

An Oracle White Paper
March 2013

Oracle Data Integrator 11g New Features Overview

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Executive Overview

Oracle Data Integrator (ODI) is a best-of-breed data integration platform focused on fast bulk data movement and handling complex data transformations.

Oracle Data Integrator is fully integrated with the Oracle technology stack, including Oracle Database, Exadata Database Machine, Exalogic, Big Data Appliance, WebLogic Server, Business Intelligence, and Oracle Applications. ODI is the strategic data integration platform for Oracle.

The 11g version of ODI has pushed the state of the art technology in data integration further ahead of the rest of the industry. Since the first ODI 11.1.1.3.0 release in July 2010, Oracle has continued its investments on this strategic data integration platform with the 11.1.1.5.0, 11.1.1.6.0 and 11.1.1.7.0 releases.

This whitepaper describes in detail some of the new features and capabilities offered in the Oracle Data Integrator 11g platform.

Oracle Data Integrator 11.1.1.7.0 Release

Feature Highlights: Hot Pluggability

A core strategy and a key feature of Oracle Fusion Middleware is hot-pluggability. Built for the heterogeneous enterprise, Oracle Fusion Middleware consists of modular component software that runs on a range of popular platforms and interoperates with middleware technologies and business applications from other software vendors such as IBM, Microsoft, and SAP. The hot-pluggability aims to make components deployable and operational in non-Oracle environments and on multiple application servers.

IBM WebSphere Support

This ODI release introduces the support of IBM WebSphere Application Server (WAS).

ODI Agents and datasources can now be deployed on Oracle WebLogic Server (WLS) and IBM WebSphere Application Server (WAS).

Other Features

In addition to the IBM WebSphere support listed above, the following features have been included in this patch.

XML Driver Enhancements

Full support for XML Schema constructs by using standard Oracle parser:

- New JDBC driver parameter `compat_mode` to indicate the compatibility with mapping modes such as the XDK XSD parser.
- New JDBC driver command `WRITEMAPPINGFILE` to help understand the relational structure that has been created for the XSD/DTD file. The mapping file contains the element/attribute name to table/table.column name mapping for each element/attribute.
- The JDBC command `CREATE SCHEMA` includes now the `compat_mode` parameter.

SSL Support for Standalone Agent

The Standalone Agent now supports the SSL protocol for secure connectivity. New parameters added to specify the Standalone Agent server side transport protocol and to configure the SSL truststore and keystore:

- New environment variables in `agent.sh/agent.bat` scripts.
- New configuration variables in `odiparams.sh/odiparams.bat` scripts.
- Java system properties in `odiparam.sh/odiparams.bat` scripts.

Oracle Enterprise Data Quality Integration

The `OdiEnterpriseDataQuality` Open Tool introduced in ODI 11.1.1.6 to invoke an Oracle Enterprise Data Quality Job is now available as a standard ODI tool. The tool includes a new, optional parameter to connect to MBean domains.

Oracle Data Integrator 11.1.1.6.0 Release

Feature Highlights: BI and Data Warehousing

The following features have been added in this release for customers using Oracle Data Integrator in Business Intelligence and Data Warehousing projects.

Shortcuts

This ODI release introduces new objects called shortcuts which greatly improve productivity by allowing end users to express the large commonality that often exists between two different versions of the same source application, such as same tables and columns, same constraints, and same transformations.

Shortcuts are links to common Oracle Data Integrator objects stored in separate locations and can be created for datastores, integration interfaces, packages, and procedures. In addition, release tags have been introduced to manage the materialization of shortcuts based on specific tags.

Tracking Variables and Sequences

Variables and sequences are often used in Oracle Data Integrator processes. Oracle Data Integrator 11.1.1.6 introduces a new feature allowing end users to determine the actual values of variables and sequences that were used during an executed session. Tracking variables and sequences is extremely useful for debugging purposes.

Session Step Load Customers

Definition

Session Step

Step Name: Load Customers Status: Done

Step Type: Flow (Interface) Context: Global

Order Number: 4 No. of Executions: 1

Record Statistics

No. of Inserts: 0 No. of Updates: 0

No. of Deletes: 0 No. of Errors: 0

No. of Rows: 6 Maximum errors allowed: %

Execution Statistics

Start: Jan 9, 2012 6:14:03 PM End: Jan 9, 2012 6:14:04 PM

Duration (seconds): 1 Return Code: 0

Target Table Details

Variable and Sequence Values

Name	Type	Value
ORACLE_DATA_INTEGRATOR_DEMO.PHO...	Variable	6505067000
ORACLE_DATA_INTEGRATOR_DEMO.TOD...	Variable	2012-01-09 06:13:58

Figure 1 - Variable and Sequence Values are displayed in the Operator Navigator

With the variable tracking feature you can also easily determine whether the variable was used in a mapping or an internal operation such as an Evaluate Variable step.

Global Knowledge Modules

ODI 11.1.1.6 introduces Global Knowledge Modules (KMs) allowing specific KMs to be shared across multiple projects. In previous versions of Oracle Data Integrator, KMs were specific to Projects and could only be used within the project into which they were imported. Global KMs are now listed in the Designer Navigator in the Global Objects accordion.

Enhanced Session Logging

The readability of the execution logs has been improved in this patch for Knowledge Modules and Procedure steps. The final code for source and target commands is now available in the Operator Navigator, making it easier to review executions containing several runtime parameters.

Handling Failed Load Plan Enhancements

It is now possible to change the execution status of a failed Load Plan step from Error to Complete on the Steps tab of the Load Plan run Editor. This particular Load Plan step will then be ignored the next time the Load Plan run is restarted. This is useful, for example, when the error causing this Load Plan step to fail is not possible to fix at the moment and you want to execute the rest of the Load Plan regardless of this Load Plan step status.

Enhanced Variable Handling in Load Plans

Load Plan variables that are not used in a Load Plan can now be hidden to improve the readability of Load Plans.

Feature Highlights: Development Lifecycle

Oracle Data Integrator has been enhanced to further simplify the management of the development lifecycle. The following feature has been added in ODI 11.1.1.6:

Smart Export and Import

Exporting and importing Oracle Data Integrator objects between repositories is a common practice when working with multiple environments such as Development, Quality Assurance and Production. The new Smart Export and Import feature guides you through this task and provides advanced code management capabilities.

