

Oracle® Cloud

Using the Oracle Database Adapter with Oracle Integration 3



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Primary Author: Oracle Corporation

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About This Content

This guide describes how to configure this adapter as a connection in an integration in Oracle Integration.

Audience

This guide is intended for developers who want to use this adapter in integrations in Oracle Integration.

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Related Resources

See these Oracle resources:

- Oracle Cloud at <http://cloud.oracle.com>
- *Using Integrations in Oracle Integration 3*
- *Using the Oracle Mapper with Oracle Integration 3*
- Oracle Integration documentation on the Oracle Help Center.

Conventions

The following text conventions are used in this document.

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

1

Understand the Oracle Database Adapter

Review the following conceptual topics to learn about the Oracle Database Adapter and how to use it as a connection in integrations in Oracle Integration. A typical workflow of adapter and integration tasks is also provided.

Topics:

- [Oracle Database Adapter Capabilities](#)
- [Oracle Database Adapter Restrictions](#)
- [What Application Version Is Supported?](#)
- [Workflow to Create and Add an Oracle Database Adapter Connection to an Integration](#)

Oracle Database Adapter Capabilities

The Oracle Database Adapter enables you to integrate the Oracle database residing behind the firewall of your on-premises environment with Oracle Integration through use of the on-premises connectivity agent. Use the Oracle Database Adapter to poll for new and updated records for processing in Oracle Integration. For example, any new record added to the `Employee` table in your Oracle database can be synchronized with Oracle HCM Cloud using Oracle Integration. In addition, use the Oracle Database Adapter to execute SQL queries or stored procedures in the Oracle database. For example, quotes in Oracle CPQ Cloud can be created as `Orders` in the on-premises Oracle database by sending SQL statements or stored procedures using the Oracle Database Adapter.

The Oracle Database Adapter provides the following capabilities:

- Support for invocation of stored procedures in the Oracle database.
- Support for non-JDBC (PL/SQL boolean, PL/SQL record, and PL/SQL table) datatypes in outbound invocations of stored procedures.
- Support for execution of DML statements and SQL queries: `Select`, `Insert`, `Update`, and `Delete`.

Select the **Run a SQL Statement** option on the Basic Info page of the Adapter Endpoint Configuration Wizard to execute simple SQL queries. For complex SQL queries, use stored procedures by selecting the **Invoke a Stored Procedure** option on the Basic Info page of the Adapter Endpoint Configuration Wizard. Stored procedures can reduce the complexity of a SQL query.

- Support for generating XSD from PureSQL. This feature generates an XSD from a PureSQL statement provided by dynamically querying the table.
- Support for polling new and updated records for processing in the Oracle database. The Oracle Database Adapter supports distributed polling and multithreading. Distributed polling helps eliminate duplicate polling of the same records while multithreading provides optimum performance.
- Support for updating or inserting multiple records in a single request.
- Support for a logical delete polling strategy. This strategy involves updating a special field on each row once it is processed.

- Support for performing a `SELECT` operation against database tables.
- Support for database fault mapping. See [Define Fault Mapping in Integrations](#).
- Support for processing message payloads up to 10 MB in size. In the case of polling, you must set the **Rejected Value** property to **REJECTED** on the Polling Strategy and Options page. If the incoming message is greater than the 10 MB threshold size, that particular record is updated to **REJECTED** instead of **READ**. If the outbound operation returns a response greater than the 10 MB threshold size, the response message is ignored and a fault response is sent to the calling client.

Note

In Java, Unicode characters are represented as 2 bytes.

- Support for integrating an Oracle Database with a private endpoint. Integration is achieved with a wallet-based connection that uses the connectivity agent. See [Configuring Connection Security](#).

The Oracle Database Adapter is one of many predefined adapters included with Oracle Integration. You can configure the Oracle Database Adapter as a connection in an integration in Oracle Integration.

Cloud Database Connectivity Support

This table describes cloud database connectivity support for the Oracle Database Adapter.

Database	Public Gateway	Private Gateway	Connectivity Agent
On-premises database	Not supported	Not supported	Supported

Oracle Database Adapter Restrictions

Note the following Oracle Database Adapter restrictions in Oracle Integration.

