads data from any Generic SQL source database to an Oracle staging area. This LKM is similar to the standard “LKM SQL to SQL” described in section “Generic SQL” except that you can specify some additional specific Oracle parameters.
Reverse-Engineer	RKM Oracle	Retrieves Oracle specific metadata for tables, views, columns, primary keys, non unique indexes and foreign keys. This RKM accesses the underlying Oracle catalog tables to retrieve metadata. It is provided as an example only. In most of the cases, consider using the standard JDBC reverse engineering instead of this RKM. However, you can use this RKM as a starter if you plan to enhance it for adding your own metadata reverse-engineering behavior.

Web service	SKM Oracle	Generates data access Web services for Oracle databases. Refer to “SKM SQL” in section “Generic SQL” for more details. This SKM is optimized for the Oracle database.

Specific Requirements

Some of the Knowledge Modules for Oracle use specific features of this database. The following restrictions apply when using such Knowledge Modules. Refer to the Oracle documentation for additional information on these topics.

Using the SQL*LOADER utility

5. The Oracle Client and the SQL*LOADER utility must be installed on the machine running the Oracle Data Integrator Agent.
6. The server names defined in the Topology must match the Oracle TNS name used to access the Oracle instances.
7. A specific log file is created by SQL*LOADER. We recommend looking at this file in case of error. Control Files (CTL), Log files (LOG), Discard Files (DSC) and Bad files (BAD) are placed in the work directory defined in the physical schema of the source files.
8. Using the DIRECT mode requires that Oracle Data integrator Agent run on the target Oracle server machine. The source file must also be on that machine.

Using External Tables

1. The file to be loaded by the External Table command needs to be accessible from the Oracle instance machine. It must be located on the file system of the server machine or reachable from a UNC path (Unique Naming Convention) or mounted locally.
2. For performance reasons, it is often recommended to install Oracle Data Integrator Agent on the target server machine.

Using Oracle Log Miner

1. The AUTO_CONFIGURATION option provides automatic configuration of the Oracle database and ensures that all prerequisites are met. As this option automatically changes database initialization parameters, it is not recommended to use it in a production environment. You should check the Create Journal step in the Oracle Data Integrator execution log to detect configurations tasks not performed correctly (Warning status).
2. Asynchronous mode gives the best performance on the journalized system, but this requires extra Oracle Database initialization configuration and additional privileges for configuration.
3. Asynchronous mode requires the journalized database to be in ARCHIVELOG. Please review Oracle documentation carefully before turning this option on. This will help you correctly manage the archives and avoid common issues such as hanging the Oracle instance if the archive files are not removed regularly from the archive repository.
4. If ASYNCHRONOUS_MODE is set to "No", journalized data is available immediately after the commit. Otherwise, there is a gap between the commit and the journalized data availability. This time may vary from 1 second to a few minutes.
5. Always stop the journal before changing the ASYNCHRONOUS_MODE option.

6. When using asynchronous mode, the user connecting to the instance must be granted admin authorization on Oracle Streams. This is done using the DMBS_STREAMS_AUTH.GRANT_ADMIN_PRIVILEGE procedure when logged in with a user already having this privilege (for example the SYSTEM user).
7. When using the AUTO_CONFIGURATION option, the logged-in user must also have the DBA role to grant other users with privileges and change instance parameters.
8. The work schema must be granted the SELECT ANY TABLE privilege to be able to create views referring to tables stored in other schemas.
9. For detailed information on all other prerequisites, refer to the Oracle documentation (Data Warehousing Guide - Change Data Capture)

Reverse-Engineer	RKM Oracle Data Quality DDX	Retrieves file definitions from Oracle Data Quality DDX description files Reverse-Engineer

Specific Requirements

Generates DQ Process in Oracle Data Quality, Data quality repair flow automatically generated based on data quality problems discovered in profiling – Modifiable, Customizable

Generates Run-time Batch Script

1 OS command for every step of the DQ process (trsfrmr, globrtr, parser, etc.). Execution platforms chosen at code generation time

Oracle E-Business Suite

Introduction

This section provides an introduction and the methodology to work with the E-Business Suite Knowledge Modules in Oracle Data Integrator.

Oracle E-Business Suite (EBS) is a suite of integrated software applications that provides a complete solution to the business needs of Oracle customers.

The Knowledge Modules for Oracle E-Business Suite are part of the Application Adapters for Data Integration for E-Business Suite.

E-Business Suite Knowledge Modules

Oracle Data Integrator Knowledge Modules for E-Business Suite provide comprehensive, bidirectional connectivity between Oracle Data Integrator and E-Business Suite, which enables you to extract and load data. The Knowledge Modules support all modules of E-Business Suite and provide bidirectional connectivity through EBS objects tables/views and interface tables. The EBS Knowledge Modules provide support for the following capabilities:

- **Data extract from EBS**: Standard Oracle or SQL LKMs can be used to extract data from E-Business suite using objects such as Tables, Views, and KeyFlexfields
- **Reverse-engineering EBS objects**: RKM E-Business Suite can be used to reverse-engineer E-Business Suite data structures
- **Data integration to EBS**: IKM E-Business Suite can be used to integrate data to E-Business Suite using OpenInterface tables. The “OpenInterface” API encapsulates a number of Oracle-specific interfaces and ensures data integrity. An OpenInterface is made up of:
    - Several Interface tables to be loaded. These tables are the incoming data entry points for E-Business Suite.
    - Several programs that validate and process the insertion of the data from the interface tables into E-Business Suite.

Oracle Data Integrator Knowledge Modules for Oracle E-Business Suite interact with the database tier to extract metadata and load data. While loading data, it also interacts with the Concurrent Processing Server of the application tier.

Oracle Data Integrator provides two Knowledge Modules (KMs) for handling E-Business Suite data:

Type	Knowledge Module	Description
Integrate	IKM E-Business Suite (Open Interface)	The IKM E-Business Suite is used to load data to EBS interface tables and submit Concurrent request (which loads from interface tables to base tables). This Integration Knowledge Module: • Integrates data from any source to Interface Tables in incremental update mode. • Enables data control: invalid data is isolated in the Error Table and can be recycled. In addition to loading the interface tables, it provides the

		following optional actions: • Create a *Group ID* for the first interface in a batch. • Use this *Group ID* in subsequent interfaces. • Delete this *Group ID* when loading the last table in the batch. • Execute an OpenInterface program if at any point in a batch it is required to call an E-Business Suite Interface porgram and once all required intreface tables have been loaded. **Note:** The **IKM E-Business Suite (Open Interface) KM** must only be used to load interface tables. Writing directly in the E-Business Suite physical tables is not supported.
Reverse-Engineer	RKM E-Business Suite	This KM reverse-enginneers E-Business Suite data structures. It reverses EBS objects such as tables, views, flexfields and interface-tables structures in E-Business Suite (columns, primary keys and foreign keys).

Platform Support

The Oracle Data Integrator E-Business Suite Knowledge Modules are certified on the following platforms and versions:

- E-Business Suite 11i
- E-Business Suite 12

Installation and Configuration

There is no specific Oracle Data Integrator configuration for using the E-Business Suite KMs.

Working with EBS KMs

The Oracle Data Integrator E-Business Suite KMs enable read and write access to E-Business Suite Data, stored in an Oracle Database.

To use Oracle Data Integrator E-Business Suite with the Oracle Data Integrator E-Business Suite KMs:

1. Define the Topology
2. Set up the Project
3. Perform an E-Business Suite Reverse-Engineering
4. Use E-Business Suite datastores as sources or targets in an integration interface

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using E-Business Suite KMs, are the following:

1. Connect to your master repository using Topology Manager.
2. Create a data server, based on the Oracle technology. This data server represents the Oracle instance that contains the E-Business Suite data.

3. Create a physical schema under this data server. This schema is the Oracle schema that contains the synonyms pointing to the E-Business Suite tables.

Note: The physical schema must represent the Oracle schema containing the synonyms pointing to the E-Business Suite tables. This schema is usually called APPS. It must not point directly to the Oracle schemas containing the Application physical tables. These are usually named after the related applications.

Note: For reverse-engineering, the Oracle user specified in the data server to which the Physical Schema is attached, must have the privileges to select from APPLSYS tables

4. Create a logical schema for this physical schema in the appropriate context.

Note: The Oracle schema containing the E-Business Suite tables and the Oracle schema containing the synonyms that point to these tables should never be defined as a Work Schema in a physical schema definition. Moreover, these Oracle schemas must not be used as staging area for an interface.

For more details on creating the topology in Oracle Data Integrator please refer to the *Oracle Data Integrator User's Guide*.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project, if they are not already in your project:

- IKM E-Business Suite (Open Interface)
- RKM E-Business Suite

Import in addition the standard Oracle LKMs and CKM to perform data extraction and data quality checks with an Oracle database. See the Oracle Database section of this guide for a list of available KMs.

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Reverse-Engineering E-Business Suite Tables

The RKM E-Business Suite is able to reverse-engineer the installed E-Business Suite tables, enriching them with information retrieved from the E-Business Suite repository.

The reverse-engineering process returns the following information:

- The installed E-Business Suite (Modules) as sub-models
- For each module sub-model, there will be sub-models for Tables, Views, Flexfields, and Interface Tables
- The tables and columns, as well as the primary and foreign keys in the datastores
- Comments on the reversed tables

To perform an E-Business Suite Reverse-Engineering:

1. Create a model based on the Oracle Technology, and on the logical schema created when configuring an E-Business Suite Connection.
2. In this Model, select the **Reverse** tab and:
    1. Select **Customized**
    2. Select the **RKM E-Business Suite** from the KM list.
    3. Set the RKM options as follows: (See the Knowledge Module Options Reference section for more details and take into account the limits of the RKM E-Business Suite).

- **Applications List**: Enter the list of the applications' short name, for example 'INV'
- **Only Installed Applications**: Set this option to YES to reverse-engineer only installed and shared applications. If this option is set to NO, all applications are reverse-engineered.
- **Min Rows**: Leave the default value '0', if you want to reverse-engineer all the tables. If you want to reverse-engineer only tables with a minimum number of rows, specify in this option the minimum number of rows.
- **Description Mask**: Specify the description mask for filtering the reverse-engineered objects based on their description in E-Business Suite.
- **Flexfields**: If this option is set to YES, applications' flexfields are reverse-engineered.
- **Interface Tables**: If this option is set to YES, applications' interface tables are reverse-engineered.

4. Specify the reverse mask in the **Mask** field in order to select the tables to reverse. The Mask field, in the Reverse tab, filters reverse-engineered objects based on their name.

Note: The Mask field and the Description Mask option are implemented using SQL Like. The patterns that you can choose from are:

% The percentage symbol allows you to match any string of any length (including zero length).

Empty value allows you to match a single character.

3. Click **Apply**, and then click **Reverse**.

You can follow the reverse-engineering process in the Execution Log.

Note: The reverse-engineering process may take several minutes. Please wait until the reversed datastores appear under the reversed module in the tree of the execution Log.

At the end of the reverse-engineering, the applications and tables are represented as sub-models and datastores. You can then use Oracle Applications as a source or a target in an interface.

Reverse-Engineering E-Business Suite Table Features

Reverse-engineering E-Business Suite Tables involves the following features:

- The E-Business Suite Modules are reversed as sub-models. The sub-model names correspond to the application names.
- Each application sub-model is divided into sub-models for Tables, Views, Flexfields and Interface Tables.
- The tables/views and columns, as well as the primary and foreign keys are reversed in the data-stores.
- A sub-model called Flexfield on <AppName> is created for each application. Data-stores in the Flexfield sub-model correspond to Concatenated_Segment_Views of registered Key flexfields for the application. These objects are a subset of Views. The datastores in the Flexfields sub-folder are named after the flexfields.
- Data-stores in Interface-Table sub-model correspond to tables whose names contain the pattern INTERFACE. These objects are subset of tables.

Note: Some of the Open-interfaces (as specified in EBS Integration Repository) may have interface tables whose names may not contain the pattern INTERFACE in their names.

This section covers restrictions on reverse-engineering E-Business Suite Tables:

- The tab Selective reverse cannot be used with this Knowledge Module.
- Option Min Rows requires Oracle statistics to be computed on all tables.
- If the Oracle user defined in the Oracle Data Integrator data server is not the owner of the tables to reverse, you must define synonyms for this user on all tables you wish to reverse.
- Only KeyFlexfields are supported. Descriptive FlexFields are not supported.

Using E-Business Suite as a Source in an Integration Interface

When using E-Business Suite as a source, you extract data from the Applications to integrate them into another system (Data warehouse, other database...).

Extracting data from E-Business Suite is performed with regular integration interfaces sourcing from an Oracle Database. For a list of the KMs available for such an integration interface, refer to the Oracle Database chapter in this manual.

Using E-Business Suite as a Target in an Integration Interface

The E-Business Suite IKM is used in integration interfaces that have E-Business Suite interface tables as a target. This IKM works similarly to the IKM Oracle Incremental Update, with some specific options for OpenInterfaces. For the IKM Incremental Update usage and restrictions please refer to the Oracle Database section of this manual.

Integrating Data into E-Business Suite through the OpenInterface

Oracle Data Integrator uses the "OpenInterface" API to write to E-Business Suite. A transaction that loads Oracle application is a batch identified by its Group ID. For example, if you load interface tables to create a product in E-Business Suite, all of these loading operations as well as the calls to the validation and processing programs will use this batch's Group ID. For more information on OpenInterfaces, please refer to the API and OpenInterface Guide of the respective E-Business Suite module or the E-Business Suite Repository.

The configuration of integration interfaces for actions specific to E-Business Suite (Group ID handling, programs execution) is detailed below.

Managing Group IDs

In the first integration interface loading a group of interface tables in one single batch, you must force the creation of a Group ID.

To create a Group ID in an integration interface:

1. Set the following in the KM options:
    - Set OA_CREATE_NEW_GROUP_ID to YES
    - Provide a Group ID Name in the OA_GROUP_ID_NAME option.
    - Warning: The Group ID Name must be unique at a given instant. You must use the OA_REMOVE_GROUP_ID option to remove a Group ID at the end of the batch processing.
    - Give a valid SQL expression for the Group ID value (use an Oracle Database sequence value - <SEQUENCE_NAME>.NEXTVAL - for instance) in the OA_GROUP_ID_EXPRESSION option.
2. In the integration interface mapping, select the flag UD1 for all the columns of the interface table you wish to load with the Group ID value and set the mapping value to 0.

In the following integration interfaces belonging to a batch, you must use an existing Group ID.

To use an existing Group ID in an integration interface:

1. Set OA_USE_EXISTING_GROUP_ID IKM option to Yes
2. Provide the Group ID Name in the OA_GROUP_ID_NAME IKM option.
3. In the integration interface mapping, select the flag UD1 for all the columns you wish to load with the Group ID value and set the mapping value to 0.

In the last integration interface that loads a batch of interface tables, you may delete a Group ID that is no longer necessary.

To delete an existing Group ID:

1. Choose the OA_REMOVE_GROUP_ID option
2. Provide the Group ID Name in the OA_GROUP_ID_NAME option.
3. In the integration interface mapping, select the flag UD1 for all the columns of the interface table you wish to load with the Group ID value and set the mapping value to 0.

Note: The Group IDs are stored in an SNP_OA_GROUP table that is created in the work schema specified in the physical schema that points to the Oracle Applications Interface tables. The Group ID is referenced in Oracle Data Integrator by a unique Group ID Name.

Executing an OpenInterface program

In the Oracle Data Integrator integration interfaces, when a set of interface tables is loaded, it is necessary to call an OpenInterface program in order to validate and process the data in the E-Business Suite interface tables. You can use an existing Group ID in this call (see Use an existing Group ID), or create it (see Create a Group ID) in the same integration interface, if the OpenInterface only contains a single table. The execution of the OpenInterface program is started in the last integration interface of a package. This integration interface populates a set of OpenInterface tables and usually deletes the Group ID, if no longer needed.

To execute an OpenInterface Program:

1. Set the SUBMIT_PROGRAM option to YES
2. Provide the name of the program to call in the OA_PROGRAM option

Note: For a list of available OpenInterface programs and their parameters, please refer to the E-Business Suite module API and OpenInterface documentation or the E-Business Suite Repository.

3. Specify the program parameters in the OA_ARGUMENTS option. The parameters are specified in the following format: argument_name => 'argument value', argument_name => 'argument value' ... If one argument must take the value of the Group ID, you must then specify argument Name => v_group_id
4. You must also specify the context parameters for the session that will execute the program by setting the values of the following options:
    - OA_USER_NAME : E-Business Suite User Name
    - OA_REPONSIBILITY : E-Business Suite Responsibility Name
    - OA_LANGUAGE : Language used for the responsibility
    - OA_APPLICATION : Application to which the responsibility belongs

Knowledge Module Options Reference

RKM E-Business Suite

Option	Values	Mandatory	Description
Applications List	String, Default is: `'INV'`	Yes	List of the applications' short names as described in the APPLSYS.FND_APPLICATION table. These names must be between quotes and separated by commas. Eg: `'INV','PO','GL'`
Only Installed Applications	Yes|No	Yes	Reverse only installed applications. If this option is selected, only installed and shared applications are reversed. Otherwise, all applications are reversed.
Min Rows	Default is: `0`	Yes	Only tables with this minimum number of rows will be reversed. A value of `0` means all the tables. Statistics have to be computed to use this option.
Description Mask	Default is: `%`	Yes	Description Mask for filtering. Only objects whose descriptions match the mask pattern will be reversed.
Flexfields	Yes|No	Yes	Flag to reverse flexfields. If this option is selected, applications' flexfields are reversed.
Interface Tables	Yes|No	Yes	Flag to reverse interface tables. If this option is selected, applications' interface tables are reversed.