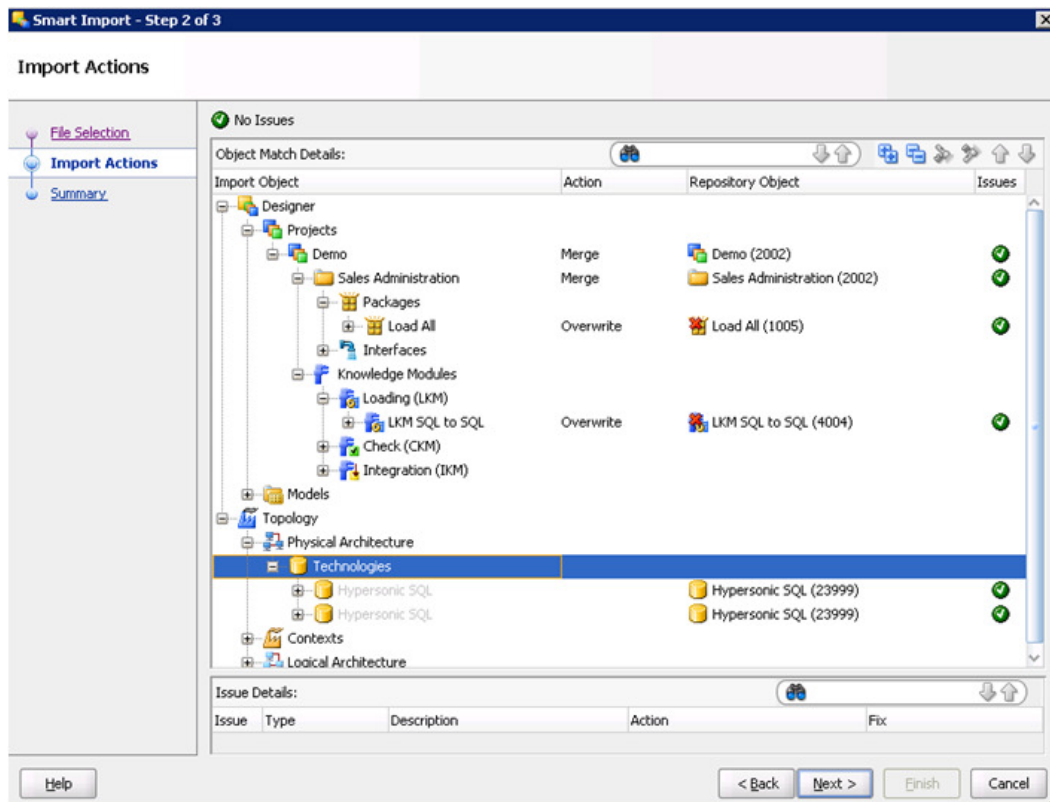


Figure 2 - Smart Export and Import provides a lightweight and consistent export and import mechanism.

Smart Export automatically exports an object with all its object dependencies. It is particularly useful when you want to move a consistent lightweight set of objects from one repository to another because Oracle Data Integrator manages all object dependencies automatically while creating a consistent sub-set of the repository.

The Smart Export and Import feature is a lightweight and consistent export and import mechanism providing several key features such as:

- Automatic and customizable object matching rules between the objects to import and the objects already present in the repository
- A set of actions that can be applied to the object to import when a matching object has been found in the repository
- Proactive issue detection and resolution that suggests a default working solution for every broken link or conflict detected during the Smart Import

Feature Highlights: Data Quality

Oracle Enterprise Data Quality extends the Data Quality features of Oracle Data Integrator to provide advanced data governance capabilities. This release integrates Oracle Data Integrator and Oracle Enterprise Data Quality together.

Oracle Enterprise Data Quality Integration

With the EnterpriseDataQuality Open Tool it is now possible to invoke an Oracle Enterprise Data Quality (Datanomic) Job in a Package. Developers can design a Data Quality process in Oracle Enterprise Data Quality and then invoke it in a Package in ODI along with the ETL steps.

The EnterpriseDataQuality Open Tool is installed using the standard procedure for Open Tools and can be used in a Package or a Procedure, similarly to the tools provided out of the box in Oracle Data Integrator.

Other Features

In addition to the features listed above, the following features have been included in this patch.

Groovy Editor

This release introduces the Groovy editor. The Groovy editor provides a single environment for creating, editing, and executing Groovy scripts within the ODI Studio context. It provides all standard features of a code editor such as syntax highlighting and common code editor commands.

Support of Undo and Redo Operations

It is now possible to undo or redo changes in editors, dialogs, wizards and in the Property Inspector using the following keyboard shortcuts: CTRL+Z and CTRL+Y.

Autocomplete for Text Fields and Lists

Certain text components and drop down lists in the ODI Studio now support the auto-complete feature, making end users more productive.

Version Numbering for Knowledge Modules

The version numbering of Knowledge Modules improves the information provided to identify the used environment:

- It is now possible to determine when a Knowledge Module (KM) has been modified and when it is not the original Knowledge Module as released by Oracle.
- The KM modifications can be tracked by a version number.
- It is now possible to find out when a KM has been released with an external component such as a jar file or a dll file (This is the case for example for the SAP and Hyperion KMs.)
- It is possible to indicate whether a given ODI version is compatible with a specific KM version.

Oracle Data Integrator 11.1.1.5.0 Release

Feature Highlight: SOA and Application Integration

Oracle Data Integrator is the only ETL tool that can run entirely within a Service Oriented Architecture. ODI is the most deeply integrated ETL product for running data integration as a service, accessing web services and writing to web services as a target. ODI 11.1.1.5 has been further enhanced for facilitating application integration and more advanced interaction with a SOA stack.

Complex File Technology

Complex file formats (multiple record files) can now be integrated using the new Complex File technology. This technology leverages a new built-in driver that converts transparently complex file formats into a relational structure using a Native Schema (nXSD) description file.

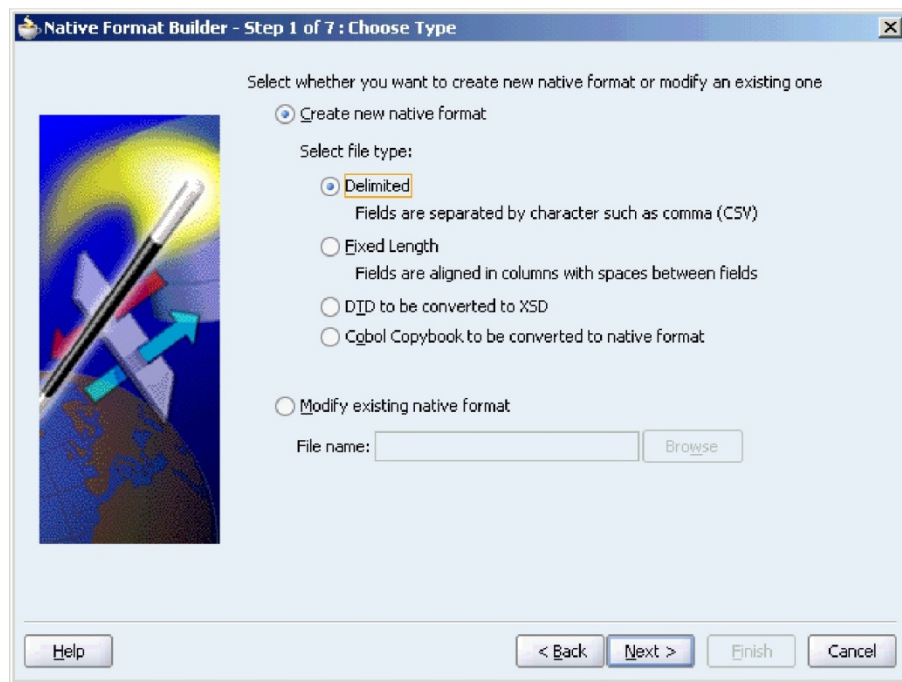


Figure 3 - Complex files described with the Native Format Builder can be integrated in Oracle Data Integrator

With ODI 11.1.1.5 the nXSD formats may be created manually, or with a graphical tool called the Native Format Builder Wizard (included with BPEL Process Manager). The Native Format Builder Wizard guides you through the creation of a native schema file from the following formats shown in Figure 3. A sample data file format for the selected type must already exist; you cannot create a native schema without one. You can also select to modify an existing native schema previously created with this wizard, except for those generated from a Document Type Definition (DTD) or COBOL copybook.