IKM E-Business Suite (Open Interface)

Option	Values	Mandatory	Description
INSERT	Yes|No	Yes	Insert new rows. Automatically attempts to insert data into the Target Datastore of the Interface
UPDATE	Yes|No	Yes	Update target table. Identifies and updates rows of the Target Datastore depending on the value of the UPDATE_KEY columns of the target datastore records.
COMMIT	Yes|No	Yes	Post Integration Commit.

<table>
<tr><td></td><td></td><td></td><td>Commit all data inserted or updated in the target datastore.</td></tr>
<tr><td>SYNC_JRN_DELETE</td><td>Yes | No</td><td>Yes</td><td>Synchronise Journalized deletions.
Check this option to synchronize journalized deletions. This option will take effect only if one source table is journalized in your interface.</td></tr>
<tr><td>FLOW_CONTROL</td><td>Yes | No</td><td>Yes</td><td>Activate Flow control.
Check this option if you wish to perform flow control.</td></tr>
<tr><td>RECYCLE_ERRORS</td><td>Yes | No</td><td>Yes</td><td>Recycle previous errors.
Check this option to recycle data rejected from a previous control.</td></tr>
<tr><td>STATIC_CONTROL</td><td>Yes | No</td><td>Yes</td><td>Post Integration Control.
Check this option to control the target table after having inserted or updated target data.</td></tr>
<tr><td>TRUNCATE</td><td>Yes | No</td><td>Yes</td><td>Check this option if you wish to truncate the target datastore.</td></tr>
<tr><td>DELETE_ALL</td><td>Yes | No</td><td>Yes</td><td>Check this option if you wish to delete all the rows of the target datastore.</td></tr>
<tr><td>DELETE_TEMPORARY_OBJECTS</td><td>Yes | No</td><td>Yes</td><td>Set this option to NO if you wish to retain temporary objects (tables, files and scripts) after integration. Note: Useful for debugging.</td></tr>
<tr><td>FLOW_TABLE_OPTIONS</td><td>String
Default is:
NOLOGGING</td><td>No</td><td>Option for Flow table creation. Use this option to specify the attributes for the integration table at create time and used for increasing performance.
This option is set by default to NOLOGGING (valid only from Oracle v8).
This option may be left empty.</td></tr>
<tr><td>COMPATIBLE</td><td>Default is: 9</td><td>No</td><td>RDBMS version of staging/target. This option affects the use of PURGE key word and the way statistics are collected:
<table>
<tr><th>Values</th><th>PURGE</th><th>STATS</th></tr>
<tr><td>10</td><td>Yes</td><td>DBMS_STATS</td></tr>
<tr><td>9</td><td>No</td><td>DBMS_STATS</td></tr>
<tr><td>8</td><td>No</td><td>ANALYZE</td></tr>
</table></td></tr>
<tr><td>VALIDATE</td><td>Yes | No</td><td>Yes</td><td>Validate KM options. This option generates an extra validation step during development. Validations performed are:
- validation of KM option COMPATIBLE
- validation of RDBMS version of staging database</td></tr>
</table>

			- validation of KM option DETECTION_STRATEGY This option should be turned off for all production use in particular for high-frequency execution. There is not added value in production, only processing overhead.
DETECTION_STRATEGY	String, Default is: `NOT_EXISTS`	Yes	Strategy to identify useless update. Valid values are - MINUS: used when populating flow table in order to exclude records, which identically exist in target. - NOT_EXISTS: used when populating flow table in order to exclude records, which identically exist in target. - POST_FLOW: all records from source are loaded into flow table. After that an update statement is used to flag all rows in flow table, which identically exist in target. - NONE: all records from source are loaded into flow table. All target records are updated even when target records is identical to flow table record.
ANALYZE_TARGET	`Yes|No`	Yes	Check this option if you wish to analyze the target table before loading data into the integration table.
OPTIMIZER_HINT		No	Use this option to specify the hint (string) to be used while loading the integration table.
SUBMIT_PROGRAM	`Yes|No`	Yes	Check this option if you want to submit Oracle Application OpenInterface Program.
OA_USER_NAME	String, Default is: `myname`	Yes	Oracle Application User Name for context initialization.
OA_RESPONSIBILITY	String, Default is: `ResponsibilityName`	Yes	Oracle Application Responsibility to use for context initialization
OA_LANGUAGE	String, Default is: `US`	Yes	Default language used for the responsibility.
OA_APPLICATION	String, Default is: `INV`	Yes	Oracle Application Name for this interface.
OA_PROGRAM	String, Default is: `INCOIN`	Yes	E-Business Suite Program to submit.
OA_ARGUMENTS	String, Default is: `,argument1 => 'BATCH'`	Yes	E-Business Suite program arguments using this syntax : `, argumentX => 'value' , argumentX`

	`,argument2 => v_group_id`		`=> 'value' , ...`
			If you are using CREATE_NEW_GROUP_ID or USE_EXISTING_GROUP_ID options, you can use v_group_id variable as argument. ex :
			`, argumentX => 'value' , argumentX => v_group_id , ...`

OA_GROUP_ID_NAME	String, Default is: `myname`	Yes	Group ID name to use to either store a new group ID or retrieve an existing group ID.
OA_GROUP_ID_EXPRESSION	String, Default is: `group_id_sequence.nextval`	Yes	Group ID Expression to obtain the first GROUP ID. In general this is an Oracle sequence.
OA_CREATE_NEW_GROUP_ID	String, Default is: `NOT_EXISTS`	Yes	Check this option if you want to create a new group id and store it's value for future use. If this option is set to YES, the value of OA_USE_EXISTING_GROUP_ID is ignored.
OA_USE_EXISTING_GROUP_ID	`Yes | No`	Yes	Check this option if you want to use the value of an existing group id, given its name. (OA_GROUP_ID_NAME)
OA_REMOVE_GROUP_ID	`Yes | No`	Yes	Check this option to remove the definition of the group ID at the end of the job.

Oracle Enterprise Service Bus

Introduction

This section provides an introduction and the methodology to work with the ESB Cross-References Knowledge Modules in Oracle Data Integrator.

Cross-Referencing

Cross-referencing is the Oracle Fusion Middleware Function, available through its Enterprise Service Bus (ESB) component, and leveraged typically by any loosely coupled integration, which is truly built on the Service Oriented Architecture. It is used to manage the runtime correlation between the various participating applications of the integration.

The Cross-referencing feature of Oracle SOA Suite enables you to associate identifiers for equivalent entities created in different applications. For example, you can use cross-references to associate a customer entity created in one application (with native id Cust_100) with an entity for the same customer in another application (with native id CT_001).

Cross-reference (XRef) facilitates mapping of native keys for entities across applications. For example, correlate the same order across different ERP systems.

The implementation of cross-referencing uses an Oracle database schema to store a cross-reference table (called XREF_DATA) that stores information to reference records across systems and data stores.

The optional ability to update or delete source table data after the data is loaded into the target table is also a need in integration. This requires that the bulk integration provides support for either updating some attributes like a status field or purging the source records once they have been successfully processed to the target system.

ESB Cross-References Knowledge Modules

The ESB Cross-References Knowledge Modules (KMs) are certified with Oracle ESB 10*g*. Oracle Data Integrator provides three Knowledge Modules for handling ESB cross-references:

Type	Knowledge Module	Description
Load	LKM SQL to SQL (ESB XREF)	This KM supports cross-references while loading data from a standard ISO source. It supports both Oracle and DB2.The **LKM SQL to SQL (ESB XREF)** has to be used in conjunction with the **IKM SQL Control Append (ESB XREF)** in the same interface.
Load	LKM MSSQL to SQL (ESB XREF)	This KM is a version of the **LKM SQL to SQL (ESB XREF)** optimized for Microsoft SQL Server.
Integrate	IKM SQL Control Append (ESB XREF)	This KM provides support for cross-references while integrating data to an Oracle, DB2 or Microsoft SQL Server target. It integrates data to the target table in truncate/insert (append) mode, and supports data checks.

Overview of the XREF KM Process

The overall process can be divided into the following three main phases:

Loading Phase (LKM)

During the loading phase, a *Source Primary Key* is created using columns from the source table. This *Source Primary Key* is computed using a user-defined SQL expression that should return a VARCHAR value. This expression is specified in the SRC_PK_EXPRESSION KM option.

For example, for a source Order Line Table (aliased OLINE in the interface) you can use the following expression: `TO_CHAR(OLINE.ORDER_ID) || '-' || TO_CHAR(OLINE.LINE_ID)`

This value will be finally used to populate the cross-reference table.

Integration and Cross-Referencing Phase (IKM)

During the integration phase, a *Common ID* is created for the target table. The value for the *Common ID* is computed from the expression in the XREF_SYS_GUID KM option. This expression can be for example:

- A database sequence (<SEQUENCE_NAME>. NEXTVAL)
- A function returning a global unique Id (SYS_GUID( ) for Oracle, NewID( ) for SQL Server)

This *Common ID* is pushed to the target columns of the target table that are marked with the UD1 flag.

Both the *Common ID* and the *Source Primary Key* are pushed to the cross-reference table (XREF_DATA). In addition, the IKM pushes to the cross-reference table a unique *Row Number* value that creates the cross-reference between the *Source Primary Key* and *Common ID*. This *Row Number* value is computed from the XREF_ROWNUMBER_EXPRESSION KM option, which takes typically expressions similar to the *Common ID* to generate a unique identifier.

The same *Common ID* is reused (and not re-computed) if the same source row is used to load several target tables across several interfaces with the Cross-References KMs. This allows the creation of cross-references between a unique source row and different targets rows.

Updating/Deleting Processed Records (LKM)

This optional phase (parameterized by the SRC_UPDATE_DELETE_ACTION KM option) deletes or updates source records based on the successfully processed source records:

- If SRC_UPDATE_DELETE_ACTION takes the DELETE value, the source records processed by the interface are deleted.
- If SRC_UPDATE_DELETE_ACTION takes the UPDATE value, the source column of the source records processed by the interface is updated with the SQL expression given in the SRC_UPD_EXPRESSION KM option. The name of this source column must be specified in the SRC_UPD_COL KM option.

Installation and Configuration

There is no specific Oracle Data Integrator configuration for using the ESB Cross-Reference KMs.

Working with XREF using the Oracle Data Integrator ESB Cross-References KMs

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using ESB Cross-References KMs, are the following:

1. Create the data servers, physical and logical schemas corresponding to the sources and targets.
2. Create an Oracle data server, a physical and a logical schema called *ESB_XREF* for the schema containing the cross-reference table named *XREF_DATA*. If this table is stored in a data server already declared, you only need to create the schemas.

Note: For the generic procedure for creating the topology in Oracle Data Integrator please refer to the Oracle Data Integrator User's Guide.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project, if they are not already in your project:

- **IKM SQL Control Append (ESB XREF)**
- **LKM SQL to SQL (ESB XREF)** or **LKM MSSQL to SQL (ESB XREF)** if using Microsoft SQL Server.

Designing an Interface with Oracle Data Integrator ESB Cross-References KMs

To create an integration interface, which both loads a target table from several source tables and handles cross-references between one of the sources and the target, run the following steps:

1. Create an interface with the source and target datastores which will have the cross-references.
2. Create joins, filters and mappings as usual. In the Diagram tab, make sure to check the `UD1` flag for the column of the target datastore that will be the placeholder for the *Common ID.* You do not need to map this column.
3. In the Flow tab of the interface, select the source set containing the source table to cross-reference, and select the **LKM SQL to SQL (ESB XREF)** or **LKM MSSQL to SQL (ESB XREF)** if the source data store is in Microsoft SQL Server.
4. Specify the KM options as follows:
   - `SRC_PK_EXPRESSION`

     Specify the expression representing the *Source Primary Key* value that you want to store in the XREF table. If the source table has just one column defined as a key, enter the column name (for example `SEQ_NO`). If the source key has multiple columns, specify the expression to use for deriving the key value. For example, if there are two key columns in the table and you want to store the concatenated value of those columns as your source value in the XREF table enter `SEQ_NO|DOC_DATE`. This option is mandatory.

   - `SRC_UPDATE_DELETE_ACTION`

     Indicates what action to take on the source records after integrating data into the target.

     - Specify `NONE` for no action on the source records.
     - Enter `UPDATE` to update the source records flag according to `SRC_UPD_COL` and `SRC_UPD_EXPRESSION.`

       If you select the `UPDATE` option you also need to specify the following options: `SRC_PK_LOGICAL_SCHEMA`, `SRC_PK_TABLE_NAME`, `SRC_PK_TABLE_ALIAS`, `SRC_UPD_COL`, and `SRC_UPD_EXPRESSION`.

     - Enter `DELETE` to delete the source records after the integration.

       If you select the `UPDATE` option, you also need to specify the following options: `SRC_PK_LOGICAL_SCHEMA`, `SRC_PK_TABLE_NAME`, and `SRC_PK_TABLE_ALIAS`.

5. Select your staging area in the Flow tab of the interface and select the **IKM SQL Control Append (ESB XREF)**.
6. Specify the KM options as follows:
   - XREF_TABLE_NAME – Enter the name of the source table that will be stored in the reference table.
   - XREF_COLUMN_NAME – This is the name of the source primary key that will be stored in the XREF table.
   - XREF_SYS_GUID_EXPRESSION – Expression to be used to computing the *Common ID*. This expression can be for example:
     a database sequence (<SEQUENCE_NAME>.NEXTVAL)
     a function returning a global unique Id (SYS_GUID() for Oracle and NewID() for SQL Server)
   - XREF_ROWNUMBER_EXPRESSION – This is the value that is pushed into the *Row Number* column of the XREF_DATA table. Use the default value of GUID unless you have the need to change it to a sequence.
   - FLOW_CONTROL - Set to YES in order to be able to use the CKM Oracle.

Notes:

If the target table doesn't have any placeholder for the *Common ID* and you are for example planning to populate the source identifier in one of the target columns, you must use the standard mapping rules of Oracle Data Integrator to indicate which source identifier to populate in which column.

If the target column that you want to load with the *Common ID* is a unique key of the target table, it needs to be mapped. You must put a dummy mapping on that column. At runtime, this dummy mapping will be overwritten with the generated common identifier by the integration Knowledge Module. Make sure to flag this target column with UD1.

7. Select optionally the *CKM Oracle* in the Control tab of the interface.
8. Click **OK** to save and close the interface.

Knowledge Module Options Reference

LKM SQL to SQL (ESB XREF)

Option	Values	Mandatory	Description
SRC_UPDATE_DELETE_ACTION	NONE|UPDATE|DELETE	Yes	Indicates what action to take on source records after integrating data into the target. Valid values for this option are: - NONE: No action is taken on source records - UPDATE: Source records flag is updated according to SRC_UPD_COL and SRC_UPD_EXPRESSION - DELETE: Source records are deleted after integration
SRC_PK_EXPRESSION	Concatenating expression	Yes	Expression that concatenates values from the PK to have them fit in a single large varchar column. Example: for the source Orderline Table (aliased OLINE in the interface) you can use expression: TO_CHAR(OLINE.ORDER_ID) || '-' || TO_CHAR(OLINE.LINE_ID)

SRC_PK_LOGICAL_SCHEMA	Name of source table's logical schema	No	Indicates the source table's logical schema. The source table is the one from which we want to delete or update records after processing them. This logical schema is used to resolve the actual physical schema at runtime depending on the Context. Example: ORDER_BOOKING This option is required only when SRC_UPDATE_DELETE_ACTION is set to UPDATE or DELETE.
SRC_PK_TABLE_NAME	Source table name, default is MY_TABLE	No	Indicate the source table name of which we want to delete records after processing them. Example: ORDERS This option is required only when SRC_UPDATE_DELETE_ACTION is set to UPDATE or DELETE.
SRC_PK_TABLE_ALIAS	Source table alias, default is MY_ALIAS	No	Indicate the source table's alias within this interface. The source table is the one from which we want to delete or update records after processing them. Example: ORD This option is required only when SRC_UPDATE_DELETE_ACTION is set to UPDATE or DELETE.
SRC_UPD_COL	Aliased source column name	No	Aliased source column name that holds the update flag indicator. The value of this column will be updated after integration when SRC_UPDATE_DELETE_ACTION is set to UPDATE with the expression literal SRC_UPD_EXPRESSION. The alias used for the column should match the one defined for the source table. Example: ORD.LOADED_FLAG This option is required only when SRC_UPDATE_DELETE_ACTION is set to UPDATE.
SRC_UPD_EXPRESSION	Literal or expression	No	Literal or expression used to update the SRC_UPD_COL. This value will be used to update this column after integration when SRC_UPDATE_DELETE_ACTION is set to UPDATE. Example: RECORDS PROCESSED This option is required only when SRC_UPDATE_DELETE_ACTION is set to UPDATE.
DELETE_TEMPORARY_OBJECTS	Yes|No	Yes	Set this option to NO if you wish to retain temporary objects (files and scripts) after integration. Useful for debugging.

LKM MSSQL to SQL (ESB XREF)

See the LKM SQL to SQL (ESB XREF) section above for details on the LKM MSSQL to SQL (ESB XREF) options.