Web Services Enhancements

Web service support in Oracle Data Integrator has been enhanced with the following capabilities:

Web Service Container Based Authentication

When external authentication and container based authentication with Oracle Platform Security Services (OPSS) are configured, authentication can be passed to the ODI Run-Time Web Services using HTTP basic authentication, WS-Security headers, SAML tokens and so forth.

Asynchronous Web Services and Callbacks

Oracle Data Integrator batch jobs are long running sessions in a web service context. Long running transactions are handled using asynchronous web service calls and callbacks. Starting with this release, a scenario or session can be started using the Run-Time Web Services on a one-way operation. When the session completes, the result of the execution can trigger an operation on a callback address. This pattern can be used for handling any WSAddressing compliant long running sessions, started for example with Oracle BPEL.

Full SOAP Support for Outbound Calls

The OdiInvokeWebService tool now supports full-formed SOAP messages as an input, including the SOAP header and body. Access to the SOAP header improves the ease of interaction with web service security, authentication, and other application-specific information.

Features Highlights: BI and Data Warehousing

The following features have been added in this patch level for customers using Oracle Data Integrator in Business Intelligence and Data Warehousing Projects.

Load Plans

Oracle Data Integrator is often used for populating very large data warehouses. In these use cases, it is common to have thousands of tables being populated using hundreds of scenarios. The execution of these scenarios has to be organized in such a way that the data throughput from the sources to the target is the most efficient within the batch window. Load Plans help the user organizing the execution of scenarios in a hierarchy of sequential and parallel steps for these types of use cases.

Load Plans are new objects introduced in this release to organize at a high level the execution of packages and scenarios. Load Plans provide features for parallel, sequential, and conditional scenario execution. They also support advanced restartability and exception handling capabilities.

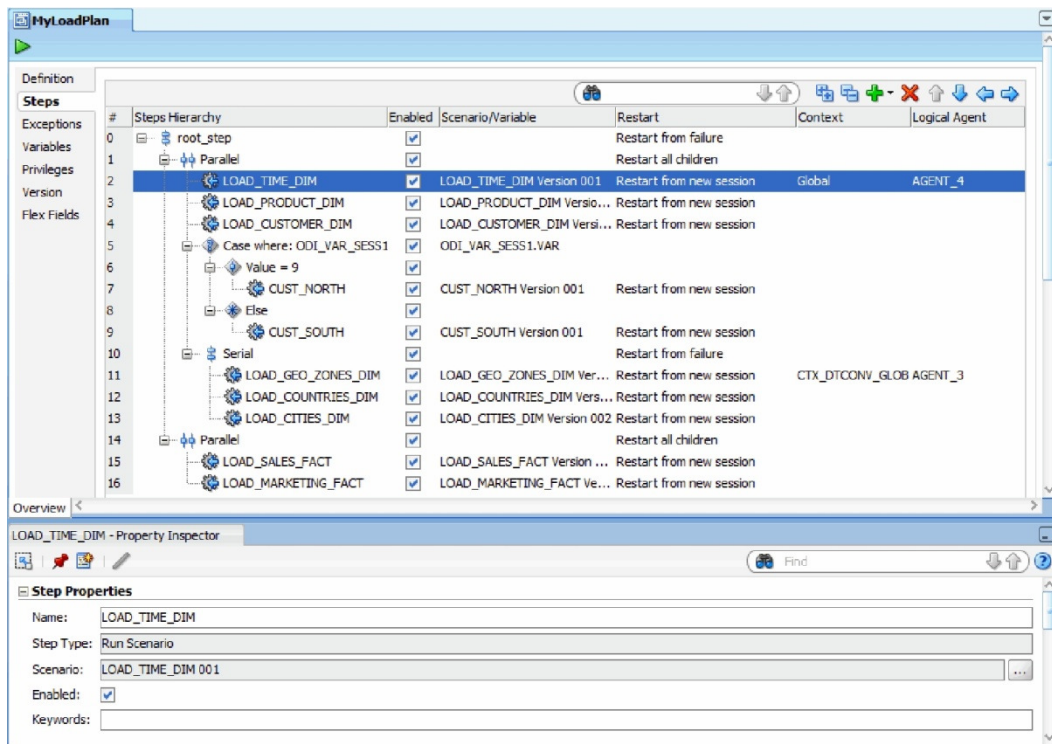


Figure 4 - Load Plans support parallel, sequential and conditional execution

Load Plans can be created and modified in production environments. They can be started, stopped, and restarted from a command line, from Oracle Data Integrator Studio, Oracle Data Integrator Console or a Web Service interface. They can also be scheduled using the run-time agent's built-in scheduler or an external scheduler.

Load plans are not substitutes for packages or scenarios. They are used to organize at a higher level the execution of packages and scenarios. Unlike packages, Load Plans provide native support for parallelism, restartability and exception handling. Load plans are moved to production as is, whereas packages are moved in the form of scenarios. Load Plans can be created in Production environments.

The Load Plan instances and Load Plan runs are similar to Sessions. The difference is that when a session is restarted, the existing session is overwritten by the new execution. The new Load Plan Run does not overwrite the existing Load Plan Run, it is added after the previous Load Plan Runs for this Load Plan Instance. The Load Plan Instance cannot be modified at run-time.

A scenario is an atomic runtime component that is given to the production. When in production, the production administrator can orchestrate the various scenarios using Load Plans in order to optimize the time taken to execute the ETL jobs in the given timeframe and ease the administration of all the ETL jobs.

For example, the production administrator will:

- Rely on Load Plans to orchestrate the execution of the various Scenarios produced by the ETL developers as part of their own projects and will organize the production globally instead of a per-project approach.
- Design the load plans in order to handle the parallelism of the scenarios in order to best use the hardware resources
- Design the load plans in order to handle serial steps to avoid overloading the system with too many scenarios at a given time
- Modify the load plans to take into account the real execution times and tune the load on the systems
- Rely on the load plans to restart only what is needed to be restarted in case of failure. This relies on the fact that the scenarios should be designed in order to be fully restartable (see above)

Oracle Business Intelligence Enterprise Edition Data Lineage

Oracle Business Intelligence Enterprise Edition (OBIEE) users need to know the origin of the data displayed on their reports. When this data is loaded from source systems into the data warehouse using Oracle Data Integrator, it is possible to use the Oracle Data Integrator Lineage for Oracle Business Intelligence feature to consolidate ODI metadata with OBIEE and expose this metadata in a report-to-source data lineage dashboard in OBIEE.



Figure 5 - OBIEE Users can click to view the Lineage of the data from their dashboards

An important capability that Oracle has provided is the ability to view detailed metadata lineage information from directly within the BI Answers dashboards.

Columns Used By a Request
Note: Click on the images to follow data lineage







Target Column		Transformation Expression		Used Columns				Metadata Lineage	
Catalog Folder	Request Name	Column Name	Expression	Catalog	Table Name	Column Name	Origin	Lineage	Hierarchy
/shared/ODI Customer Demo	Customer Per Countries Chart	CITY	Cities.CITY	ODI Customers	Cities	CITY	BI Presentation Column		
		COUNTRY	Countries.COUNTRY	ODI Customers	Countries	COUNTRY	BI Presentation Column		
		REGION	Regions.REGION	ODI Customers	Regions	REGION	BI Presentation Column		

Figure 6 - OBIEE Users can see the Lineage details directly in their BI dashboards

Other Features

In addition to the features listed above, the following features have been included in this patch level.