IKM SQL Control Append (ESB XREF)

Option	Values	Mandatory	Description
INSERT	Yes | No	Yes	Automatically attempts to insert data into the Target Datastore of the Interface.
COMMIT	Yes | No	Yes	Commit all data inserted in the target datastore.
FLOW_CONTROL	Yes | No	Yes	Check this option if you wish to perform flow control.
RECYCLE_ERRORS	Yes | No	Yes	Check this option to recycle data rejected from a previous control.
STATIC_CONTROL	Yes | No	Yes	Check this option to control the target table after having inserted or updated target data.
TRUNCATE	Yes | No	Yes	Check this option if you wish to truncate the target datastore.
DELETE_ALL	Yes | No	Yes	Check this option if you wish to delete all the rows of the target datastore.
CREATE_TARG_TABLE	Yes | No	Yes	Check this option if you wish to create the target table.
DELETE_TEMPORARY_OBJECTS	Yes | No	Yes	Set this option to NO if you wish to retain temporary objects (tables, files and scripts) after integration. Useful for debugging.
XREF_TABLE_NAME	XREF table name	Yes	Table Name to use in the XREF table. Example: ORDERS
XREF_COLUMN_NAME	Coumn name	Yes	Primary key column name to use as a literal in the XREF table
XREF_LAST_ACCESSED	ODI	Yes	Last Accessed literal to use in the XREF table.
XREF_SYS_GUID_EXPRESSION	SYS_GUID()	Yes	Enter the expression used to populate the common ID for the XREF table (column name "VALUE"). Valid examples are: SYS_GUID(), MY_SEQUENCE.NEXTVAL, etc.

Introduction

This section provides an introduction and the methodology to work with the Oracle OLAP Knowledge Modules in Oracle Data Integrator.

Oracle OLAP Knowledge Modules

The Oracle Data Integrator Knowledge Modules for Oracle OLAP provide integration and connectivity between Oracle Data Integrator and Oracle OLAP cubes. Oracle Data Integrator is able to handle two different types of cubes with the Oracle OLAP KMs, depending on the storage mode of these cubes:

- **ROLAP** (Relational OnLine Analytical Processing) cubes are based on a relational storage model. ROLAP cubes can handle a large amount of data and benefit all functionalities of the relational database.
- **MOLAP** (Multidimensional OnLine Analytical Processing) data is stored in form of multidimensional cubes. The MOLAP model provides high query performance and fast data retrieval for a limited amount of data.

The Oracle Data Integrator KMs for Oracle OLAP use mature integration methods for Oracle OLAP in order to:

- Reverse-Engineer Oracle OLAP data structures (all tables used by a ROLAP or a MOLAP cube).
- Integrate data in an Oracle Analytical Workspace target in incremental update mode.

Oracle Data Integrator provides two Knowledge Modules (KM) for handling Oracle OLAP data.

Type	Knowledge Module	Description
Reverse-Engineer	RKM Oracle OLAP (Jython)	Reverse-engineering knowledge module to retrieve the tables, views, columns, Primary Keys, Unique Keys and Foreign keys from Oracle Database, which are used by a ROLAP or a MOLAP Cube. This KM provides logging (Use Log & Log File Name) options. Set the options as follows: • **MOLAP**: Set to YES to reverse an Analytic Workspace • **AW_NAME**: Indicate the name of the Analytical Workspace • **AW_URL**: Specify the URL of the Analytical Workspace • **AW_OWNER**: Indicate the name of the Analytical Workspace Owner • **AW_PASSWORD**: Indicate the password of the Analytical Workspace Owner • **ROLAP**: Set to YES to reverse tables from a ROLAP schema • **USE_LOG**: Set to YES to write the log details of the reverse-engineering process into a log file. • **LOG_FILE_NAME**: Specify the name of the log file

Integrate	IKM Oracle AW Incremental Update	This KM is similar to the IKM Oracle Incremental Update. It has four additional options for handling MOLAP cubes: • **AW_NAME**: Indicate the name of the Analytical Workspace • **AW_OWNER**: Indicate the name of the Analytical Workspace owner • **CUBE_NAME**: Indicate the name of the cube • **REFRESH_CUBE**: Set this option to YES to refresh the cube for an Analytical Workspace.

Platform Support

The Oracle Data Integrator Oracle OLAP knowledge modules are certified on the following platforms and versions:

- Oracle 10gR2 and higher

Installation and Configuration

The RKM Oracle OLAP (Jython) uses the `AWXML.jar` API during its reverse-engineering process. This API is provided by Oracle. Copy the `AWXML.jar` file from the `ORACLE_HOME/olap/api/lib` folder into your `oracledi/drivers` folder, and restart ODI.

Note: The AWXML.jar file is also available for download on the Oracle web site.

Working with Oracle OLAP KMs

You can use the Oracle Data Integrator Oracle OLAP KMs like the standard Oracle KMs. The Oracle OLAP KM specific steps are detailed in the following sections.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project, if they are not already in your project:

- IKM Oracle AW Incremental Update
- RKM Oracle OLAP (Jython)

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Reverse-Engineering Oracle Tables used by a OLAP Cube

The RKM Oracle OLAP (Jython) is able to reverse-engineer Oracle tables stored in the physical schema defined in the topology which are used by an Oracle OLAP Cube. This RKM retrieves the tables, views, columns and constraints when existing.

To perform an Oracle OLAP Reverse-Engineering:

1. Create a model based on the Oracle Technology, and on the logical schema created when configuring the Oracle OLAP Connection.
2. In this Model, select the Reverse tab and:
    1. Select **Customized**

2. Select the RKM Oracle OLAP (Jython) from the KM list.
3. Set the RKM options as follows:
    - **MOLAP**: Set to YES to reverse an Analytic Workspace. If this option is set to YES, the following options are mandatory:
        - **AW_NAME**: Indicate the name of the Analytical Workspace
        - **AW_URL**: Specify the URL of the Analytical Workspace
        - **AW_OWNER**: Indicate the name of the Analytical Workspace Owner
        - **AW_PASSWORD**: Indicate the password of the Analytical Workspace Owner
    - **ROLAP**: Set to YES to reverse tables from a ROLAP schema
    - **USE_LOG**: Set to YES to write the log details of the reverse-engineering process into a log file.
    - **LOG_FILE_NAME**: Specify the name of the log file
4. Specify the reverse mask in the **Mask** field in order to select the tables to reverse. The **Mask** field, in the Reverse tab, filters reverse-engineered objects based on their name. The **Mask** field must not be empty and must contain at least the percentage symbol (%).

3. Click **Apply**, and then click **Reverse**.

You can follow the reverse-engineering process in the Execution Log.

Note: The reverse-engineering process may take several minutes or longer depending on the number of tables reverse-engineered.

At the end of the reverse-engineering process, the tables used by a cube are represented as datastores. You can then use these datastores as a source or a target of your interfaces.

Using Oracle OLAP as a Source in an Integration Interface

After performing a reverse-engineering using the **RKM Oracle OLAP (Jython)**, you can use Oracle OLAP data tables as a source of an integration interface to extract data from the Oracle OLAP database and integrate them into another system (Data warehouse, other database...). Using Oracle OLAP as a source in these conditions is identical to using an Oracle datastore as a source in an integration interface. The Generic SQLand Oracle Database KMs can be used for this purpose.

Using Oracle ROLAP as a Target in an Integration Interface

After performing a reverse-engineering using the **RKM Oracle OLAP (Jython)**, you can use Oracle ROLAP data tables as a target of an integration interface to load data from any system to the Oracle ROLAP database. Using Oracle ROLAP as a target in these conditions is identical to using an Oracle datastore as a target in an integration interface. The Generic SQLand Oracle Database KMs can be used for this purpose.

Using Oracle MOLAP as a Target in an Integration Interface

Using Oracle MOLAP as a Target in an integration interface is similar to using Oracle ROLAP as a target with the difference that, in addition to the standard features of the integration process, you can refresh the MOLAP cube at the execution of the integration interface by using the IKM Oracle AW Incremental Update.

Note: In order to avoid refreshing the cube at every integration interface step, use the IKM Oracle AW Incremental Update with the refresh cube options only in the last integration interface of the package. In the last integration interface set the options to refresh the cube as follows: Set the REFRESH_CUBE option to YES and specify the values for the AW_OWNER, AW_NAME, and CUBE_NAME option.

Knowledge Module Options Reference

RKM Oracle OLAP (Jython)

Option	Values	Mandatory	Description
MOLAP	Yes|No	Yes	Reverse Table from an AW
AW_NAME	string	Yes, if MOLAP is set to YES	Analytical Workspace Name
AW_URL	<server>:1521:<SID>	Yes, if MOLAP is set to YES	Analytical Workspace URL If your JDBC connection is jdbc:oracle:thin:@<server>:1521:<SID> the AW_URL should be: <server>:1521:<SID>
AW_OWNER	<%=odiRef.getModel("SCHEMA_NAME")>	Yes, if MOLAP is set to YES	Analytical Workspace Owner
AW_PASSWORD	String	Yes, if MOLAP is set to YES	Analytical Workspace Owner Password
ROLAP	Yes|No	Yes	Reverse tables from a ROLAP schema
USE_LOG	Yes|No	Yes	Set this option to Yes to use a log file.
LOG_FILE_NAME	/temp/reverse.log	Yes, if USE_LOG is set to Yes	Log File Name

IKM Oracle AW Incremental Update

Option	Values	Mandatory	Description
INSERT	Yes|No	Yes	If set to Yes, automatically attempts to insert data into the Target Datastore of the Interface.
UPDATE	Yes|No	Yes	If set to Yes, identifies and updates rows of the Target Datastore depending on the value of the UPDATE_KEY columns of the target datastore records.
COMMIT	Yes|No	Yes	If set to Yes, commits all data inserted or updated in the target datastore.
SYNC_JRN_DELETE	Yes|No	Yes	If set to Yes, synchronizes journalized deletions. This option will take effect only if one source table is journalized in your interface.
FLOW_CONTROL	Yes|No	Yes	If set to Yes, performs flow control.

<table>
<tr><td>RECYCLE_ERRORS</td><td>Yes|No</td><td>Yes</td><td>Set this option to YES, to recycle data rejected from a previous control.</td></tr>
<tr><td>STATIC_CONTROL</td><td>Yes|No</td><td>Yes</td><td>Set this option to YES, to control the target table after having inserted or updated target data.</td></tr>
<tr><td>TRUNCATE</td><td>Yes|No</td><td>Yes</td><td>Set this option to YES, to truncate the target datastore.</td></tr>
<tr><td>DELETE_ALL</td><td>Yes|No</td><td>Yes</td><td>Set this option to YES, to delete all the rows of the target datastore.</td></tr>
<tr><td>CREATE_TARG_TABLE</td><td>Yes|No</td><td>Yes</td><td>Set this option to YES, to create the target table.</td></tr>
<tr><td>DELETE_TEMPORARY_OBJECTS</td><td>Yes|No</td><td>Yes</td><td>Set this option to NO, to retain temporary objects (tables, files and scripts) after integration. Useful for debugging.</td></tr>
<tr><td>FLOW_TABLE_OPTIONS</td><td>NOLOGGING</td><td>No</td><td>Option for Flow table creation. Use this option to specify the attributes for the integration table at create time and used for increasing performance.
This option is set by default to NOLOGGING (valid only from Oracle v8).
This option may be left empty.</td></tr>
<tr><td>COMPATIBLE</td><td>9</td><td>Yes</td><td>RDBMS version of staging/target. This option affects the use of PURGE key word and the way statistics are collected:<table><tr><th>Values</th><th>PURGE</th><th>STATS</th></tr><tr><td>10</td><td>Yes</td><td>DBMS_STATS</td></tr><tr><td>9</td><td>No</td><td>DBMS_STATS</td></tr><tr><td>8</td><td>No</td><td>ANALYZE</td></tr></table></td></tr>
<tr><td>VALIDATE</td><td>Yes|No</td><td>Yes</td><td>Validate KM options. This option generates an extra validation step during development. Validations performed are: validation of KM option COMPATIBLE validation of RDBMS version of staging database validation of KM option DETECTION_STRATEGY This option should be turned off for all production use in particular for high-frequency execution. There is not added value in production, only processing overhead.</td></tr>
<tr><td>DETECTION_STRATEGY</td><td>NOT_EXISTS</td><td>Yes</td><td>Strategy to identify useless update. Valid values are
- MINUS: used when populating flow table in order to exclude records, which identically exist</td></tr>
</table>

			in target. - NOT_EXISTS: used when populating flow table in order to exclude records, which identically exist in target. - POST_FLOW: all records from source are loaded into flow table. After that an update statement is used to flag all rows in flow table, which identically exist in target. - NONE: all records from source are loaded into flow table. All target records are updated even when target records is identical to flow table record.
ANALYZE_TARGET	Yes|No	Yes	Check this option if you wish to analyze the target table before loading data into the integration table.
OPTIMIZER_HINT		No	Use this option to specify the hint (string) to be used while loading the integration table.
REFRESH_CUBE	Yes|No	No	Set this option to Yes, to refresh the MOLAP cube for an Analytical Workspace. If this option is set to YES, the following cube specific options are mandatory: AW_OWNER, CUBE_NAME, and
AW_OWNER	string	Yes, if REFRESH_CUBE is set to Yes	Analytical Workspace owner
AW_NAME	string	Yes, if REFRESH_CUBE is set to Yes	Analitical Workspace Name
CUBE_NAME	string	Yes, if REFRESH_CUBE is set to Yes	MOLAP cube name.

Oracle PeopleSoft

Introduction

This section provides an introduction and the methodology to work with the PeopleSoft Knowledge Modules in Oracle Data Integrator.

The Knowledge Modules for Oracle PeopleSoft are part of the Application Adapters for Data Integration for PeopleSoft.

PeopleSoft Knowledge Modules

The Oracle Data Integrator Knowledge Modules for PeopleSoft provide integration and connectivity between Oracle Data Integrator and the PeopleSoft platform.

These KMs enable **Data-level integration for PeopleSoft**: Data extraction is performed directly on the PeopleSoft Business Objects tables. This method is read-only.

The Oracle Data Integrator KMs for PeopleSoft use mature integration methods for PeopleSoft, in order to:

- Reverse-Engineer PeopleSoft data structures (Business Objects, tables, views, columns, keys, and foreign keys).
- Extract data from PeopleSoft using a data-level integration approach.

Oracle Data Integrator provides two Knowledge Modules (KMs) for handling PeopleSoft data.

Type	Knowledge Module	Description
Reverse-Engineer	RKM PeopleSoft ORACLE	Reverse-engineering knowledge module to retrieve the business objects, tables, views, columns, keys, and foreign keys from PeopleSoft. The database hosting the PeopleSoft tables is Oracle.
Reverse-Engineer	RKM PeopleSoft MSSQL	Reverse-engineering knowledge module to retrieve the business objects, tables, views, columns, keys, and foreign keys from PeopleSoft.The database hosting the PeopleSoft tables is Oracle.

Platform Support

The Oracle Data Integrator PeopleSoft knowledge modules are certified on the following platforms and versions:

- Oracle PeopleSoft 8.x or higher

Installation and Configuration

There is no specific Oracle Data Integrator configuration for using the PeopleSoft KMs.

Working with PeopleSoft KMs

The Oracle Data Integrator PeopleSoft KMs enable read-only access to PeopleSoft data.

To use PeopleSoft with the Oracle Data Integrator PeopleSoft KM, you must:

5. Define the Topology.
6. Set up the Project
7. Perform a PeopleSoft Reverse-Engineering.
8. Use PeopleSoft datastores as sources in an integration interface

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using PeopleSoft KMs, are the following:

6. Connect to your master repository using Topology Manager.
7. Create a data server using the appropriate Oracle or Microsoft SQL Server technology. This data server represents the database instance that stores the PeopleSoft data.
8. Create a physical schema under this data server. This schema is, for example, the Oracle schema or the Microsoft SQL Server database that contains the PeopleSoft tables you want to reverse-engineer.
9. Create a logical schema for this physical schema in the appropriate context.

You can now perform a PeopleSoft Reverse-Engineering.

Note: The Oracle schema or the Microsoft SQL Server database storing the PeopleSoft tables should not be defined as a work schema in the physical schema definition. Moreover, this schema or database must not be used as staging area for an interface.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project, if they are not already in your project:

- RKM PeopleSoft ORACLE
- RKM PeopleSoft MSSQL

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Reverse-Engineering PeopleSoft Tables

The RKM PeopleSoft <database> is able to reverse-engineer PeopleSoft data structures at data level, enriching them with information retrieved from the PeopleSoft dictionary.

Data extraction is performed directly on the PeopleSoft Business Objects tables. This access method is read-only.

The reverse-engineering process returns the following information:

- Business Objects as sub-models
- Business Objects tables as datastores with their associated columns and constraints
- Comments attached to the reversed tables and columns

To perform a PeopleSoft Reverse-Engineering:

1. Create a model based on the Oracle or Microsoft SQL Server Technology, and on the logical schema created when defining the Topology.
2. In this Model, select the Reverse tab and:
    1. Select **Customized**
    2. Select the RKM PeopleSoft ORACLE or RKM PeopleSoft MSSQL from the KM list.
    3. Set the **BUSINESS OBJECT** RKM option as follows:

Enter the Business Object code, for example CCM, DBI, or DPO.

The Business Object code corresponds to the PeopleSoft “Object Owner ID”. The different Object Owner IDs are listed in the PeopleSoft view: EO_BCOWNRID_VW. This field is used as a mask to filter the Business Objects to be reverse-engineered. This field must not be empty and must contain at least the percentage symbol (%).

See the *Knowledge Module Options Reference* section below for more details.

4. Specify the reverse-engineering mask in the **Mask** field in order to select the tables to reverse. The **Mask** field, in the Reverse tab, filters reverse-engineered objects based on their name. The **Mask** field must not be empty and must contain at least the percentage symbol (%).

3. Click **Apply**, and then click **Reverse**.

You can follow the reverse-engineering process in the Execution Log.

Note: The reverse-engineering process may take several minutes or longer depending on the number of Business Objects reverse-engineered.

At the end of the reverse-engineering process, the applications and tables are represented as sub-models and datastores. You can then use PeopleSoft as a source in an integration interface.