Commands on Connect/Disconnect

It is now possible to define data server commands that will be automatically executed when connections to this data server are created or closed by ODI components or by a session. Such a command can be used for altering and pre-configure sessions (for example, for internationalization of messages or forcing implicit conversions), or in multi-tenant infrastructure where commands must be placed at connection time to access information of a given tenant.

Built-in Technology Additions and Updates

The following technologies used in Oracle Data Integrator have been added and updated to benefit from their new features:

- Embedded HSQL engine is upgraded to version 2.0. This embedded engine is used for the Memory Engine as well as the XML and LDAP Drivers' built-in storage
- Jython BSF engine is updated to version 2.1
- JAX-WS/JRF is now used as a standard stack for web service calls and processing. Axis is no longer used

Groovy Technology

Groovy is added to the list of scripting engines supported by Oracle Data Integrator for use in knowledge modules and procedures.

Ordered and Non-Ordered Join Syntax

Technologies can now support both the ordered or non-ordered (database-specific) syntax for joins. The Oracle DB technology was modified to support both join syntaxes.

New Method for Setting Task Names

A new setTaskName method is available to update at run-time the name of a task. This API can be used in knowledge modules and procedures to modify at run time the task name displayed in the log, making it more readable for production users.

Shared Library for WLS Agent

A new template called Oracle Data Integrator - Agent Libraries includes libraries shared by all the deployed JEE agent in a domain, and must be deployed before the Oracle Data Integrator - Agent default template or a generated template.

This shared library facilitates the deployment, patching and maintenance of ODI domains, as it is deployed once and shared by both the default and user-generated templates.

Performance Optimization

The following optimizations have been made in the design-time and run-time components to improve their performance:

- Long text storage modified to use CLOBs.
- Agent-Repository network communications reduced at run-time
- Agent JDBC to JDBC loading mechanism reviewed and optimized

Oracle Data Integrator 11.1.1.3.0 Release

Architecture for Enterprise-Scale Deployment

Oracle Data Integrator 11g dramatically changes the vision of data integration in the information system. In fact, it makes data integration a key service in the information system, providing the backbone infrastructure for Enterprise Information Management.

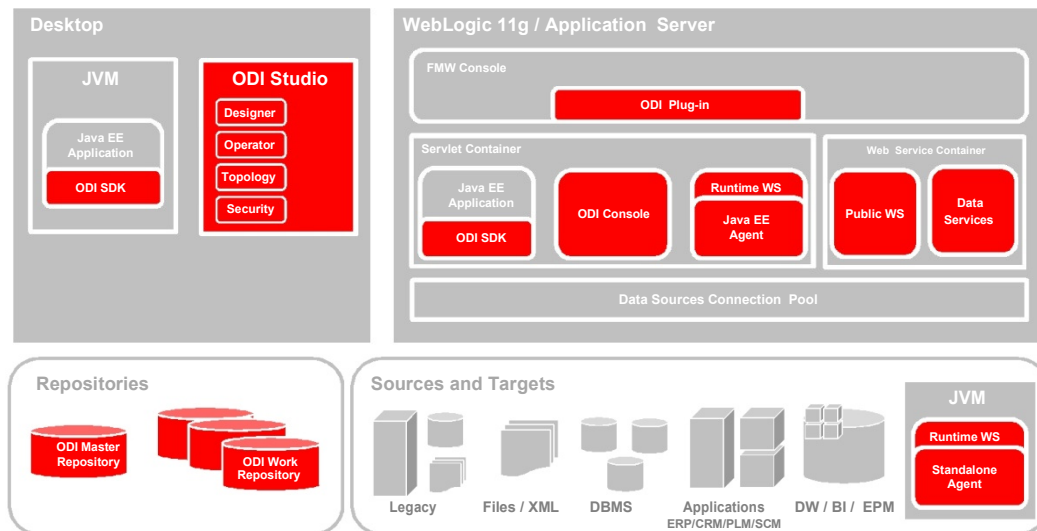


Figure 7 - ODI 11g Component Architecture

The new Oracle Data Integrator platform integrates in the broader Fusion Middleware platform and becomes a key component of this stack. Oracle Data Integrator 11g provides its run-time components as Java EE applications, enhanced to fully leverage the capabilities of the Oracle WebLogic Application Server. Oracle Data Integrator components include exclusive features for Enterprise-Scale Deployments, high availability, scalability, and hardened security.

High Availability and Scalability

High-Availability (HA) and Scalability is fully supported via clustered deployments for Java EE components. The ODI components deployed in WebLogic Server benefit from the capabilities of the WLS cluster for scalability, including JDBC Connection Pooling and Load Balancing.

In addition to the cluster-inherited HA capabilities, the run-time agent also supports a Connection Retry mechanism to transparently recover sessions running in repositories that are stored in HA-capable database engines such as Oracle RAC.

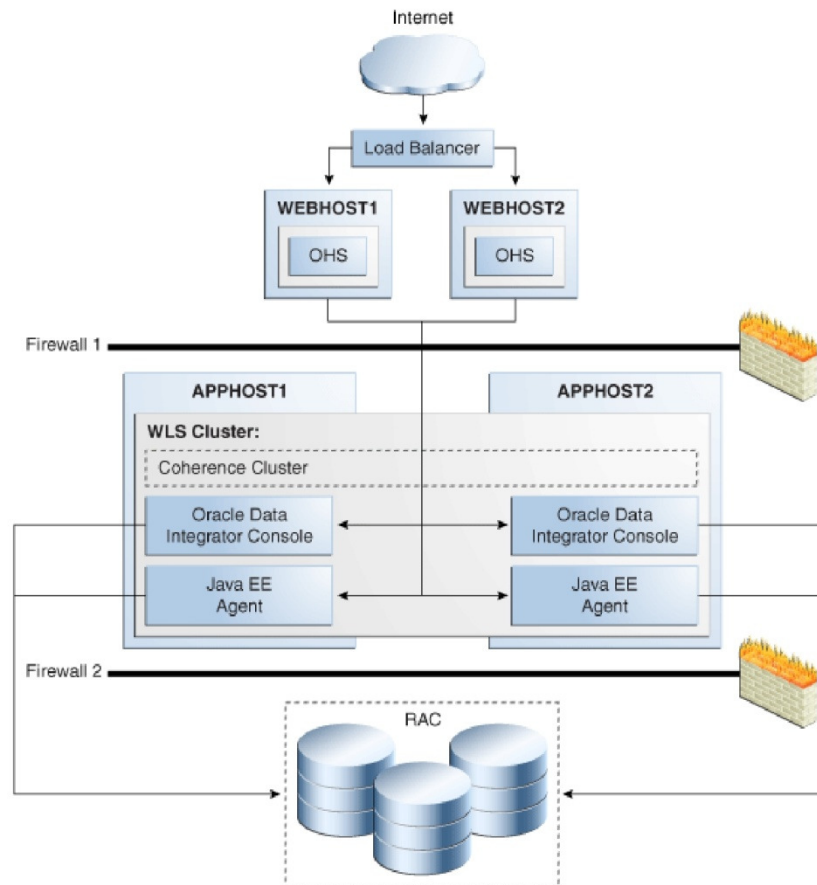


Figure 8 - High Availability Configuration for Oracle Data Integrator JEE Components

Corporate Security Integration

Security in Oracle Data Integrator can be hardened and unified with the corporate security stores.