Using PeopleSoft as a Source in an Integration Interface

After performing a reverse-engineering using the RKM PeopleSoft <database>, you can use PeopleSoft data tables as a source of an integration interface to extract data from the PeopleSoft database and integrate them into another system (Data warehouse, other database...). Using PeopleSoft as a source in these conditions is identical to using an Oracle or Microsoft SQL Server datastore as a source in an integration interface. The Generic SQL, Oracle Database or Miscrosoft SQL Server KM%s can be used for this purpose.

Knowledge Module Options Reference

RKM PeopleSoft ORACLE and RKM PeopleSoft MSSQL

Option	Values	Mandatory	Description
BUSINESS OBJECT	String, Default is: %	Yes	Business Object name. Mask used to filter the Business Objects to be reverse-engineered. '%' returns all the Business Objects. The Business Object is corresponding to the PeopleSoft "Object Owner ID" You will find the different Object Owner ID in the PeopleSoft view: EO_BCOWNRID_VW. Some tables do not have an Object Owner ID listed in this view. These tables are reverse-engineered in the default Business Object (sub-model) named “NA”.

Oracle Siebel CRM

Introduction

This section provides an introduction and the methodology to work with the Oracle Siebel CRM Knowledge Modules in Oracle Data Integrator.

The Knowledge Modules for Oracle Siebel CRM are part of the Application Adapters for Data Integration for Siebel.

Siebel Knowledge Modules

The Oracle Data Integrator Siebel Knowledge Modules (KMs) use mature integration methods for Siebel, in order to:

- Reverse-Engineer Siebel data structures (Business Components and Business Objects)
- Reverse-Engineer EIM (Enterprise Integration Manager) tables
- Read data from Siebel using data-level integration
- Read and write Siebel data using the EIM tables

Oracle Data Integrator provides the following Knowledge Modules for handling Siebel:

Type	Knowledge Module	Description
Integrate	IKM SQL to Siebel Append (EIM)	Integrates data into a Siebel EIM (Enterprise Integration Manager) table from any ANSI-SQL92 compliant staging area, then generates the appropriate EIM configuration files (.ifb) and runs the import process using the Siebel Server Manager. The target table is populated in truncate/insert mode.
Load	LKM Siebel to SQL (EIM)	Loads data from a Siebel EIM (Enterprise Integration Manager) table to any ISO-92 compliant target database. This module uses the run-time Agent to extract data from EIM (Enterprise Integration Manager) table to the staging area. It is able to generate the appropriate EIM configuration files (.ifb) and runs the export process using the Siebel Server Manager.
Reverse-Engineer	RKM Siebel Oracle	Reverse-engineering knowledge module for Siebel. Business Objects are reversed as sub-models, Business Components are reversed as datastores with their columns and their constraints (Primary and Foreign Keys).
Reverse-Engineer	RKM Siebel EIM Oracle	Reverse-engineering knowledge module for Siebel EIM (Enterprise Integration Manager) tables. Siebel projects are reversed as sub-models, EIM tables are reversed as datastores with their columns and Primary

		Keys.
Reverse-Engineer	RKM Siebel MSSQL	This RKM provides the same features as the RKM Siebel Oracle for Siebel installed on top of a Microsoft SQL Server database.
Reverse-Engineer	RKM Siebel EIM MSSQL	This RKM provides the same features as the RKM Siebel EIM Oracle for Siebel installed on top of a Microsoft SQL Server database

Platform Support

The Oracle Data Integrator Siebel Knowledge Modules are certified on the following platforms and versions:

- Oracle Siebel CRM 7.7 or higher.

Overview of Extracting Data from Siebel

Oracle Data Integrator provides two ways to extract data from Siebel:

1. **Data-level integration**: Data extraction is performed directly on the Siebel Business Components tables. You can use a Siebel data model as a source of an integration interface by extracting data from the Siebel Database and integrate them into another system. Using Siebel as a source in these conditions is the same as using a regular table as a source in an integration interface. This integration method is read-only.
    - **Reversing**: To reverse-engineer Siebel Business Components, use the RKM Siebel <database> (`<database>` is the name of the database hosting the Siebel tables). This RKM allows for reverse-engineering of the Siebel data structures, enriching them with information retrieved from the Siebel dictionary.
    - **Extracting**: You have access to a range of knowledge modules to extract Siebel data from Siebel. The Generic SQL, Oracle Database or Microsoft SQL Server KMs can be used for this purpose.
2. **Integration through EIM tables**: The EIM tables are used to extract data from Siebel and load data to Siebel. EIM tables act as a staging area between the Siebel application and the other applications (another Siebel can be one of these applications). This method supports read and write.
    - **Reversing**: To reverse-engineer Siebel EIM tables, use the `RKM Siebel EIM <database>` knowledge module. This RKM allows for reverse-engineering of the Siebel EIM tables, enriching them with information retrieved from the Siebel dictionary.
    - **Extracting**: Data extraction is performed on the EIM tables after executing automatically an export script to load these EIM tables from the Siebel application tables. To extract data from a Siebel EIM table and load it to any SQL staging area, use the LKM Siebel to SQL (EIM).

      This LKM first generates the appropriate EIM Configuration file (.ifb – Interface Builder File) and runs the export process using the Server Manager. Then, it extracts selected data from the EIM Siebel table into the staging area.
    - **Integrating**: Data integration is performed to the EIM tables and then an import script is generated and executed to import data from the EIM tables into the Siebel application tables. To perform such integration, from the staging area, use the IKM SQL to Siebel Append (EIM).

      This IKM first loads data from the staging area to the EIM table. Then, it generates the EIM configuration file (.ifb) and runs the import process using the server Manager.

Warning: Only EIM tables should be used to write into Siebel. Writing directly into the Siebel physical tables is not recommended.

Installation and Configuration

If using the EIM KMS, it is required that the Siebel Srvrmgr Siebel utility is installed on the machine hosting the run-time Agent.

Working with the Siebel KMs

Defining the Topology

The steps to create the topology in Oracle Data Integrator, which are specific to projects using Siebel KMs, are the following:

1. Connect to your master repository using Topology Manager.
2. Create a data server, based on the Oracle or Microsoft SQL Server technology (depending on the technology of the database), pointing to the instance that contains the Siebel data.
3. Create a physical schema under this data server. This schema must point to the Oracle schema or Microsoft SQL Server database that contains the Siebel tables or EIM data structures you want to reverse-engineer.
4. Create a logical schema for this physical schema in the appropriate context.

For more information on creating these elements in Topology Manager, please refer to the Oracle Data Integrator User's Guide.

Warning! The Oracle schema or Microsoft SQL Server database containing the Siebel tables should not be defined as a work schema in the physical schema definition. Moreover, this schema/database must not be used as staging area for an integration interface.

Setting up the Project

Depending on the technology of the database that you will be using in your project, import the following KMs into your Oracle Data Integrator project, if they are not already in your project:

- **RKM Siebel <database>** or **RKM Siebel EIM <database> KM**
- **LKM Siebel to SQL (EIM)**
- **IKM SQL to Siebel Append (EIM)**

Siebel Reverse-Engineering

To perform a Siebel Reverse-Engineering:

1. Create a model based on the Oracle or Microsoft SQL Server technology and on the logical schema created when defining the Topology.
2. In this Model, select the Reverse tab:
    1. Select Customized, and select, depending on the integration method you want use, the RKM Siebel <database> or RKM Siebel EIM <database> KM.
    2. Configure the RKM options as follows when using the
        a. RKM Siebel to Oracle or the RKM Siebel MSSQL:

- **Business Object**: Specify the mask to filter the Business Objects to reverse-engineer. For example: Account, Acc%, Customer, Employee, %mpl%. The percent sign (%) returns all Business Objects.

b. RKM Siebel EIM Oracle or the RKM Siebel EIM MSSQL:

- **USE_PROJECT**: Set this option to YES to reverse-engineer projects as sub-models in Oracle Data Integrator.
- **REPOSITORY**: Specify the Siebel Repository name. Default is *Siebel Repository*.
- **PROJECT_NAME**: Specify the mask to filter the Siebel projects to reverse-engineer. For example: EIM Accounts and Quotes, EIM Activity, EIM A%. The percent sign (%) returns all Siebel projects.

3. Specify the reverse-engineering mask in the Mask field in order to select the tables to reverse. The Mask field, in the Reverse tab, filters reverse-engineered objects based on their name. The Mask field must not be empty and must contain at least the percentage symbol (%).

4. Click **Apply**, and then click **Reverse**.

You can follow the reverse-engineering process in the Execution Log.

Note: The reverse-engineering process may take several minutes or longer depending on the number of business object reverse-engineered.

At the end of the reverse-engineering, the applications and tables are represented as sub-models and datastores.

Features of the Reverse-Engineering

The `RKM Siebel <database>` process returns:

- The installed Business Objects as sub-models.
- The Business Components as datastores with their columns and their constraints (Primary and Foreign Keys).
- Comments on the reversed tables and columns.

The `RKM Siebel <database> EIM` process returns:

- Projects as sub-models.
- EIM tables as datastores with their columns and their constraints (Primary and Foreign Keys).

Use Siebel as a Source in an Integration Interface

After performing a reverse-engineering using the **RKM Siebel <database>**, you can use Siebel data tables as a source for the integration interface.

Using Siebel as a source in these conditions is the same as using a standard Oracle or MSSQL database as a source in an interface. The Generic SQL, Oracle Database or Microsoft SQL Server KMs can be used for this purpose.

Use Siebel as a Source in an Integration Interface through EIM tables

To extract data from Siebel through the EIM tables, create an integration interface with EIM tables as a source. Select the LKM Siebel to SQL (EIM) and set the KM options as follows:

- IFB_PATH: Specify the path where you want to create the EIM configuration file (.ifb).
- SRVRMGR_PATH: Specify the location of the Siebel srvrmgr binary. This parameter is mandatory.

- SIEBEL_GATEWAY: Specify the network address of the Gateway Server machine.
- SIEBEL_ENTERPRISE: Indicate the name of the Enterprise Server.
- SIEBEL_SERVER: Indicate the name of the Siebel Server.
- SERVER_USER: Indicate the user name of the Server administrator.
- SERVER_USER_PWD: Indicate the Server administrator password.

The LKM Siebel to SQL (EIM) automatically performs the following operations:

1. Generate an EIM Configuration File, describing the export process to the EIM tables.
2. Run the EIM process using for example the Siebel srvrmgr command line.
3. Extract, transform and load data from the EIM tables to the other application.

Use Siebel as a Target in an Integration Interface through EIM tables

To insert data into Siebel through the EIM tables, create an integration interface with EIM tables as target. Select the IKM SQL to Siebel Append (EIM) and set the KM options as follows:

- IFB_PATH: Specify the path where you want to create the EIM configuration file (.ifb).
- SRVRMGR_PATH: Specify the location of the Siebel srvrmgr binary. This parameter is mandatory.
- SIEBEL_GATEWAY: Specify the network address of the Gateway Server machine.
- SIEBEL_ENTERPRISE: Indicate the name of the Enterprise Server.
- SIEBEL_SERVER: Indicate the name of the Siebel Server.
- SERVER_USER: Indicate the user name of the Server administrator.
- SERVER_USER_PWD: Indicate the Server administrator password.

The IKM SQL to Siebel Append (EIM) automatically performs the following operations:

1. Load the appropriate EIM tables.
2. Generate an EIM Configuration File, describing the import process from the EIM tables.
3. Run the EIM process using for instance the Siebel srvrmgr command line.

Knowledge Module Options Reference

IKM SQL to Siebel Append (EIM)

Option	Values	Mandatory	Description
INSERT	Yes|No	Yes	Automatically attempts to insert data into the Target Datastore of the integration interface.
TRUNCATE	Yes|No	Yes	Check this option if you wish to truncate the target datastore.
DELETE_ALL	Yes|No	Yes	Check this option if you wish to delete all the rows of the target datastore.
IFB_PATH	/temp	Yes	Path to create the EIM configuration files (.ifb).

SRVRMGR_PATH	/temp	Yes	Path to the srvrmgr binary.
SIEBEL_GATEWAY	GATEWAY	Yes	Network address of the Gateway Server machine.
SIEBEL_ENTERPRISE	SIEBEL_ENTERPRISE	Yes	Enterprise Server name.
SIEBEL_SERVER	SERVER	Yes	Siebel Server name.
SERVER_USER	SERVER_USER	Yes	Server administrator user name.
SERVER_USER_PWD	SEVER_USER_PWD	Yes	Server administrator password.

LKM Siebel to SQL (EIM)

Option	Values	Mandatory	Description
DELETE_TEMPORARY_OBJECTS	Yes|No	Yes	Set this option to NO if you wish to retain temporary objects (tables, files, and scripts) after the integration. Useful for debugging.
IFB_PATH	/temp	Yes	Path to create the EIM configuration files (.ifb).
SRVRMGR_PATH	/temp	Yes	Path to the srvrmgr binary. This parameter is mandatory.
SIEBEL_GATEWAY	GATEWAY	Yes	Network address of the Gateway Server machine.
SIEBEL_ENTERPRISE	SIEBEL_ENTERPRISE	Yes	Enterprise Server name.
SIEBEL_SERVER	SERVER	Yes	Siebel Server name (default is all servers).
SERVER_USER	SERVER_USER	Yes	Server administrator user name.
SERVER_USER_PWD	SERVER_USER_PWD	Yes	Server administrator password.

RKM Siebel Oracle / RKM Siebel MSSQL

Option	Values	Mandatory	Description
BUSINESS_OBJECT	%	Yes	Business object name. Mask used to filter the Business Objects to be reverse-engineered. '%' returns all the Business Objects.

RKM Siebel EIM Oracle / RKM Siebel EIM MSSQL

Option	Values	Mandatory	Description
USE_PROJECT	Yes|No	Yes	If this option is set to YES, Projects are reverse-engineered as sub-models in Oracle Data Integrator.
REPOSITORY	Siebel Repository	Yes	Siebel Repository name
PROJECT_NAME	%	Yes	Project name. Mask used to filter the projects to be reverse-engineered. '%' returns all the projects.

SalesForce

Knowledge Modules

Type	Knowledge Module	Description
Integrate	IKM File to SalesForce (Upsert)	Integrates data from a file to SalesForce in insert/update mode.
Integrate	IKM SalesForce to File (with filter)	Retrieves data from SalesForce to a file using a filter
Integrate	IKM SalesForce to File (without filter)	Retrieves data from SalesForce to a file without using a filter
Reverse-Engineer	RKM Salesforce.com	Reverse engineering Knowledge Module to retrieve the tables, views, system tables and columns from Sales Force.

Specific Requirements

Knowledge Modules for SalesForce require the Sforce 6.0 Java QuickStart and the AppExchange Data Loader utilities.

You can follow the following procedure to install these components:

- Sforce 6.0 Java QuickStart: Download this package and copy the `quickstart.jar` file into the `/drivers` directory of Oracle Data Integrator.
- AppExchange Data Loader: This utility is used to perform bulk loading from and to Salesforce. It should be installed on the machine where the agent executing Salesforce scenarios runs.

Both these components can be downloaded from Salesforce.com. See their respective documentations for more information.

Note: Oracle Data integrator does not use the JDBC/ODBC drivers. You do not need to provide the JDBC Driver and URL in your Topology.

The following restrictions apply when using these Knowledge Modules:

1. The reverse-engineering uses the Sforce 6.0 Java QuickStart component that requires a specific version of the JVM to run. Make sure that you use the appropriate JVM.
2. The SalesForce schema cannot be used as a staging area.
3. Data integration from and to SalesForce is performed through files. These files should be defined in a File model as comma-delimited file datastores with a 1 line header containing the field names. This header is used by the KM to identify these fields. You can for example drag and drop datastores from the SalesForce model to the File model while keeping the <*CTRL*> key pressed to quickly copy SalesForce datastores as file datastores.
4. To load data into SalesForce, you must load the file model first, using one interface, and then load the target SalesForce system using the "IKM File to SalesForce (Upsert)". This IKM manages insert and updates to the SalesForce system.

5. To unload data from SalesForce, you must first load the file model using the "IKM Salesforce to File", and then use this file model as a source for your interface. This IKM comes in two versions, depending on whether data filtering is required on Salesforce of not. Note that filters executed in SalesForce should be coded in *Sforce Object Query Language* (SOQL), and not in plain SQL.

Note: SalesForce IKMs uses the **AppExchange Data Loader** component to load data from and to SalesForce. It should be installed in the machine running the sessions integrating data from and to SalesForce. You should also provide this utility location in the KM options.

SAP ABAP BW

Introduction

This section provides an introduction and the methodology to work with the adapter, which lets Oracle Data Integrator connect to SAP-BW system using SAP Java Connector (SAP JCo) libraries. This adapter allows mass data extraction from SAP-BW systems.

The Knowledge Modules for SAP ABAP BW are part of the Application Adapters for Data Integration for SAP Business Warehouse.

If this is the first time you are using the SAP ABAP – BW connector, it is recommended to use the *Getting Started Guide for SAP ABAP - BW*. It contains the complete pre-requisites list as well as step-by-step instructions including SAP connection testing.

Overview

- RKM SAP BW enables Oracle Data Integrator (ODI) to connect to SAP BW system using SAP JCo libraries and perform a customized reverse-engineering of SAP BW metadata.
- LKM SAP BW to Oracle (SQLLDR) is in charge of extracting and loading data from SAP BW system (source) to an Oracle Staging Area.

Overview of the SAP ABAP - BW Integration Process

Reverse-Engineering Process

Reverse-engineering is using the RKM SAP BW. This knowledge module automatically installs the required RFC programs to retrieve the metadata about SAP BW data targets. It can extract the list of SAP BW data objects and display it in a tree Metadata Browser graphical interface. The user can pick and choose BW data store objects to reverse-engineer from this interface. The KM uses the `OdiSAPAbapExecute` open tool to call ABAP code. The open tool must be installed prior to reverse-engineering.