The source and target data server passwords can be externalized in the enterprise credential store. The externalized passwords are no longer retained in the Oracle Data Integrator Repository.

In addition, the Oracle Data Integrator user can be mapped to users from the corporate identity store (LDAP, Oracle Internet Directory or Active Directory). With this feature, authentication is delegated to the corporate authentication service and Single Sign-On (SSO) can be enabled.

With these external password storage and external authentication features, passwords as well as user identities can be retained in a centralized location meeting any corporate standards for security.

Enterprise-Scale E-LT Architecture

The E-LT architecture mandates the use of lightweight run-agents able to run in strategic locations (for example on a Data Warehouse server) for optimal performances of the integration processes. Oracle Data Integrator 11g continues the support of Standalone Agents. Standalone agents support the same level of service as the Java EE Agent, including corporate security integration and connection retry, yet require a simple Java Machine. Standalone agents also support the ODI built-in load-balancing feature and can

be protected using Oracle Process Manager and Notification Server (OPMN).

With this new architecture, every run-time component of Oracle Data Integrator guarantees high scalability, 24/7 availability, and best-in-class security.

Simplified Deployment and Unified Administration

Enterprise-Scale deployments frequently end up being a dilemma between simplicity and efficiency. Indeed, setting up components in highly available and highly secured configurations is a challenge that not every administrator is ready to accept. In addition, monitoring and managing such configurations can become a complex activity.

Simplified Deployment

Oracle Data Integrator simplifies the deployment and administration of the data integration services and components. Java EE components deploy easily and quickly in an Oracle WebLogic Server using preconfigured templates or templates that are generated based on the metadata defined in the topology. It is also possible to create data server definitions for sources and targets in the topology and to deploy these in few clicks as datasources in an Oracle WebLogic Server.

With these deployment capabilities, creating or extending a domain for data integration is a matter of minutes.

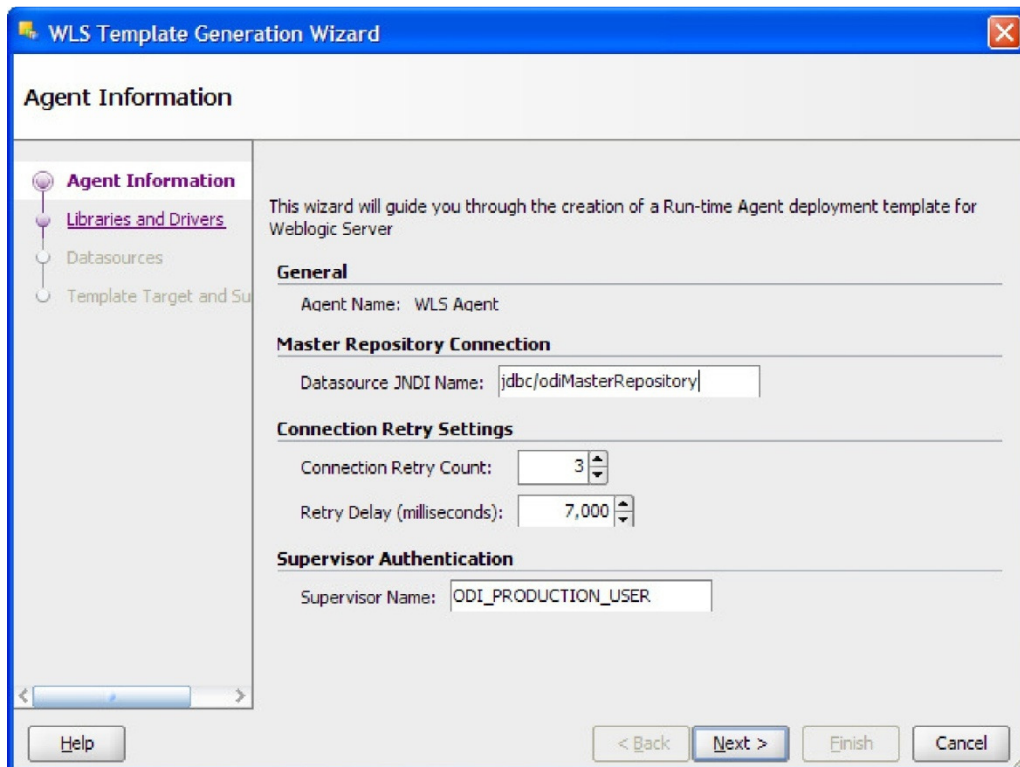


Figure 9 - Wizard for creating an Agent Template for WLS

Unified Administration and Monitoring

The Data Integration Architecture includes a number of components, including the Java EE and Standalone Agents as well as the Oracle Data Integrator Console web application. To manage and monitor these components, Oracle Data Integrator provides a new plug-in that integrates in Enterprise Manager Fusion Middleware Control.

With this plug-in, the Fusion Middleware administrator can manage from a single screen his data integration components along with his WebLogic servers, his deployed web applications, or his SOA composite applications.

This component allows the administrator to monitor the status, metrics, and notifications of Oracle Data Integrator components, including Repositories, Agents and Oracle Data Integrator Console instances.

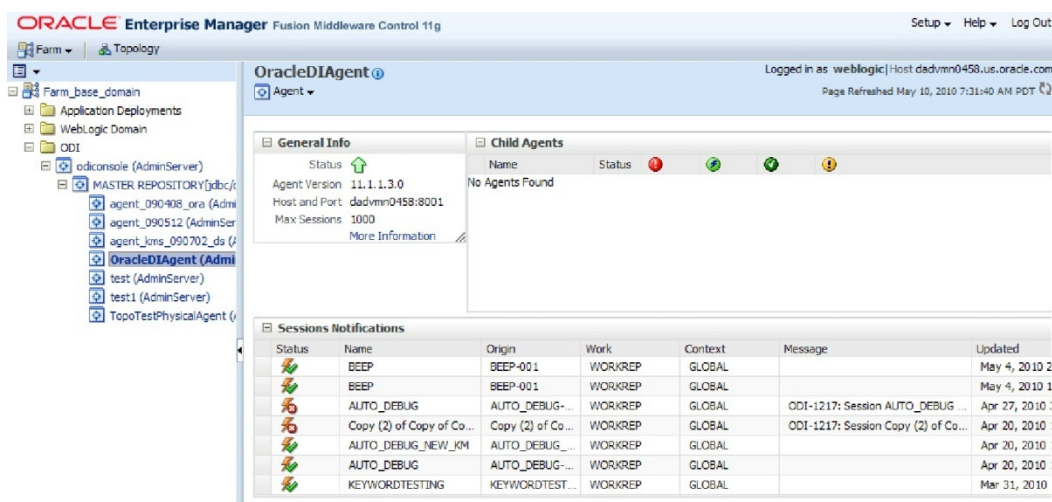


Figure 10 - Oracle Data Integrator in Oracle Enterprise Manager

Better Control over Production

Having a large-scale deployment involves frequently hundreds of integration flows and requires extreme tools for monitoring the production environment.

Oracle Data Integrator enhances the control capabilities available to the production operators by providing unique features.

Oracle Data Integrator Console

The new Oracle Data Integrator Console replaces and unifies the former 10g Metadata Navigator and Lightweight Designer components. This web interface for production operations has been rewritten using the ADF-Faces Ajax Framework for a rich user experience.