In the reverse-engineering process, data targets, primary keys, foreign keys and index are reverse-engineered into an Oracle Data Integrator model.

Integration Process

Data integration from SAP is managed by the LKM SAP BW to Oracle (SQLLDR). This KM can be used for interfaces sourcing from SAP via ABAP and having a Staging Area located in an Oracle Database engine.

The KM first generates optimized ABAP code corresponding to the extraction required for a given interface. This code includes filters and joins that can be processed directly in the source SAP BW server. This ABAP program is uploaded and can be executed using the `OdiSAPAbapExecute` open tool to generate the extraction file.

The KM then transfers this extraction file to a preconfigured FTP server. This file is downloaded from this server using FTP, SFTP, SCP, and so forth to the machine where the Oracle Staging Area is located, and finally loaded using SQL*Loader to the Staging Area. The agent can also directly read the extraction file on the FTP server's disk if the FTP server is installed on the ODI agent machine.

The rest of the integration process (Data quality check and integration) is managed with regular Oracle Data Integration KMs.

SAP ABAP - BW Knowledge Modules

The Oracle Data Integrator SAP ABAP Knowledge Modules provide integration from SAP BW systems using SAP JCo libraries. This set of KMs has the following features:

- Reads SAP BW data from SAP BW system.
- Loads this data into Oracle Staging Area.
- Reverse-engineers SAP Metadata and proposes a tree browser to pick up only the required Metadata.
- Uses flexfields to map the SAP BW data targets types (InfoCube, InfoObject, ODS/DSO, OpenHub and Text Table) and their columns.

Oracle Data Integrator provides following Knowledge Modules (KM) for handling SAP data:

Type	Knowledge Module	Description
Load	LKM SAP BW to Oracle(SQLLDR)	Extracts data from SAP BW system into a flat file and then loads it into Oracle Staging Area using the SQL*LOADER command line utility.
Reverse-Engineer	RKM SAP BW	Reverse-engineering Knowledge Module to retrieve SAP specific metadata for modules, Info Cubes, Info Objects, ODS/DSO, columns, primary keys, foreign keys and indexes.

Platform Support

SAP ABAP BW KM is certified for Oracle Data Integrator 10gR3 (10.1.3.5.3) and above.

The Oracle Data Integrator SAP ABAP BW knowledge modules are certified on the following SAP BW platforms and versions:

- SAP BI 7.0
- SAP BW 3.5

Installation and Configuration

System Requirements and Certification

Before performing any installation you should read the system requirements and certification documentation to ensure that your environment meets the minimum installation requirements for the products you are installing.

The Oracle Data Integrator requirements are listed in the *Oracle Data Integrator Installation Guide* available from the Oracle Technology Network (OTN).

The requirements specific to the Oracle Data Integrator SAP ABAP BW Adapter are:

- The minimum patch level for Oracle Data Integrator 10gR3 is version 10.1.3.5.3 (Metalink Patch #8909138).
- A JCo version compatible with adapter must be used. The list of supported JCo versions is available in the Compatibility Matrix available from the Oracle Technology Network (OTN). A minimum version of JCo 3.0.2 is required.

- A JVM version compatible with both Oracle Data Integrator and JCo must be used. A minimum version of JVM 1.5 is required JCo pre-requisite.
- LKM SAP BW to Oracle (SQLLDR) requires a FTP server to upload data from the SAP BW system. This data is either read locally by the agent executing the interface (when this agent runs on the FTP server machine), or remotely (when this agent is located on a different machine than the FTP server). This FTP server must be accessible over the network from both the SAP BW machine and the agent machine. We recommend using an FTP server installed on the ODI agent machine instead of on a third machine. This allows using the FTP_TRANSFER_METHOD = NONE and optimizes performance.
- SQL*Loader is required on the machine running the agent when executing interfaces using LKM SAP BW to Oracle (SQLLDR). SQL*Loader is used for loading data extracted from SAP to the Oracle Staging Area.

Gathering SAP Connection Information

In order to connect to the SAP BW system, you must request the following information from your SAP administrators:

- **SAP BW System IP Address or Hostname**: IP address/ Hostname is the technical name given to the host on which SAP is running.
- **SAP User**: SAP User is the unique user name given to a user for logging on the SAP System.
- **SAP Password**: Case-sensitive password used by the user to log in.
- **SAP Language**: Code of the language used when logging in For example: `EN` for English, `DE` for German.
- **SAP Client Number**: The three-digit number assigned to the self-contained unit which is called *Client* in SAP. A Client can be a training, development, testing or production client or represent different divisions in a large company.
- **SAP System Number**: The two-digit number assigned to a SAP instance which is also called Web Application Server or WAS.
- **SAP System ID**: The three-character, unique identifier of a SAP system in a landscape.
- **SAP SNC Connection Properties (optional) SAP Router String (optional)**: SAP is enhancing security through SNC and SAP router. It is used when these securities are implemented.

Note: All the connection data listed above (except SAP SNC Connection Properties and SAP Router String) are mandatory and should be requested from the SAP Administrators. You may consider requesting support during connection setup from your SAP administrators.

Getting the Right Privileges

The SAP Adapter requires privileges to perform set up and execution operations. Please provide your administrators with the list of privileges listed in the *Getting the Right Privileges* section of the *Getting Started with SAP ABAP BW Adapter* guide.

These privileges are required for the SAP user that they will provide you to login the SAP System.

Gathering FTP Connection Information

The SAP BW system will push data to a server using the FTP protocol. For later setup, collect the following information from your system administrator:

- FTP server name or IP address

- FTP login ID
- FTP login password
- Directory path for storing temporary data files

Validate that the FTP server is accessible both from SAP System and from ODI agent machine.

Installing and Configuring JCo

The SAP adapter uses JCo to connect to the SAP system. JCo must be configured before proceeding with the project.

To install and configure JCo:

1. Download a supported JCo version for your configuration from http://service.sap.com/connectors. Check the supported JCo version in the Compatibility Matrix available at Oracle Technology Network. Note that a minimum version of JCo 3.0.2 is required.
2. Unzip the appropriate distribution package into an arbitrary directory `{sapjco-install-path}`.
3. Follow the installation instructions in `{sapjco-install-path}/javadoc/installation.html` for the respective platform.
4. Copy `sapjco3.jar` and `sapjco3.dll` (or respective binary) into the `oracledi/drivers` directory.
5. Check the JCo installation.

Note: Changing the JCo library installed in the `{windows-dir}\system32` directory of a machine running other SAP tools or components may cause issues with these components. Please check with your machine administrator before performing this change.

Setting up the Topology

If you are using this adapter in an existing Oracle Data Integrator version, the topology components required for this adapter are not installed yet.

You must perform the following operations after upgrading your Oracle Data Integrator version:

1. If the SAP ABAP technology does not exist in your Master Repository, import the SAP ABAP technology in Synonym INSERT_UPDATE mode from the `/impexp` folder.
2. Open the **Java BeanShell** technology and check on Language tab, that the **JYTHON** language is listed. If not, add it.
3. Create a **File** Physical Schema pointing to an existing FTP server into which the extraction file will be pushed from SAP and picked up for SQL*Loader. Set the parameters for this data server as follows:
   - **Host (Data Server)**: FTP Server IP host name or IP address.
   - **User**: Username to log into FTP server.
   - **Password**: This user's password.
   - **Data Schema:** Path on FTP server
4. Create a **File** Logical Schema called **File Server for SAP ABAP,** if it does not exist yet**.** This Logical Schema name is fixed and must be mapped to the Physical Schema created in the previous step.
5. Configure the `OdiSAPAbapExecute` Open Tool in your repository. The Open Tool is available in your classpath after an upgrade, and needs to be added to the list of tools in the Master Repository.

This process is described in the Using *Open Tools* section of the *Oracle Data Integrator Tools Reference Manual*.
The class name for this open tool is: `oracle.odi.sap.km._OdiSapAbapExecute`

Working with the SAP ABAP BW KMs

The Oracle Data Integrator SAP ABAP BW KMs enable to reverse and extract data from SAP BW.

To use SAP BW data in your Oracle Data Integrator integration projects, you must:

1. Define the Topology.
2. Set up the Project.
3. Create a model and reverse-engineer SAP BW data targets.
4. Design an Interface using the LKM SAP BW to Oracle (SQLLDR). Use the SAP BW data store object(s) as source of such an integration interface.

Defining the Topology

You must perform the following operations after installing or upgrading your Oracle Data Integrator version:

1. Connect to Topology Manager.
2. If the SAP ABAP technology does not exist in your Master Repository, import the SAP ABAP technology in Synonym INSERT_UPDATE mode from the `/impexp` folder.
3. Perform an upgrade of the Master Repository. Refer to the *Oracle Data Integrator Installation Guide* on OTN for more information on the Master Repository upgrade process.
4. In Topology Manager, open the JavaBeanShell technology and check on the Language tab that the JYTHON language is listed. If not, add it.
5. Create a File data server pointing to an existing FTP server into which the extraction file will be pushed from SAP and picked up for SQL*Loader. Set the parameters for this data server as follows:
   - **Host (Data Server)**: FTP server IP host name or IP address.
   - **User**: Username/login Id for FTP server.
   - **Password**: Password for the username/login Id.
6. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server to upload or download extraction files from the remote location. This path is used when uploading extraction files from the SAP BW system into the FTP server. It is also used by a remote agent to download the extraction files. Note that this path must use slashes and must end with a slash character.
   - **Work Schema**: Local path on the FTP server's machine. This path is used by an agent installed on this machine to access the extraction files without passing via the FTP server. This access method is used if the FTP_TRANSFER_METHOD parameter of the LKM SAP BW to Oracle (SQLLDR) is set to NONE. As Work Schema is an OS file name, slashes/ backslashes should be used according to OS. Path names need to end on slash/ backslash.

     Path names given on Data and Work schemas are not necessarily the same: the FTP service may provide access to a FTP directory named `/sapfiles` while the files are can be stored locally in `c:\inetpub\ftproot\sapfiles`.

   Refer to the *File Transfer Configurations* section in the *SAP ABAP* chapter of the *Oracle Data Integrator Knowledge Modules Reference Guide*.

7. If the corresponding Logical Schema called `File Server for SAP ABAP` does not exist yet, create it. This Logical Schema name is fixed and must be mapped to the Physical Schema created in the previous step.

You can now add the SAP connection information.

To configure a SAP ABAP BW data server:

1. Create a data server for **SAP ABAP** technology. This data server represents the SAP connection information.
2. Set the parameters for this data server as follows:
    - **Name**: `SAP_BW`. The name of the data server as it will appear in ODI.
    - **Host (Data Server)**: SAP BW System IP Address or Hostname.
    - **User**: SAP BW User, as provided by the SAP Administrator.
    - **Password**: This user's SAP BW Password. This password is case-sensitive.
3. Set the flexfields values for this data server in the Flexfields tab.
    - **SAP Language**: Code of the language used when logging in. For example `EN` for English, `DE` for German.
    - **SAP Client Number**: The three-digit number assigned to the self-contained unit which is called *Client* in SAP. A Client can be a training, development, testing or production client or represent different divisions in a large company.
    - **SAP System Number**: The two-digit number assigned to a SAP instance which is also called Web Application Server or WAS.
    - **SAP System ID**: The three-character, unique identifier of a SAP system in a landscape.
    - **SAP SNC Connection Properties**: SNC Connection Properties. This parameter is optional and can be left empty.
    - **SAP Router String**: Router String. This parameter is optional and can be left empty.
4. Create a Physical Schema under the data server.
5. Create a Logical Schema for this Physical Schema in the appropriate context.

Note: The **Test** button for validating the SAP Connection and the FTP Connection definition is not supported.

Except for Data Server Name, all the parameters that you provide while defining the SAP Data Server should be provided by the SAP Administrators. See *Gathering SAP Connection Information* for more information about these parameters.

Setting up the Project

Import the following KMs into your Oracle Data Integrator Project:

- RKM SAP BW
- RKM SAP Connection Test
- LKM SAP BW to Oracle (SQLLDR)
- Import also the standard LKMs, IKMs and CKMs to perform data extraction and data quality checks for your project.

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Creating and Reverse-Engineering a Model

Note: Before using SAP ABAP - BW KM, make sure that the `OdiSAPAbapExecute` Open Tool has already been installed. For more information, refer to the Installation and Configuration section.

To create and reverse-engineer a SAP BW Model:

1. Connect to Designer.
2. In the Models tree view, click **Insert Model**.
3. In the **Definition** tab, enter the Model name in the **Name** field.
4. In the **Technology** field, select the `SAP ABAP` technology.
5. In the **Logical Schema** field, select the Logical Schema on which your model will be based.
6. Go to the **Reverse** tab, select **Customized Reverse**, and select a **Context** which will be used for the Model's reverse-engineering.
7. Select the `RKM SAP ABAP.<PROJECT_NAME>`.
8. Click **Apply**.
9. Click **Reverse**, and then click **Yes** to validate the changes.
10. Click **OK.**
11. The Session started window appears. Click **OK**.
12. The **Tree Metadata Browser** appears if the `USE_GUI` KM option is set to `Yes` (default value).
13. Select the data store object(s) to reverse.
14. Click **Reverse**.

Consequent to following above mentioned steps, selected data store objects should be reverse-engineered and appear under the new Model in Designer.

Designing an Interface Using the SAP ABAP - BW KM

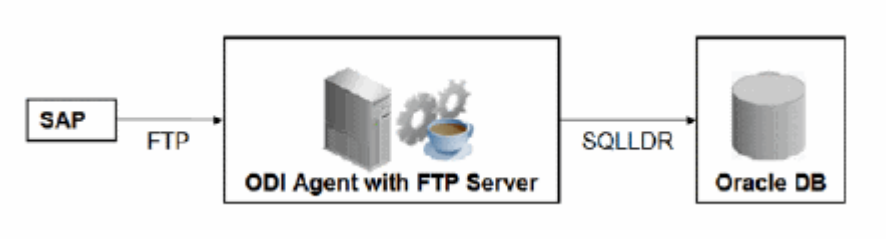
To create an interface loading SAP BW data into your Oracle Data warehouse table:

1. Create an interface with source data objects from the SAP ABAP Model created previously. This interface should have an Oracle target or use an Oracle schema as the Staging Area.
2. Create joins, filters and mappings for your interface.
3. In the **Flow** tab of the interface, select the source set containing the SAP ABAP BW source data object(s) and select the `LKM SAP BW to Oracle (SQLLDR)`.
4. Click **Apply** to save your interface.
5. Click **Execute** to run the interface.

File Transfer Configurations

The ODI SAP connector extracts data using ABAP programs. At the end of the extraction process these ABAP programs will push the data file to an FTP server. Ideally this FTP server is located on the ODI agent machine. If this is not the case, the ODI agent will download the file from the FTP server to the agent for loading the data using SQLLDR. This download can be performed using FTP, SFTP or SCP.

Configuration 1: FTP Server is installed on an ODI Agent machine



This configuration is used, when `FTP_TRANSFER_METHOD = NONE`. In this configuration the data movements described will be performed:

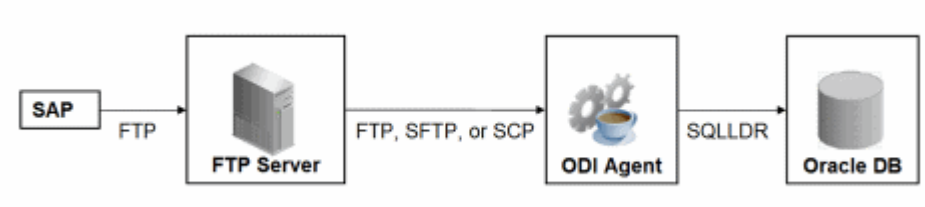
1. The ABAP program extracts the data and pushes the data file to the FTP server defined by the FTP data server. The file is stored in the directory given by the FTP server's data schema.
2. SQLLDR locates the data file using the work schema of the FTP server and uploads the data into Oracle DB.

This configuration requires the following Topology settings in ODI:

1. Create a File data server pointing to the FTP server/ ODI Agent box:
   - **Host (Data Server)**: FTP server/ ODI Agent IP host name or IP address. This
   - **Hostname / IP address** must be accessible from SAP system.
   - **User**: Username to log into FTP server.
   - **Password**: Password for the user.
2. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server for SAP extraction files. This path is used when uploading extraction files from the SAP system into the FTP server. Note that this path must use slashes and must end with a slash character.
   - **Work Schema**: Local path on the FTP server's machine. This path is used by the agent/SQLLDR installed on this machine to access the extraction files. As Work Schema is an OS file name, slashes/ backslashes should be used according to OS. Path names need to end on slash/ backslash.

   The path names given on Data and Work schemas are usually not the same: the FTP service may provide access to a FTP directory named `/sapfiles` while the files can be stored locally in `c:\inetpub\ftproot\sapfiles`. .

Configuration 2: FTP Server is not installed on ODI Agent machine



This configuration is used, when `FTP_TRANSFER_METHOD <> NONE`. In this configuration the data movements described will be performed:

1. The ABAP program extracts the data and pushes the data file to the FTP server defined by the FTP data server. The file is stored in the directory given by the FTP server's data schema.
2. The ODI agent downloads the file into the directory given by KM Option TEMP_DIR.
3. SQLLDR loads this file up into Oracle DB

This configuration requires the following Topology settings in ODI:

1. Create a File data server pointing to the FTP server into which the extraction file will be pushed from SAP and picked up from for SQL*Loader.