Using this console, production users can set up an environment, export and import the repositories, manage run-time operations, monitor the sessions, diagnose the errors, browse design-time artifacts and generate lineage reports.

This web interface integrates seamlessly with Oracle Fusion Middleware Control Console and allows Fusion Middleware administrators to drill down into the details of any Oracle Data Integrator design-time and run-time object.

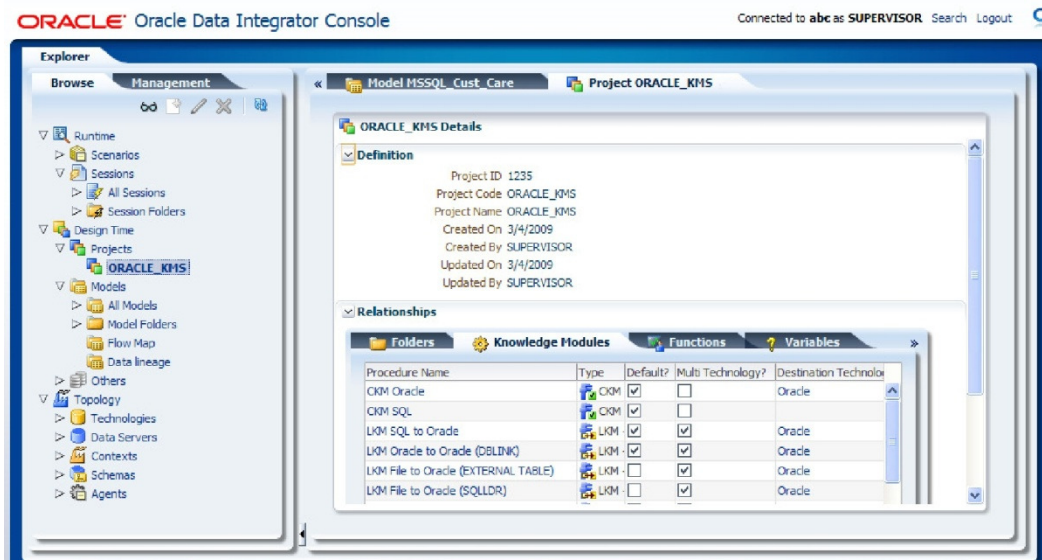


Figure 11 - Oracle Data Integrator Console

Enhanced Session Control

Sessions can now be stopped in an immediate mode. This new mode aborts the current operation (for example, a long-running SQL statement started on a database engine) instead of waiting for its completion before stopping the session.

In addition to this mechanism, sessions that failed due to a repository or the run-time agent failure are automatically identified as stale and moved from the Running state to the Error state for operator review.

Enhanced Error Management

Error messages raised by Oracle Data Integrator Components and Sessions have been enhanced to provide administrators and production operators with precise information for troubleshooting and fixing the status of the architecture and debugging the sessions.

Enhanced messages cover component lifecycle (agent startup, shutdown, schedule refresh, and so forth) as well as session lifecycle (incorrect scenario version, load balancing issue, agent not available and so forth). They render clearer errors starting at the lowest level of the session (steps and task). These error messages are enriched with context and infrastructure information to help development or production users quickly find the source and solution for an issue.

Errors raised by components or sessions are automatically notified to the operation administrator in Enterprise Manager Fusion Middleware Control.

Design-Time Productivity

Oracle Data Integrator 11g introduces a new JDeveloper-based integrated development environment (IDE) called the Oracle Data Integrator Studio. This client is entirely redesigned in this release to dramatically increase the developer's productivity and make advanced features more accessible.

Design-Time Experience

New IDE Based on JDeveloper IDE Framework

The new Oracle Data Integrator studio is used as a replacement for all Oracle Data Integrator 10g modules (Designer, Topology, Operator, and Security Manager). All the features of these modules now appear as Navigators within the Oracle Data Integrator Studio.

This new IDE provide state-of-the-art features for developer productivity, including redesigned and reorganized editors in addition to enhanced windows, improved docking, and document navigation and management.

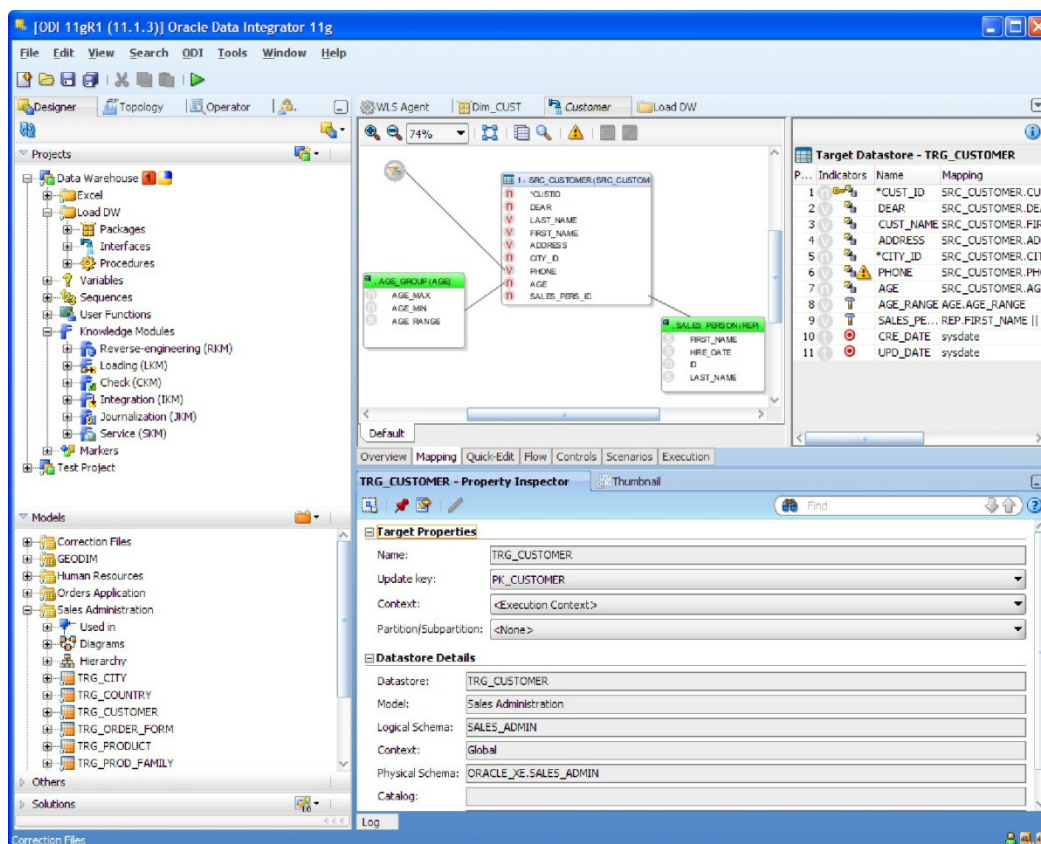


Figure 12 - In Oracle Data Integrator Studio, Editing the “Customer” Interface

Redesigned Interface Editor

The Interface Editor, used to create the integration interfaces, has been entirely redesigned to use the JDeveloper diagramming framework, providing:

- Enhanced diagram look and feel, plus manual or automated diagram layout organization
- Better support of large diagrams via thumbnails, zoom in/out, and bird's eye
- Small but useful features such as source column drag and drop in the target mapping and column sort/selection in the mapping
- Reorganized and searchable Property Inspector

Auto-Fixing

When saving an interface or clicking the Error button in the Interface Editor toolbar, the list of all design errors is displayed with meaningful messages and tips. Automated fixes are suggested and can be applied with a single click.