   Set the parameters for this data server as follows:

   - **Host (Data Server)**: FTP server IP host name or IP address. This hostname / IP address must be accessible both from SAP system and from ODI agent.
   - **User**: Username to log into FTP server.
   - **Password**: Password for the user.
2. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server to upload or download extraction files from the remote location. This path is used when uploading extraction files from the SAP system into the FTP server. It is also used by the agent to download the extraction files. Note that this path must use slashes and must end with a slash character.
   - **Work Schema**: <undefined> ; This path is left blank, as data files are never accessed directly from the FTP server's file system.

Please note that data files will be downloaded to the ODI Agent. The default directory for download is the system's temp directory. On UNIX this is usually `/tmp` and on Windows `c:\Documents and Settings\<user>\Local Settings\Temp`. This directory can be overriden by setting redefining the KM option TEMP_DIR.

Log Files

During the RKM and LKM execution several log files are created. These log files may contain valuable details for troubleshooting.The list below describes the different log files and their usage:

Default Log File Name	KM / Phase	Content
`<System Temp Dir>/sap_rkm_bw_<ODI Session Number>.log`	RKM	Execution Log of metadata retrieval
`<System Temp Dir>/sap_rkm_bw_<ODI Session Number>.log.opentool.log`	RKM	Information about first time installation of SAP RFC for RKM
`<System Temp Dir>/ODI_BW_Log/ODI_<Interface Id>_<SrcSet>.genlog`	LKM – Generation Time	Information about code generation for ABAP extractor.
`<System Temp Dir>/ODI_BW_Log/SAPAbapExecuteOpenTool_<Interface Id>_<SrcSet>.log`	LKM - Runtime	Information about installation of ABAP extractor.
`<System Temp Dir>/ODI_BW_Log/ODI_<Interface Id>_<SrcSet>.log`	LKM Runtime	Information about Delta Extraction
`<System Temp Dir or local FTP dir>/ ZODI_<Interface Id>_<SrcSet>_<Context>.log`	LKM – Runtime	SQLLDR log file
`<System Temp Dir or local FTP dir>/ ZODI_<Interface Id>_<SrcSet>_<Context>.out`	LKM – Runtime	OS std output during SQLLDR execution, may contain information, e.g. when SQLLDR is not

		installed
<System Temp Dir or local FTP dir>/ ZODI_<Interface Id>_<SrcSet>_<Context>.err	LKM - Runtime	OS error output during SQLLDR execution, may contain information, e.g. when SQLLDR is not installed

Controling ABAP Uploading in Development and in Production

During development, ABAP code is uploaded to the SAP system with every interface execution. This upload can be explicitely turned off by setting the LKM option UPLOAD_ABAP_CODE to No.

Once an Interface or Package has been unit tested and is ready to be migrated out of the development environment, ODI should no longer upload ABAP code, as the ABAP code will be transported by SAP's CTS (Change and Transport System).

Alternatively, the upload can be turned off using the FlexField SAP Allow ABAP Upload defined on the SAP data server in the Topology: The ABAP code is only uploaded, if the LKM option UPLOAD_ABAP_CODE and the Flexfield SAP Allow ABAPUpload are both set to Yes. So for disabling upload for non-development systems the user must set the Flexfield SAP Allow ABAPUpload to 0 in Topology.

Note: Before starting the extraction process, ODI verifies that the interface/scenario matches the code installed in SAP. Otherwise an exception is thrown.

Limitations of the SAP ABAP BW Adapter

The SAP ABAP BW adapter has the following limitations:

- The **Test** button for validating SAP Connection definition in ODI's Topology manager is not supported.
- The SAP BW data store type (InfoCube, InfoObject, ODS/DSO, OpenHub and Text Table) cannot be changed after a table has been reverse-engineered.
- The SAP ABAP KMs only support **Ordered** Joins.
- Full Outer join and Right outer joins are not supported.
- In one-to-many relationships (InfoCube and associated InfoObject join), the first data target should be InfoCube and then InfoObjects and its TextTables

Knowledge Module Options Reference

RKM SAP BW

Option	Values	Mandatory	Description
USE_GUI	Yes | No	Yes	If set to Yes, the Tree Metadata Browser UI for selecting SAP BW data target to reverse-engineer is shown. If Set to No, only the specified

			data target in the KM option is reverse-engineered.
UPLOAD_ABAP_CODE	Yes | No	Yes	Set this flag to Yes to upload the RFCs used by the RKM. This operation is required only when you run the RKM first against your SAP system. This option must be set to NO afterwards.
INFOCUBE_NAME	%	No	InfoCube to reverse
INFOOBJECT_NAME	%	No	InfoObject to reverse
ODS_DSO_NAME	%	No	ODS/DSO to reverse
OHD_TABLE_NAME	%	No	OpenHub table name
SAP_CONNECTION_POOL	SAP_BW_POOL	Yes	SAP Connection Pool name
SAP_CONNECTION_POOL_SIZE		Yes	Number of SAP connections to be maintained as a pool.
LOG_FILE_NAME		Yes	Logs file name and location.
UPLOAD_ABAP_CODE	Yes | No	Yes	Set this flag to Yes to upload the RFCs used by the RKM. This operation is required only when you run the RKM first against your SAP system. This option must be set to NO afterwards.
SAP_FUNCTION_GROUP_NAME	ZODIBW_FUNGRP_03	Yes	Name of the SAP function group where all generated ABAP programs will be uploaded.

LKM SAP BW to Oracle (SQLLDR)

Option	Values	Mandatory	Description
ABAP_PROGRAM_NAME		Yes	Name of the ABAP program into which the code is generated.
SAP_FUNCTION_GROUP_NAME	ZODI_LKM_FUNC_GRP	Yes	The name of the SAP function group where all generated ABAP programs will be uploaded.
UPLOAD_ABAP_CODE	Yes | No	Yes	Flag to indicate whether to upload the program for every interface

			execution.
EXECUTE_ABAP_CODE	Yes | No	Yes	Flag to indicate whether to execute the uploaded program.
VALIDATE	Yes | No	Yes	Flag to indicate whether to validate all the option values specified before executing the LKM
MAX_ALLOWED_ERRORS	1	Yes	When the number of discarded records is equal to MAX_ALLOWED_ERRORS the load process will stop.
SAP_CONNECTION_POOL	SAP_ODI_LKM_POOL_BI7	Yes	Name of the SAP connection pool
SAP_CONNECTION_POOL_SIZE	5	Yes	Number of SAP connections to be maintained as a pool.
FIELD_SEPARATOR	|	Yes	Field separator character to be used to write data to the extraction file, default "|".
FILE_FORMAT	DELIMITED|FIXED	Yes	Format of the extraction file.
FILE_TRANSFER_TIMEOUT	<Default>:100000	Yes	FTP transfer timeout in seconds.
FTP_PASSIVE_MODE	Yes | No	Yes	FTP transfer mode.
FTP_TRANSFER_METHOD	FTP	Yes	File transfer protocol used. Default is FTP. Other values are SFTP, SCP and NONE. If NONE is used, then the agent accesses directly the extraction file on a local or network drive.
CHECK_DATA_FOR_DELIMITERS	Yes | No	Yes	If set to Yes on delimited files, the ABAP program will check any data field and detect whether it contains the delimiter character. Appropriate action will be taken to handle the data values

			by raising exceptions.
DELETE_TEMPORARY_OBJECTS	Yes | No	Yes	Flag to Indicate whether to delete temporary objects created.
LOG_FILE_NAME		Yes	Logs file name and location.
TEMP_DIR		Yes	Temporary directory where extraction files are downloaded.
SSH_COMPRESSION	Yes | No	Yes	Set to Yes to activate data compression (SFTP only).
SSH_IDENTITY_FILE	<empty>	No	Specify the identify file name if using the SFTP protocol.
FIRST_REQ_ID	0	No	Start point of Delta Extraction
LAST_REQ_ID	0		End point of Delta Extraction

SAP ABAP ERP

Introduction

This section provides an introduction and the methodology to work with the adapter, which lets Oracle Data Integrator connect to SAP ERP system using SAP Java Connector (SAP JCo) libraries. This adapter allows mass data extraction from SAP ERP systems.

The Knowledge Modules for SAP ABAP BW are part of the Application Adapters for Data Integration for SAP Application.

If this is the first time you are using the SAP ABAP – ERP connector, it is recommended to use the *Getting Started with SAP ABAP Adapter guide*. It contains the complete pre-requisites list as well as step-by-step instructions including SAP connection testing.

Overview

- RKM SAP ERP enables Oracle Data Integrator to connect to SAP ERP system using SAP JCo libraries and perform a customized reverse engineering of SAP metadata.
- LKM SAP ERP to Oracle (SQLLDR) is in charge of extracting and loading data from SAP ERP system (Source) to an Oracle Staging Area.

Overview of the SAP ABAP Integration Process

Reverse-Engineering Process

Reverse-engineering is using the RKM SAP ERP. This knowledge module automatically installs the required RFC programs to retrieve the metadata about SAP tables. It can extract the list of SAP tables and display it in a tree Metadata Browser graphical interface. The user can select the list of tables to reverse-engineer from this interface. To call the uploaded ABAP code, the KM uses the `OdiSAPAbapExecute` open tool that must be installed prior to reverse-engineering.

In the reverse-engineering process, tables, primary keys, foreign keys and index are reverse-engineered into an Oracle Data Integrator model.

Integration Process

Data integration from SAP is managed by the LKM SAP ERP to Oracle (SQLLDR). This KM can be used for interfaces sourcing from SAP via ABAP and having a Staging Area located in an Oracle Database engine.

The KM first generates optimized ABAP code corresponding to the extraction required for a given interface. This code includes filters and joins that can be processed directly in the source SAP server. This ABAP program is uploaded and can be executed using the `OdiSAPAbapExecute` open tool to generate the extraction file.

The KM then transfers this extraction file to a preconfigured FTP server. This file is downloaded from this server using FTP, SFTP, SCP, etc.to the machine where the Oracle Staging Area is located, and finally loaded using SQL*Loader to the staging area. The agent can also directly read the extraction file on the FTP server's disk.

The rest of the integration process (Data quality check and integration) is managed with regular Oracle Data Integration KMs.

SAP ABAP Knowledge Modules

The Oracle Data Integrator SAP ABAP Knowledge Modules provide integration from SAP ERP systems using SAP JCo libraries. This set of KMs has the following features:

- Reads SAP data from SAP ERP system.
- Loads this SAP data into Oracle Staging Area.
- Reverse-engineers SAP Metadata and proposes a tree browser to pick up only the required Metadata.
- Uses flexfields to map the SAP table types (Transparent, Cluster and Pool).

Oracle Data Integrator provides following Knowledge Modules (KM) for handling SAP data:

Type	Knowledge Module	Description
Load	LKM SAP ERP to Oracle(SQLLDR)	Extracts data from SAP ERP into a flat file and then loads it into Oracle Staging Area using the SQL*LOADER command line utility.
Reverse-Engineer	RKM SAP ERP	Reverse-engineering Knowledge Module to retrieve SAP specific metadata for modules, application components, tables, columns, primary keys, foreign keys and indexes.

Platform Support

SAP ABAP KM is certified for Oracle Data Integrator 10gR3 (10.1.3.5.1) and above.

The Oracle Data Integrator SAP ABAP knowledge modules are certified on the following SAP ERP platforms and versions:

- SAP 4.6c
- SAP ECC6.0

Installation and Configuration

System Requirements and Certification

Before performing any installation you should read the system requirements and certification documentation to ensure that your environment meets the minimum installation requirements for the products you are installing.

The Oracle Data Integrator requirements are listed in the *Oracle Data Integrator Installation Guide* available from the Oracle Technology Network (OTN).

The requirements specific to the Oracle Data Integrator SAP ABAP Adapter are:

- The minimum patch level for Oracle Data Integrator 10gR3 is version 10.1.3.5.1_01 (Metalink Patch #8610114).
- A JCo version compatible with adapter must be used. The list of supported JCo versions is available in the Compatibility Matrix available from the Oracle Technology Network (OTN). A minimum version of JCo 3.0.2 is required.
- A JVM version compatible with both Oracle Data Integrator and JCo must be used. A minimum version of JVM 1.5 is required due to JCo pre-requisites.

- LKM SAP ERP to Oracle (SQLLDR) requires a FTP server to upload data from the SAP ERP system. This data is either read locally by the agent executing the interface (when this agent runs on the FTP server machine), or remotely (when this agent is located on a different machine than the FTP server). This FTP server must be accessible over the network from both the SAP ERP machine and the agent machine.
- SQL*Loader is required on the machine running the agent when executing interfaces using LKM SAP ERP to Oracle (SQLLDR). SQL*Loader is used for loading data extracted from SAP to the Oracle staging area.

Gathering SAP Connection Information

In order to connect to the SAP ERP system, you must request the following information from your SAP administrators:

- **SAP ERP System IP Address or Hostname**: IP address/ Hostname is the technical name given to the host on which SAP is running.
- **SAP User**: SAP User is the unique user name given to a user for logging on the SAP System.
- **SAP Password**: Case-sensitive password used by the user to log in.
- **SAP Language**: Code of the language used when logging in For example: `EN` for English, `DE` for German.
- **SAP Client Number**: The three-digit number assigned to the self-contained unit which is called *Client* in SAP. A Client can be a training, development, testing or production client or represent different divisions in a large company.
- **SAP System Number**: The two-digit number assigned to a SAP instance which is also called Web Application Server or WAS.
- **SAP System ID**: The three-character, unique identifier of a SAP system in a landscape.
- **SAP SNC Connection Properties (optional) SAP Router String (optional)**: SAP is enhancing security through SNC and SAP router. It is used when these securities are implemented.

Note: All the connection data listed above (except SAP SNC Connection Properties and SAP Router String) are mandatory and should be requested from the SAP Administrators. You may consider requesting support during connection setup from your SAP administrators.

Getting the Right Privileges

The SAP Adapter requires privileges to perform set up and execution operations. Please provide your administrators with the list of privileges listed in the *Appendix A - SAP ABAP Required Privileges* of the *Getting Started with Sap ABAP ERP Adapter* guide.

These privileges are required for the SAP user that they will provide you to login the SAP System.

Gathering FTP Connection Information

The SAP system will push data to a server using FTP. For later setup, gather the following information from your system administrator:

- FTP userID
- FPT login
- Directory path for storing temporary data files

Validate that the FTP server is accessible both from SAP System and from ODI agent machine.

Installing and Configuring JCo

The SAP adapter uses JCo to connect to the SAP system. JCo must be configured before proceeding with the project.

To install and configure JCo:

1. Download a supported JCo version for your configuration from http://service.sap.com. Check the *Oracle Data Integrator Certification Matrix* available on the Oracle Technology Network to choose the appropriate SAP JCo version. Note that a minimum version of JCo 3.0.2 is required.
2. Unzip the appropriate distribution package into an arbitrary directory `{sapjco-install-path}`.
3. Follow the installation instructions in `{sapjco-install-path}/javadoc/installation.html` for the respective platform.
4. Copy `sapjco3.jar` and `sapjco3.dll` (or respective binary) into the `oracledi/drivers` directory.
5. Check the JCo installation.

Note: Changing the JCo library installed in the `{windows-dir}\system32` directory of a machine running other SAP tools or components may cause issues with these components. Please check with your machine administrator before performing this change.

Setting up the Topology

If you are using this adapter in an existing Oracle Data Integrator version, the topology components required for this adapter are not installed yet.

You must perform the following operations after upgrading your Oracle Data Integrator version:

1. If the SAP ABAP technology does not exist in your Master Repository, import the SAP ABAP technology in Synonym INSERT_UPDATE mode from the `/impexp` folder.
2. Open the **Java BeanShell** technology and check on Language tab, that the **JYTHON** language is listed. If not, add it.
3. Create a **File** Physical Schema pointing to an existing FTP server into which the extraction file will be pushed from SAP and picked up for SQL*Loader. Set the parameters for this data server as follows:
   - **Host (Data Server)**: FTP Server IP host name or IP address.
   - **User**: Username to log into FTP server.
   - **Password**: This user's password.
   - **Data Schema:** Path on FTP server
4. Create a **File** Logical Schema called **File Server for SAP ABAP,** if it does not exist yet**.** This Logical Schema name is fixed and must be mapped to the Physical Schema created in the previous step.
5. Configure the `OdiSAPAbapExecute` Open Tool in your repository. The Open Tool is available in your classpath after an upgrade, and needs to be added to the list of tools in the Master Repository. This process is described in the Using *Open Tools* section of the *Oracle Data Integrator Tools Reference Manual*.
   The class name for this open tool is: `oracle.odi.sap.km._OdiSapAbapExecute`

Working with the SAP ABAP ERP KMs

The Oracle Data Integrator SAP ABAP ERP KMs enable to reverse and extract data from SAP ERP.

To use SAP ERP data in your Oracle Data Integrator integration projects, you must:

1. Define the Topology.
2. Set up the Project.
3. Create a model and reverse-engineer SAP tables.
4. Design an Interface using the LKM SAP ERP to Oracle (SQLLDR). Use the SAP ERP datastore as source of such an integration interface.