Quick-Edit

The new Interface Editor includes a new Quick-Edit tab to edit the interface diagram faster. The Quick-Edit Editor displays the interface components in a tabular form, supports mass-updates, and intuitive and accessible keyboard navigation.

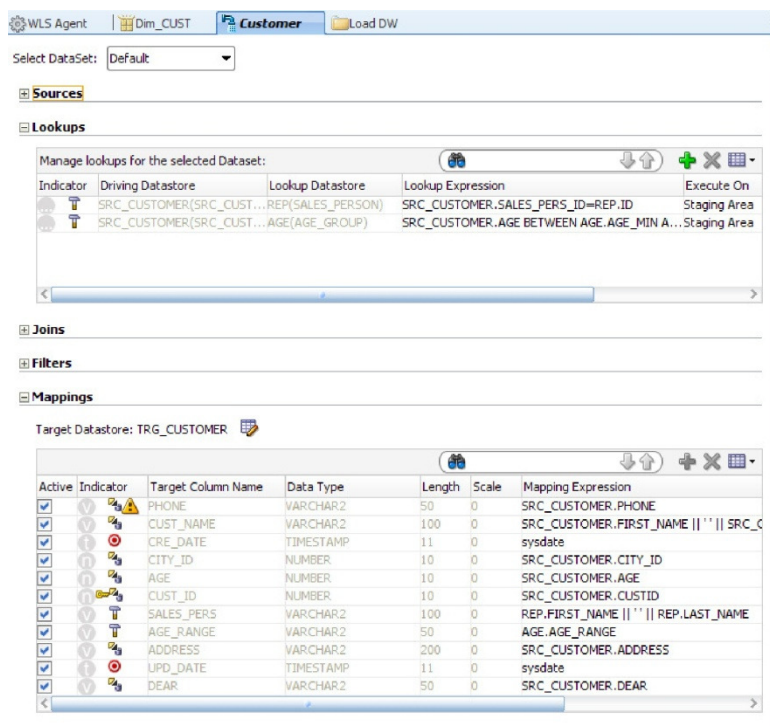


Figure 13 - Quick Edit view for the “Customer” Interface

Small (yet Important) Things

In addition to these major changes, some small improvements have been made in ODI to make the developer's life easier. For example:

- **Code Simulation** – When running a session at design-time, it is possible to make a code simulation instead of running a full execution. This simulation mode generates a session simulation report displaying the generated code for review.
- **Reverse-Engineering** – When a model is created, the reverse-engineering context is automatically set to the default context. In addition, when performing a selective reverse-engineering, the system tables are now hidden from the display.
- **Scenario Naming Convention** – A user can define a pattern (using for example the object name, folder path, or project name) for the naming convention that is automatically applied to new scenarios created by this user.
- **Long Object Names** – Object names have been extended to support long database object names (128 characters) and repository object labels (400 characters).

Java API for Task Automation

Oracle Data Integrator 11g introduces a new Java API for creating and managing both design-time and run-time operations.

Using this API, it is for example possible to perform the following operations:

- Create or modify the topology contents
- Set up projects and models
- Create and browse interfaces, procedures, and packages
- Start and manage sessions and monitor their status

This API allows developers to programmatically perform operations without using the user interfaces and to create their own applications to access the repository content.

E-LT Features for Better Performance

New core features have been built in Oracle Data Integrator Studio around the E-LT architecture and declarative design approach to support a more productive development process and better performances at run-time.

Datasets and Set-Based Operators

This major enhancement introduces the notion of datasets in interfaces. A dataset represents the data flow coming from a group of joined and filtered source datastores. Each dataset includes the target mappings for this group of sources. Several datasets can be merged into the interface target datastore using set-based operators such as Union and Intersect.

Figure 15 illustrates the use of datasets to merge data from a source file and from an HR system. Each

of these datasets (From File, From HR) is a flow with its own set of source tables, joins, filters and mappings.

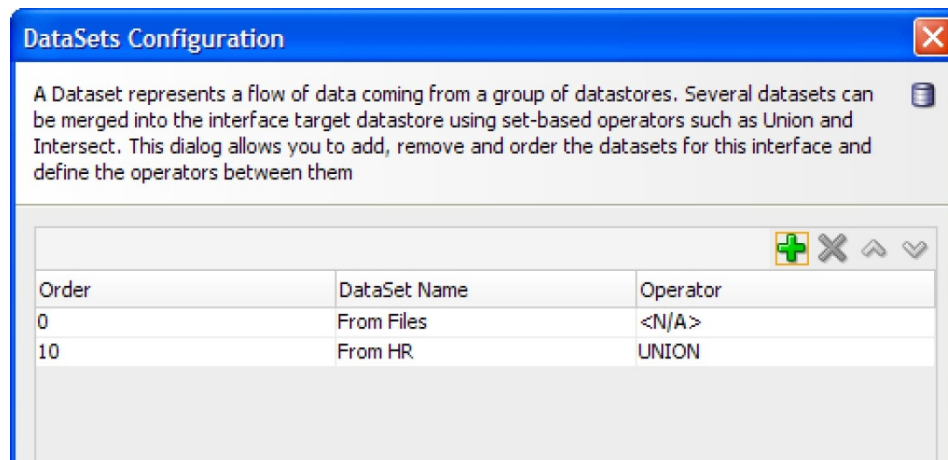


Figure 14 - One interface merges with a UNION operator flows from two diagrams

These two flows appear in different diagram tabs in the Interface Editor. They are merged using the UNION operator as shown in Figure 15.

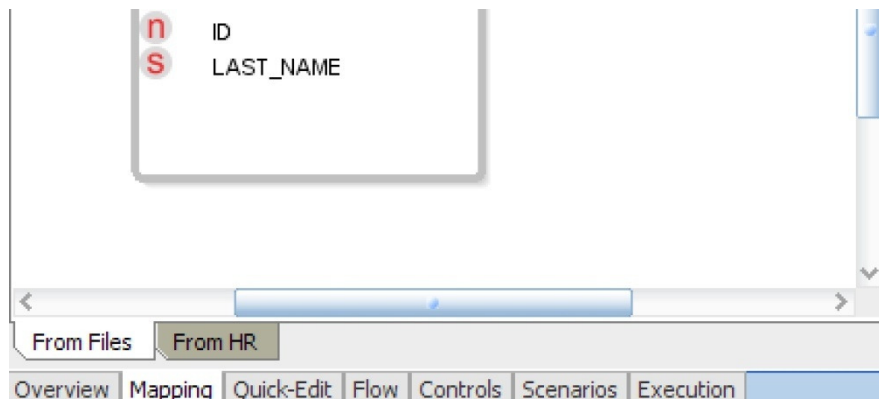


Figure 15 - Two diagram tabs for the datasets in the Interface Editor

This feature accelerates the interface design and reduces the number of interfaces needed to merge several data flows into the same target datastore.

Partitioning

Oracle Data Integrator now supports partitioning features of the data servers. Partitions can be reverse-engineered using RKMs or manually created in models. When designing an interface, it is possible to define the partition to address on the sources and target datastores. Oracle Data Integrator code generation handles the partition usage syntax for each technology that supports this feature.

Lookups

A wizard is available in the Interface Editor to design a lookup from a driving source datastore to

a lookup datastore or interface. These lookups appear as a compact graphical object in the Sources diagram of the interface. The user can choose how the lookup is executed: as a Left Outer Join in the FROM clause or as an expression in the SELECT clause (in-memory lookup with nested loop). This second syntax is frequently more efficient on small lookup tables.

This feature simplifies the design and readability of interfaces using lookups, and allows optimized execution of these lookups.

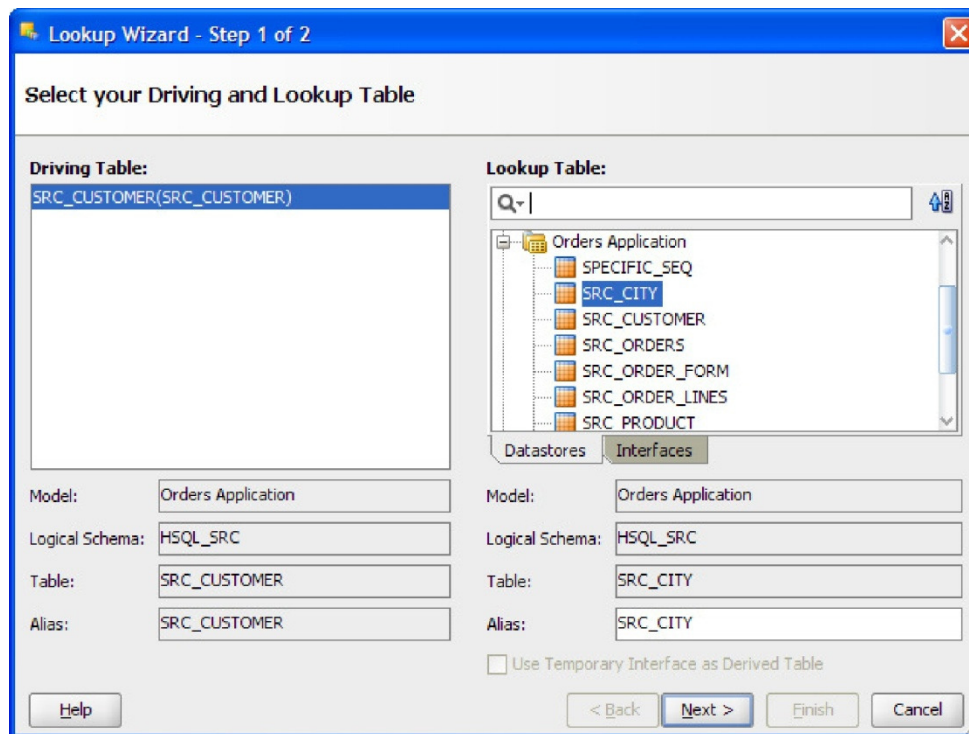


Figure 16 - Lookup Creation Wizard

Derived Select for Temporary Interfaces

When using a temporary interface as a source in another interface, it is possible to avoid persisting the target datastore of the temporary interface by generating instead a Derived Select (sub-select) statement corresponding to the execution of this temporary interface. Consequently, the temporary interface no longer needs to be executed to load the temporary datastore. The code generated for the sub-select can be optionally customized in an IKM.

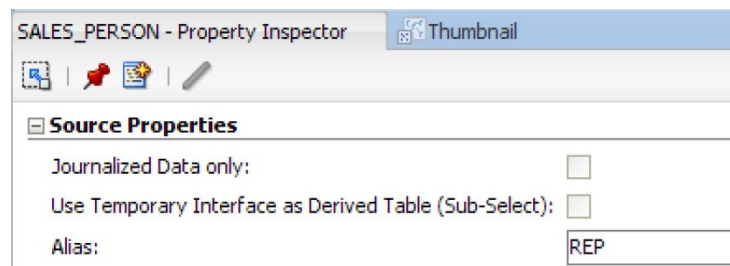


Figure 17 - Use Temporary Interface as Derived Table option can be checked when an interface is used as a source

This feature eliminates the need for complex packages to handle the execution order of temporary interfaces. It dramatically simplifies the execution of cascades of temporary interfaces.

Support for Native Sequences

Oracle Data Integrator now provides support for a new type of sequences that directly maps to database-defined sequences. Such a sequence is selected from a list retrieved from the database when the sequence is created. Native Sequences are used as regular Oracle Data Integrator sequences, and the code generation automatically handles technology-specific syntax for sequences.

This feature simplifies the use of native sequences in all expressions and enables cross-referencing on native sequence usage.

Support for Natural Joins

Oracle Data Integrator now provides support for Natural joins, defined at technology level. A natural join does not require any join expression to be specified, and is handled by the engine that processes it. This engine matches automatically columns with the same name.

Automatic Temporary Index Management

When creating joins or filters on source tables, it is possible to have Oracle Data Integrator automatically generate temporary indexes for optimizing the execution of these joins or filters. The user simply selects the type of index from a list for the given technology. Knowledge modules automatically generate the code for creating and dropping the temporary index as needed.

This feature accelerates join and filter execution and enables better performances for integration interfaces.

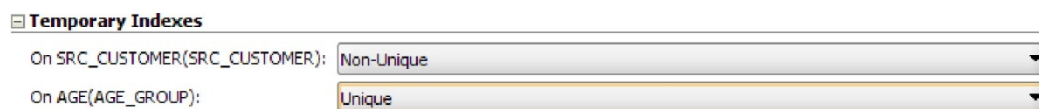


Figure 18 - Two temporary Indexes (Non-Unique and Unique) will be created for optimizing the execution of the join between SRC_CUSTOMER and AGE_GROUP

Broaden Connectivity

Data Integration is about moving and transforming data from sources to targets in a heterogeneous world. In this context, hot-pluggability, that is being able to access and integrate any source and any target in the most performing way, is a constant challenge that Oracle Data Integrator addresses using the knowledge modules architecture.

The Oracle Data Integrator highly flexible knowledge module architecture allowed the release of significant connectivity improvements in the previous version lifecycles. These improvements included:

- Application Adapters for Oracle E-Business Suite, PeopleSoft, Siebel, JDE EnterpriseOne, SAP ERP, and SAP BW,
- Performance optimizations for Teradata
- Adapters for Oracle OLAP and Oracle Changed Data Capture.
- Adapters for Hyperion Planning, Financial Management, and Essbase
- Changed Data Capture using Oracle GoldenGate.
- Oracle Data Integrator 11g adds to this long list the following improvements:
- Adapter for sourcing from ADF-View Objects exposed in an Oracle Business Intelligence Enterprise Edition Server
- Support for Oracle Database Multi-Table Insert
- Support for Teradata Multi-Statements

Of course, the Knowledge Modules have also been enhanced in various manners to support the new productivity and performance enhancements such as datasets and temporary indexes.

Conclusion

With the Oracle Data Integrator 11g releases Oracle introduced several new enhancements such as a redesigned ODI Studio user interface, WebLogic support for ODI agents' deployments, Java API, Oracle Business Intelligence Enterprise Edition Data Lineage, Load Plans, Web Services Improvements, Smart Export and Import, Global Knowledge Modules or the integration with Oracle Enterprise Data Quality.

The ODI 11g releases continue to improve Oracle's strategic Data Integration platform while preserving the key product differentiators: Declarative Design, Knowledge Modules, Hot-Pluggability, and E-LT.



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