Defining the Topology

You must perform the following operations after installing or upgrading your Oracle Data Integrator version:

1. Connect to Topology Manager.
2. If the SAP ABAP technology does not exist in your Master Repository, import the SAP ABAP technology in Synonym INSERT_UPDATE mode from the `/impexp` folder.
3. Perform an upgrade of the Master Repository. Refer to the *Oracle Data Integrator Installation Guide* on OTN for more information on the Master Repository upgrade process.
4. In Topology Manager, open the JavaBeanShell technology and check on the Language tab that the JYTHON language is listed. If not, add it.
5. Create a File data server pointing to an existing FTP server into which the extraction file will be pushed from SAP and picked up for SQL*Loader. Set the parameters for this data server as follows:
   - **Host (Data Server)**: FTP server IP host name or IP address.
   - **User**: Username to log into FTP server.
   - **Password**: Password for the user.
6. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server to upload or download extraction files from the remote location. This path is used when uploading extraction files from the SAP ERP system into the FTP server. It is also used by a remote agent to download the extraction files. Note that this path must use slashes and must end with a slash character.
   - **Work Schema**: Local path on the FTP server's machine. This path is used by an agent installed on this machine to access the extraction files without passing via the FTP server. This access method is used if the FTP_TRANSFER_METHOD parameter of the LKM SAP ERP to Oracle (SQLLDR) is set to NONE. As Work Schema is an OS file name, slashes/ backslashes should be used according to OS. Path names need to end on slash/ backslash.

     Path names given on Data and Work schemas are not necessarily the same: the FTP service may provide access to a FTP directory named `/sapfiles` while the files are can be stored locally in `c:\inetpub\ftproot\sapfiles`.

   Refer to the *File Transfer Configurations* section in the *SAP ABAP* chapter of the *Oracle Data Integrator Knowledge Modules Reference Guide*.
7. If the corresponding Logical Schema called `File Server for SAP ABAP` does not exist yet, create it. This Logical Schema name is fixed and must be mapped to the Physical Schema created in the previous step.

You can now add the SAP connection information.

To configure a SAP ABAP data server:

1. Create a data server for **SAP ABAP** technology. This data server represents the SAP connection information.

2. Set the parameters for this data server as follows:
    - **Name**: SAP_ERP. The name of the data server as it will appear in ODI.
    - **Host (Data Server)**: SAP ERP System IP Address or Hostname.
    - **User**: SAP User, as provided by the SAP Administrator.
    - **Password**: This user's SAP Password. This password is case-sensitive.
3. Set the flexfields values for this data server in the Flexfields tab.
    - **SAP Language**: Code of the language used when logging in. For example EN for English, DE for German.
    - **SAP Client Number**: The three-digit number assigned to the self-contained unit which is called *Client* in SAP. A Client can be a training, development, testing or production client or represent different divisions in a large company.
    - **SAP System Number**: The two-digit number assigned to a SAP instance which is also called Web Application Server or WAS.
    - **SAP System ID**: The three-character, unique identifier of a SAP system in a landscape.
    - **SAP SNC Connection Properties**: SNC Connection Properties. This parameter is optional and can be left empty.
    - **SAP Router String**: Router String. This parameter is optional and can be left empty.
4. Create a Physical Schema under the data server.
5. Create a Logical Schema for this Physical Schema in the appropriate context.

Note: The **Test** button for validating the SAP Connection and the FTP Connection definition is not supported.

Except for Data Server Name, all the parameters that you provide while defining the SAP Data Server should be provided by the SAP Administrators. See *Gathering SAP Connection Information* for more information about these parameters.

Setting up the Project

Import the following KMs into your Oracle Data Integrator project:

- RKM SAP ERP
- LKM SAP ERP to Oracle (SQLLDR)
- Import in addition the standard LKMs, IKMs and CKMs to perform data extraction and data quality checks for your project.

For more information about importing a KM, please refer to the *Oracle Data Integrator User's Guide*.

Creating and Reverse-Engineering a Model

Note: Before using SAP ABAP KM, make sure that the OdiSAPAbapExecute open tool has already been installed. For more information, refer to the Installation and Configuration section.

To create and reverse-engineer a SAP ERP Model:

1. Connect to Designer.
2. In the Models tree view, click **Insert Model**.
3. In the **Definition** tab, enter the Model name in the **Name** field.
4. In the **Technology** field, select the SAP ABAP technology.

5. In the **Logical Schema** field, select the Logical Schema on which your model will be based.
6. Go to the **Reverse** tab, select **Customized Reverse**, and select a **Context** which will be used for the Model's reverse-engineering.
7. Select the `RKM SAP ABAP.<PROJECT_NAME>`.
8. Click **Apply**.
9. Click **Reverse**, and then click **Yes** to validate the changes.
10. Click **OK.**
11. The Session started window appears. Click **OK**.
12. The **Tree Metadata Browser** appears if the `USE_GUI` KM option is set to `Yes` (default value).
13. Select the table(s) to reverse.
14. Click **Reverse**.

The tables selected in the Tree Metadata Browser are reverse-engineered and appear under the new Model.

Designing an Interface Using the SAP ABAP KM

To create an interface that loads SAP ERP data into your Oracle Data warehouse table:

1. Create an interface with source datastores from the SAP ABAP Model created previously. This interface should have an Oracle target or use an Oracle schema as the Staging Area.
2. Create joins, filters and mappings for your interface.
3. In the **Flow** tab of the interface, select the source set containing the SAP ABAP source table(s) and select the `SAP ERP LKM to Oracle (SQLLDR)`.
4. Click **Apply** to save your interface.
5. Click **Execute** to run the interface.

File Transfer Configurations

The ODI SAP connector extracts data using ABAP programs. At the end of the extraction process these ABAP programs will push the data file to an FTP server. Ideally this FTP server is located on the ODI agent machine. If this is not the case, the ODI agent will download the file from the FTP server to the agent for loading the data using SQLLDR. This download can be performed using FTP, SFTP or SCP.

Configuration 1: FTP Server is installed on an ODI Agent machine

This configuration is used, when `FTP_TRANSFER_METHOD = NONE`. In this configuration the data movements described will be performed:

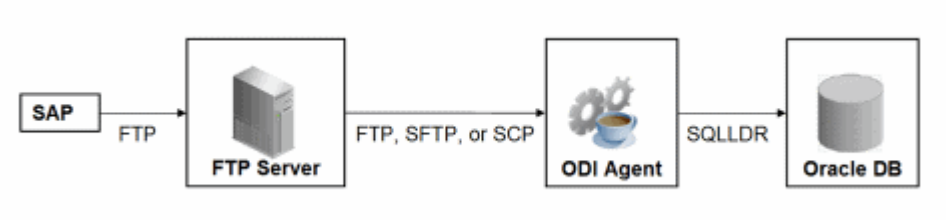
1. The ABAP program extracts the data and pushes the data file to the FTP server defined by the FTP data server. The file is stored in the directory given by the FTP server's data schema.
2. SQLLDR locates the data file using the work schema of the FTP server and uploads the data into Oracle DB.

This configuration requires the following Topology settings in ODI:

1. Create a File data server pointing to the FTP server/ ODI Agent box:
   - **Host (Data Server)**: FTP server/ ODI Agent IP host name or IP address. This
   - **Hostname / IP address** must be accessible from SAP system.
   - **User**: Username to log into FTP server.
   - **Password**: Password for the user.
2. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server for SAP extraction files. This path is used when uploading extraction files from the SAP system into the FTP server. Note that this path must use slashes and must end with a slash character.
   - **Work Schema**: Local path on the FTP server's machine. This path is used by the agent/SQLLDR installed on this machine to access the extraction files. As Work Schema is an OS file name, slashes/ backslashes should be used according to OS. Path names need to end on slash/ backslash.

   The path names given on Data and Work schemas are usually not the same: the FTP service may provide access to a FTP directory named `/sapfiles` while the files can be stored locally in `c:\inetpub\ftproot\sapfiles`. .

Configuration 2: FTP Server is not installed on ODI Agent machine



This configuration is used, when `FTP_TRANSFER_METHOD <> NONE`. In this configuration the data movements described will be performed:

1. The ABAP program extracts the data and pushes the data file to the FTP server defined by the FTP data server. The file is stored in the directory given by the FTP server's data schema.
2. The ODI agent downloads the file into the directory given by KM Option TEMP_DIR.
3. SQLLDR loads this file up into Oracle DB

This configuration requires the following Topology settings in ODI:

3. Create a File data server pointing to the FTP server into which the extraction file will be pushed from SAP and picked up from for SQL*Loader.

   Set the parameters for this data server as follows:
   - **Host (Data Server)**: FTP server IP host name or IP address. This hostname / IP address must be accessible both from SAP system and from ODI agent.
   - **User**: Username to log into FTP server.
   - **Password**: Password for the user.
4. In this File data server create a Physical Schema representing the folder in the FTP host where the extraction file will be pushed. Specify the Data and Work Schemas as follows:
   - **Data Schema**: Path on the FTP server to upload or download extraction files from the remote location. This path is used when uploading extraction files from the SAP system into the FTP server. It is also used by the agent to download the extraction files. Note that this path must use slashes and must end with a slash character.

- **Work Schema**: <undefined>; this path is left blank, as data files are never accessed directly from the FTP server's file system.

Please note that data files will be downloaded to the ODI Agent. The default directory for download is the system's temp directory. On UNIX this is usually `/tmp` and on Windows `c:\Documents and Settings\<user>\Local Settings\Temp`. This directory can be overriden by setting redefining the KM option TEMP_DIR.

Controling ABAP Uploading in Development and in Production

During development, ABAP code is uploaded to the SAP system with every interface execution. This upload can be explicitely turned off by setting the LKM option UPLOAD_ABAP_CODE to No.

Once an Interface or Package has been unit tested and is ready to be migrated out of the development environment, ODI should no longer upload ABAP code, as the ABAP code will be transported by SAP's CTS (Change and Transport System).

Alternatively, the upload can be turned off using the FlexField SAP Allow ABAP Upload defined on the SAP data server in the Topology: The ABAP code is only uploaded, if the LKM option UPLOAD_ABAP_CODE and the Flexfield SAP Allow ABAPUpload are both set to Yes. So for disabling upload for non-development systems the user must set the Flexfield SAP Allow ABAPUpload to 0 in Topology.

Note: Before starting the extraction process, ODI verifies that the interface/scenario matches the code installed in SAP. Otherwise an exception is thrown.

Log Files

During the RKM and LKM execution several log files are created. These log files may contain valuable details for troubleshooting.The list below describes the different log files and their usage:

Default Log File Name	KM / Phase	Content
`<System Temp Dir>/sap_rkm_erp_<ODI Session Number>.log`	RKM	Execution Log of metadata retrieval
`<System Temp Dir>/sap_rkm_erp_<ODI Session Number>.log.opentool.log`	RKM	Information about first time installation of SAP RFC for RKM
`<System Temp Dir>/ODI_<Interface Id>_<SrcSet>.genlog`	LKM – Generation Time	Information about code generation for ABAP extractor.
`<System Temp Dir>SAPAbapExecuteOpenTool_<Interface Id>.log`	LKM - Runtime	Information about installation of ABAP extractor.
`<System Temp Dir or local FTP dir>/ZODI_<Interface Id>_<SrcSet>_<Context>.log`	LKM – Runtime	SQLLDR log file
`<System Temp Dir or local FTP dir>/ZODI_<Interface Id>_<SrcSet>_<Context>.out`	LKM – Runtime	OS std output during SQLLDR execution, may contain information, e.g. when SQLLDR is not installed
`<System Temp Dir or local FTP dir>/ZODI_<Interface Id>_<SrcSet>_<Context>.err`	LKM - Runtime	OS error output during SQLLDR execution, may contain information, e.g. when SQLLDR is

		not installed

Limitations of the SAP ABAP Adapter

The SAP ABAP adapter has the following limitations:

- The **Test** button for validating SAP Connection definition in ODI's Topology manager is not supported.
- SAP table type (Transparent, Pool, and Cluster) cannot be changed after a table has been reverse-engineered.
- SAP ABAP KMs only support Ordered Joins.
- Full Outer join and Right outer joins are not supported.
- In one- to-many relationships, the first table of a join needs to be the one-table, for example when joining MARA and MARC, MARA needs to be the first table in the join.

Knowledge Module Options Reference

RKM SAP ERP

Option	Values	Mandatory	Description
USE_GUI	`Yes | No`	Yes	If set to Yes, the Tree Metadata Browser UI for selecting SAP tables to reverse-engineer is shown. If Set to No, only the specified table name or module name, or application component name in the KM option is reverse-engineered.
SAP_MODULE_NAME	%	No	This option is used to select a SAP Module to reverse-engineer. You can use wildcards in this parameter.
SAP_APP_COMP_NAME	%	No	This option is used to select a SAP Application Component to reverse-engineer. You can use wildcards in this parameter.
SAP_PACKAGE_NAME	%	No	This option is used to select a SAP Package to reverse-engineer. You can use wildcards in this parameter.
SAP_TABLE_DESC	%	No	This option is used to select a SAP Table to reverse-engineer using its description. You can use wildcards in this

			parameter.
SAP_TABLES_NAME		No	This option is used for selecting multiple tables to reverse-engineer., for example: MARA,BSEG,HRP1270
SAP_CONNECTION_POOL	SAP_POOL_NAME_ECC6	Yes	SAP Connection Pool name
SAP_CONNECTION_POOL_SIZE		Yes	Number of SAP connections to be maintained as a pool.
GET_FOREIGN_KEYS	Yes | No	No	Set this parameter to Yes to reverse foreign keys of SAP tables.
GET_INDEXES	Yes | No	No	Set this parameter to Yes to reverse indexes of SAP tables.
GET_PRIMARY_KEYS	Yes | No	No	Set this parameter to Yes to reverse the primary keys of SAP tables.
LOG_FILE_NAME		Yes	Logs file name and location.
UPLOAD_ABAP_CODE	Yes | No	Yes	Set this flag to Yes to upload the RFCs used by the RKM. This operation is required only when you run the RKM first against your SAP system. This option can be set to NO afterwards.
SAP_FUNCTION_GROUP	SAP_ERP_FUN_GRP	Yes	Name of the SAP function group where all generated ABAP programs will be uploaded.

LKM SAP ERP to Oracle (SQLLDR)

Option	Values	Mandatory	Description
ABAP_IMPORT_PARAMETER	IV_DELIMITER,BAPIEXT-VALUE;IV_FILENAME,BAPIEXT-VALUE;IV_USER,BAPI0012_3-NAME;IV_PWD,BAPI0012_3-NAME;IV_HOST,BAPI0012_3-TAXJURCODE;IV_HASHVALUE,BAPI0012_3-TAXJURCODE	Yes	ABAP Import Parameter helps to generate ABAP Code
ABAP_PROGRAM_NAME		Yes	Name of the ABAP program into which the code is generated.

SAP_FUNCTION_GROUP_NAME	ZODI_LKM_FUNC_GRP	Yes	The name of the SAP function group where all generated ABAP programs will be uploaded.
UPLOAD_ABAP_CODE	Yes | No	Yes	Flag to indicate whether to upload the program for every interface execution.
EXECUTE_ABAP_CODE	Yes | No	Yes	Flag to indicate whether to execute the uploaded program.
VALIDATE	Yes | No	Yes	Flag to indicate whether to validate all the option values specified before executing the LKM
SAP_CONNECTION_POOL	SAP_ODI_LKM_POOL_ECC6	Yes	Name of the SAP connection pool
SAP_CONNECTION_POOL_SIZE	5	Yes	Number of SAP connections to be maintained as a pool.
FIELD_SEPARATOR	|	Yes	Field separator character to be used to write data to the extraction file, default "|".
FILE_FORMAT	DELIMITED|FIXED	Yes	Format of the extraction file.
FILE_TRANSFER_TIMEOUT	<Default>:100000	Yes	FTP transfer timeout in seconds.
FTP_PASSIVE_MODE	Yes | No	Yes	FTP transfer mode.
FTP_TRANSFER_METHOD	FTP	Yes	File transfer protocol used. Default is FTP. Other values are SFTP, SCP and NONE. If NONE is used, then the agent accesses directly the extraction file on a local or network

			drive.
CHECK_DATA_FOR_DELIMITERS	Yes | No	Yes	If set to Yes on delimited files, the ABAP program will check any data field and detect whether it contains the delimiter character. Appropriate action will be taken to handle the data values by raising exceptions.
DELETE_TEMPORARY_OBJECTS	Yes | No	Yes	Flag to Indicate whether to delete temporary objects created.
LOG_FILE_NAME		Yes	Logs file name and location.
TEMP_DIR		Yes	Temporary directory where extraction files are downloaded.
SSH_COMPRESSION	Yes | No	Yes	Set to Yes to activate data compression (SFTP only).
SSH_IDENTITY_FILE	<empty>	No	Specify the identify file name if using the SFTP protocol.

Knowledge Modules

Type	Knowledge Module	Description
Check	CKM SAS	Checks data integrity against constraints defined on a SAS table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this KM if you plan to check data integrity on a SAS tables. This CKM is dedicated to SAS.
Integrate	IKM SAS Control Append	Integrates data in a SAS target table in replace/append mode. When flow data needs to be checked using a CKM, this IKM creates a temporary staging table before invoking the CKM. Consider using this IKM if you plan to load your SAS target table in replace mode, with or without data integrity check. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM SAS Incremental Update	Integrates data in a SAS target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Consider using this IKM if you plan to load your SAS target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Load	LKM File to SAS	Loads data from a File to a SAS staging area database. Consider using this LKM if your source is a flat file and your staging area is a SAS server.
Load	LKM SAS to SQL	Loads data from a SAS source to any Generic SQL staging area. This LKM is similar to the standard “LKM SQL to SQL” described in section “Generic SQL” except that it is dedicated to SAS as source.
Load	LKM SQL to SAS	Loads data from any Generic SQL source database to a SAS staging area. This LKM is similar to the standard “LKM SQL to SQL” described in section “Generic SQL” except

		that it is dedicated to SAS as target.
Reverse-Engineer	RKM SAS	Reverse engineering Knowledge Module to retrieve the table and view structures in SAS (columns only).

Specific Requirements

Knowledge Modules for SAS leverage the SAS/CONNECT and SAS/BASE utilities. Therefore, both these modules should be installed on the machine running the Oracle Data Integrator Agent.

The Knowledge Modules also use the SAS interpreter to run SAS commands. You should know the location of the SAS interpreter (It is called `sas.exe` on Windows platforms) and provide it to the Knowledge Modules in the `SAS_COMMAND` KM option.

See the SAS documentations for more information on SAS/CONNECT and SAS/BASE configuration.

Note: Oracle Data integrator does not use the JDBC/ODBC drivers from the SAS/SHARE package. This component is not available on all SAS versions.

The following topics can help you configure these Knowledge Modules for SAS.

Obtaining a SAS Username and Password

You should ask the SAS Administrator for a valid username and password to connect to the SAS server. This user should have enough privileges to read/write data to the data libraries and to read/write and create objects in the work libraries. Typically, an administrator account could be used. You should also ask for the SAS server name.

Configuring Oracle Data Integrator for SAS

The following restrictions apply when using the SAS Knowledge Modules:

1. The JDBC URL of your SAS server (in the JDBC Tab of the Topology) must contain the path to the SAS/CONNECT Signon script used to connect to the SAS server. For example: `p:\oracle\sas\saslink\tcpunix.scr`.
2. The SAS/CONNECT Signon script used to connect to the SAS server should be accessible on the machine running the Oracle Data Integrator Agent. In this file, the username and password should be set using variables called `userid` and `password`, as shown below. These variables are set at run-time by the Knowledge Modules when connecting to the server and passed to the script.

```
/*----------------UNIX LOGON----------------*/
/*------------------------------------------*/
   *input 'Userid?';
   type "&userid" LF;
   waitfor 'Password', 30 seconds : nolog;
   *input nodisplay 'Password?';
   type "&password" LF;
```

3. Remove the "`$`" signs for all prefixes of your physical schema definitions. For example, the prefix for the integration tables should be "`I_`" instead of "`I$_`".
4. Primary keys and foreign keys do not exist in SAS. You can choose to add them manually in your Models.

SAS Remote Tables vs. Local Tables

The Knowledge Modules process data differently depending on the location of the Oracle Data Integrator Agent. When the Agent is installed on the machine hosting the SAS data, SAS tables are considered as *Local* Tables. Otherwise, they are considered as *Remote* tables.

The *Local* or *Remote* nature of the SAS tables processed by an Interface can be specified through the `REMOTE_LIB` KM option. When set to `"Yes"`, the Knowledge Modules will assume that the tables are *Remote*.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Integrate	IKM Sybase ASE Incremental Update	Integrates data in a Sybase Adaptive Server Enterprise target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Sybase Adaptive Server Enterprise target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Sybase ASE Slowly Changing Dimension	Integrates data in a Sybase Adaptive Server Enterprise target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Sybase Adaptive Server Enterprise target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore.
Journalize	JKM Sybase ASE Consistent	Creates the journalizing infrastructure for consistent journalizing on Sybase Adaptive Server Enterprise tables using triggers. Enables consistent Changed Data Capture on Sybase Adaptive Server Enterprise.
Journalize	JKM Sybase ASE Simple	Creates the journalizing infrastructure for simple journalizing on Sybase Adaptive Server Enterprise tables using triggers.

		Enables simple Changed Data Capture on Sybase Adaptive Server Enterprise.
Load	LKM SQL to Sybase ASE (BCP)	Loads data from any SQL compliant database to a Sybase Adaptive Server Enterprise staging area database using the BCP (Bulk Copy Program) utility. This LKM unloads the source data in a temporary file and calls the Sybase BCP utility to populate the staging table. Because this method uses the native BCP utility, it is often more efficient than the “LKM SQL to SQL” method when dealing with large volumes of data. Consider using this LKM if your source data located on a generic database is large, and when your staging area is a Sybase Adaptive Server Enterprise database.
Load	LKM Sybase ASE to Sybase ASE (BCP)	Loads data from a Sybase Adaptive Server Enterprise source database to a Sybase Adaptive Server Enterprise staging area database using the native BCP out/BCP in commands. This module uses the native BCP (Bulk Copy Program) command to extract data in a temporary file. Data is then loaded in the target staging Sybase Adaptive Server Enterprise table using the native BCP command again. This method if often more efficient than the standard “LKM SQL to SQL” when dealing with large volumes of data. Consider using this LKM if your source tables are located on a Sybase Adaptive Server Enterprise instance and your staging area is on a different Sybase Adaptive Server Enterprise instance.

Specific Requirements

Some of the Knowledge Modules for Sybase Adaptive Server Enterprise use the BCP specific loading utility. The following restrictions apply when using such Knowledge Modules. Refer to the Sybase Adaptive Server Enterprise documentation for additional information on these topics.

1. The BCP utility as well as the Sybase Adaptive Server Enterprise Client must be installed on the machine running the Oracle Data Integrator Agent.
2. The server names defined in the Topology must match the Sybase Adaptive Server Enterprise Client connect strings used for these servers.
3. White spaces in server names defined on the Client are not supported.
4. The target staging area database must have option "select into/bulk copy"
5. Execution can remain pending if the file generated by the BCP program is empty.
6. For performance reasons, it is often recommended to install Oracle Data Integrator Agent on the target server machine.

Knowledge Modules

Refer to section “Generic SQL” for additional Knowledge Modules that work with this database.

Type	Knowledge Module	Description
Check	CKM Sybase IQ	Checks data integrity against constraints defined on a Sybase IQ table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this KM if you plan to check data integrity on a Sybase IQ database. This CKM is optimized for Sybase IQ.
Integrate	IKM Sybase IQ Incremental Update	Integrates data in a Sybase IQ target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to guess which records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Sybase IQ target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same data server as the target.
Integrate	IKM Sybase IQ Slowly Changing Dimension	Integrates data in a Sybase IQ target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Sybase IQ target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore.
Load	LKM File to Sybase IQ (LOAD TABLE)	Loads data from a File to a Sybase IQ staging area database using the LOAD TABLE SQL command. Because this method uses the native LOAD TABLE

		command, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data. However, the loaded file must be accessible from the Sybase IQ machine. Consider using this LKM if your source is a large flat file and your staging area is a Sybase IQ database.
Load	LKM SQL to Sybase IQ (LOAD TABLE)	Loads data from any Generic SQL source database to a Sybase IQ staging area database using the native LOAD TABLE SQL command. This LKM unloads the source data in a temporary file and calls the Sybase IQ LOAD TABLE SQL command to populate the staging table. Because this method uses the native LOAD TABLE, it is often more efficient than the “LKM SQL to SQL” method when dealing with large volumes of data. Consider using this LKM if your source data located on a generic database is large, and when your staging area is a Sybase IQ database.

Specific Requirements

Some of the Knowledge Modules for Sybase IQ use the LOAD TABLE specific command. The following restrictions apply when using such Knowledge Modules. Refer to the Sybase IQ documentation for additional information on these topics.

1. The file to be loaded by the LOAD TABLE command needs to be accessible from the Sybase IQ machine. It could be located on the file system of the server or reachable from a UNC (Unique Naming Convention) path or mounted from a remote file system.
2. UNC file paths are supported but not recommended as they may decrease performance.
3. For performance reasons, it is often recommended to install Oracle Data Integrator Agent on the target server machine.

Knowledge Modules

Refer to section Generic SQL for additional Knowledge Modules that work with this database.

The Oracle Data Integrator KMs include specific optimizations for Teradata. These optimizations and their configuration are detailed in the KM Optimizations for Teradata section.

Type	Knowledge Module	Description
Check	CKM Teradata	Checks data integrity against constraints defined on a Teradata table. Rejects invalid records in the error table created dynamically. Can be used for static controls as well as flow controls. Consider using this KM if you plan to check data integrity on a Teradata database. This KM support the following Teradata optimizations: • Primary Indexes and Statistics
Integrate	IKM File to Teradata (TTU)	This IKM is designed to leverage the power of the Teradata utilities for loading files directly to the target. It is restricted to one file as source and one Teradata table as target. Depending on the utility you choose, you'll have the ability to integrate the data in either replace or incremental update mode. Consider using this IKM if you plan to load a single flat file to your target table. Because it uses the Teradata utilities, this IKM is recommended for very large volumes. To use this IKM, you have to set the staging area to the source file's schema. This KM support the following Teradata optimizations: • Primary Indexes and Statistics • Support for Teradata Utilities • Optimized Temporary Tables Management
Integrate	IKM SQL to Teradata (TTU)	Integrates data from a SQL compliant database to a Teradata database target table using Teradata Utilities. This IKM is designed to leverage the power of the Teradata utilities for loading source data directly to the target. It can only be used when all source tables belong to the same data server and when this data server is used as a staging area (staging area on source). Source data can be unloaded into a file or Named Pipe and then loaded by the selected Teradata utility directly in the target table. Using

		named pipes avoids landing the data in a file. This IKM is recommended for very large volumes. Depending on the utility you choose, you'll have the ability to integrate the data in either replace or incremental update mode. Consider using this IKM when: • You plan to load your target table with few transformations on the source • All your source tables are on the same data server (used as the staging area) • You don't want to stage your data between the source and the target To use this IKM, you have to set the staging area to the source data server's schema. This KM support the following Teradata optimizations: • Primary Indexes and Statistics • Support for Teradata Utilities • Support for Named Pipes • Optimized Temporary Tables Management
Integrate	IKM Teradata Control Append	Integrates data in a Teradata target table in replace/append mode. When flow data needs to be checked using a CKM, this IKM creates a temporary staging table before invoking the CKM. Consider using this IKM if you plan to load your Teradata target table in append mode, with or without data integrity check. To use this IKM, the staging area must be on the same data server as the target Teradata table. This KM support the following Teradata optimizations: • Primary Indexes and Statistics • Optimized Temporary Tables Management
Integrate	IKM Teradata Incremental Update	Integrates data in a Teradata target table in incremental update mode. This IKM creates a temporary staging table to stage the data flow. It then compares its content to the target table to calculatewhich records should be inserted and which others should be updated. It also allows performing data integrity check by invoking the CKM. Inserts and updates are done in bulk set-based processing to maximize performance. Therefore, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Teradata target table to insert missing records and to update existing ones. To use this IKM, the staging area must be on the same

		data server as the target. This KM support the following Teradata optimizations: • Primary Indexes and Statistics • Optimized Temporary Tables Management
Integrate	IKM Teradata Slowly Changing Dimension	Integrates data in a Teradata target table used as a Type II Slowly Changing Dimension in your Data Warehouse. This IKM relies on the Slowly Changing Dimension metadata set on the target datastore to figure out which records should be inserted as new versions or updated as existing versions. Because inserts and updates are done in bulk set-based processing, this IKM is optimized for large volumes of data. Consider using this IKM if you plan to load your Teradata target table as a Type II Slowly Changing Dimension. To use this IKM, the staging area must be on the same data server as the target and the appropriate Slowly Changing Dimension metadata needs to be set on the target datastore. This KM support the following Teradata optimizations: • Primary Indexes and Statistics • Optimized Temporary Tables Management This KM also includes a *COMPATIBLE* option. This option corresponds to the Teradata engine major version number. If this version is 12 or above, then a MERGE statement will be used instead of the standard INSERT then UPDATE statements to merge the incoming data flow into the target table.
Integrate	IKM Teradata to File (TTU)	Integrates data in a target file from a Teradata staging area in replace mode. This IKM requires the staging area to be on Teradata. It uses the native Teradata utilities to export the data to the target file. Consider using this IKM if you plan to transform and export data to a target file from your Teradata server. To use this IKM, the staging area must be different from the target. It should be set to a Teradata location. This KM support the following Teradata optimizations: • Support for Teradata Utilities
Load	LKM File to Teradata (TTU)	Loads data from a File to a Teradata staging area database using the Teradata bulk utilities. Because this method uses the native Teradata utilities to load the file in the staging area, it is more efficient than the standard “LKM File to SQL” when dealing with large volumes of data.

		Consider using this LKM if your source is a large flat file and your staging area is a Teradata database. This KM support the following Teradata optimizations: • Statistics • Optimized Temporary Tables Management
Load	LKM SQL to Teradata (TTU)	Loads data from a SQL compliant source database to a Teradata staging area database using a native Teradata bulk utility. This LKM can unload the source data in a file or Named Pipe and then call the specified Teradata utility to populate the staging table from this file/pipe. Using named pipes avoids landing the data in a file. This LKM is recommended for very large volumes. Consider using this IKM when: • The source data located on a SQL compliant database is large • You don't want to stage your data between the source and the target • Your staging area is a Teradata database. This KM support the following Teradata optimizations: • Support for Teradata Utilities • Support for Named Pipes • Optimized Temporary Tables Management
Reverse-Engineer	RKM Teradata	Retrieves metadata from the Teradata database using the DBC system views. This RKM supports UNICODE columns. Metadata includes tables, views, columns, Keys (primary indexes and secondary indexes) and Foreign Keys. Descriptive information (Column titles and short descriptions) are also reverse-engineered. Note that Unique Indexes are reversed as follows: • The unique primary index is considered as a primary key. • The primary index is considered as a non unique index. • The Secondary unique primary index is considered as an alternate key • The Secondary non-unique primary index is considered as a non-unique index. You can use this RKM to retrieve specific Teradata metadata that is not supported by the standard JDBC interface (such as primary indexes).

Specific Requirements

The following requirements and restrictions apply for these Knowledge Modules:

1. When using Teradata Utilities enabled KMs, the appropriate Teradata Utilities must be installed on the machine running the Oracle Data Integrator Agent.
2. The server name of the Teradata Server defined in the Topology must match the Teradata connect string used for this server (without the COP_n postfix).
3. It is recommended to install the Agent on a separate platform than the target Teradata host. The machine, where the Agent is installed should have a very large network bandwidth to the target Teradata server.

KM Optimizations for Teradata

The Oracle Data Integrator KMs include specific optimizations for Teradata. These optimizations are detailed below:

Primary Indexes and Statistics

Teradata performance heavily relies on primary indexes. The Teradata KMs support customized primary indexes (PI) for temporary and target tables. This applies to Teradata LKMs, IKMs and CKMs. The primary index for the temporary and target tables can be defined in these KMs using the *PRIMARY_INDEX* KM option, which takes the following values:

- *[PK]*: The PI will be the primary key of each temporary or target table. This is the default value.
- *[NOPI]*: Do not specify primary index (Teradata 13.0 & above only).
- *[UK]*: The PI will be the update key of the interface. This is the default value.
    - <Column list>: This is a free PI based on the comma-separated list of column names.
    - <Empty string>: No primary index is specified. The Teradata engine will use the default rule for the PI (first column of the temporary table).

Teradata MultiColumnStatistics should optionally be gathered for selected PI columns. This is controlled by *COLLECT_STATS KM* option, which is set to true by default."

Support for Teradata Utilities

Teradata Utilities (TTU) provide an efficient method for transferring data from and to the Teradata engine. When using a LKM or IKM supporting TTUs, it is possible to set the method for loading data using the *TERADATA_UTILITY* option.

This option takes the following values when pushing data to a Teradata target (IKM) or staging area (LKM):

- *FASTLOAD*: use Teradata FastLoad
- *MLOAD*: use Teradata MultiLoad
- *TPUMP*: use Teradata TPump
- *TPT-LOAD*: use Teradata Parallel Transporter (Load Operator)
- *TPT-SQL-INSERT*: use Teradata Parallel Transporter (SQL Insert Operator)

This option takes the following values when pushing data FROM Teradata to a file:

- *FEXP*: use Teradata FastExport.

- *TPT*: use Teradata Parallel Transporter.

When using TTU KMs, you should also take into account the following KM parameters:

- *REPORT_NB_ROWS*: This option allows you to report the number of lines processed by the utility in a Warning step of the integration interface.
- *SESSIONS*: Number of FastLoad sessions
- *MAX_ALLOWED_ERRORS*: Maximum number of tolerated errors. This corresponds to the ERRLIMIT command in FastLoad/MultiLoad/TPump and to the ErrorLimit attribute for TPT.
- *MULTILOAD_TPUMP_TYPE*: Operation performed by the MultiLoad or TPump utility. Valid values are INSERT, UPSERT and DELETE. For UPSERT and DELETE an update key is required in the interface.

For details and appropriate choice of utility and load operator, refer to the Teradata documentation.

Support for Named Pipes

When using TTU KMs to move data between a SQL source and Teradata, it is possible to increase the performances by using Named Pipes instead of files between the unload/load processes. Named Pipes can be activated by setting the *NP_USE_NAMED_PIPE* option to YES. The following options should also be taken into account for using Named Pipes:

- *NP_EXEC_ON_WINDOWS*: Set this option to YES if the run-time agent runs on a windows platform.
- *NP_ACCESS_MODULE*: Access module used for Named Pipes. This access module is platform dependant. Refer to the knowledge module option help for a list of values.
- *NP_TTU_STARTUP_TIME*: This number of seconds for the TTU to be able to receive data through the pipe. This is the delay between the moment the KM starts the TTU and the moment the KM starts to push data into the named pipe. This delay is dependant on the machine workload.

Optimized Management of Temporary Tables

Creating and dropping Data Integrator temporary staging tables can be a resource consuming process on a Teradata engine. The *ODI_DDL* KM option provides a mean to control these DDL operations. It takes the following values:

- *DROP_CREATE*: Always drop and recreate all temporary tables for every execution (default behavior).
- *CREATE_DELETE_ALL*: Create temporary tables when needed (usually for the first execution only) and use DELETE ALL to drop the temporary table content. Temporary table are reused for subsequent executions.
- *DELETE_ALL*: Do not create temporary tables. Only submit DELETE ALL for all temporary tables.
- *NONE*: Do not issue any DDL on temporary tables. Temporary tables should be handled separately.