- Using the Oracle Database Adapter to access the Oracle E-Business Suite Database is not recommended. Instead, use the Oracle E-Business Suite Adapter to access the Oracle E-Business Suite Database.
- The NCHAR field type is not supported as the primary key on merge (update/insert) operations.
- The Oracle Database Adapter can only be used with the on-premises connectivity agent.
- Overloaded procedures are not supported.
- Wrappers are not generated for releases 18c and later of the database. Any integrations created on prior releases of the database that contain wrappers require a manual migration of the wrapper procedures. A re-edit of such invokes is not supported and goes through a non-wrapper route by selecting the original procedure.
- Automatic metadata refresh is not supported. Any modifications to stored procedures or tables used in the invoke or trigger connection require a re-import or redo in the Adapter Endpoint Configuration Wizard for the changes to be reflected.
- The database password length cannot exceed 20 characters.
- Database schema names with hyphens (-) are not supported.

- All integrations that include stored procedure, PureSQL, or operation on table database operations must finish within 240 seconds. Otherwise, the query times out and a `Limit Exceeded` error occurs.
- The Oracle Database Adapter uses JDBC drivers to interact with the database and is restricted by JDBC driver constraints. Therefore, nested PL/SQL types (for example, `RECORD` types inside a `TABLE` type) are not supported as IN/OUT parameters in a stored procedure. However, you can define `OBJECT` types inside the `TABLE` type.
- When using the Oracle Database Adapter with a PureSQL statement operation, carriage returns are not supported in the SQL statement.
- Cross schema stored procedures are not allowed in cases where Oracle Integration must generate the wrappers.
- The Oracle Database Adapter does not support polling when the logical delete column is in lower case.
- No order is maintained while polling records.

Note

There are overall service limits with Oracle Integration. A service limit is the quota or allowance set on a resource. See [Service Limits](#).

What Application Version Is Supported?

For information about which application version is supported by this adapter, see the [Connectivity Certification Matrix](#).

Workflow to Create and Add an Oracle Database Adapter Connection to an Integration

You follow a very simple workflow to create a connection with an adapter and include the connection in an integration.

Step	Description	More Information
1	Decide where to work	<ul style="list-style-type: none"> • Work in a project (see <i>why working with projects is preferred in Using Integrations in Oracle Integration 3</i>). • Work outside a project.
2	Create the adapter connections for the applications you want to integrate. The connections can be reused in multiple integrations and are typically created by the administrator.	Create an Oracle Database Adapter Connection
3	Create the integration. When you do this, you add trigger and invoke connections to the integration.	Create Integrations and Add the Oracle Database Adapter Connection to an Integration
4	Map data between the trigger connection data structure and the invoke connection data structure.	Map Data in <i>Using Integrations in Oracle Integration 3</i>

Step	Description	More Information
5	(Optional) Create lookups that map the different values used by those applications to identify the same type of object (such as gender codes or country codes).	Manage Lookups in <i>Using Integrations in Oracle Integration 3</i>
6	Activate the integration.	Manage Integrations in <i>Using Integrations in Oracle Integration 3</i>
7	Monitor the integration on the dashboard.	Monitor Integrations in <i>Using Integrations in Oracle Integration 3</i>
8	Track payload fields in messages during runtime.	Assign Business Identifiers for Tracking Fields in Messages and Manage Business Identifiers for Tracking Fields in Messages in <i>Using Integrations in Oracle Integration 3</i>
9	Manage errors at the integration level, connection level, or specific integration instance level.	Manage Errors in <i>Using Integrations in Oracle Integration 3</i>

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Create an Oracle Database Adapter Connection

A connection is based on an adapter. You define connections to the specific cloud applications that you want to integrate.

Topics:

- [Prerequisites for Creating a Connection](#)
- [Create a Connection](#)

Prerequisites for Creating a Connection

You must satisfy the following prerequisites for creating a connection with Oracle Integration.

1. Ensure that you have write permissions to the database.
2. Ensure that you have the required permissions to run stored procedures and SQL statements.
3. Know the database URL, including the hostname or IP address and the port number.
4. Know the database system ID and service name.
5. Know the username and password for connecting to the database.
6. Oracle Integration can connect to Oracle Real Application Clusters (RAC) databases with the on-premises connectivity agent using Single Client Access Name (**SCAN**) as the hostname while configuring the connection. SCAN provides a single name for clients to access any Oracle Database running in a cluster.

Create a Connection


Before you can build an integration, you must create the connections to the applications with which you want to share data.

Note

You can also create a connection in the integration canvas. See Define Inbound Triggers, Outbound Invokes, and Actions.

To create a connection in Oracle Integration:

1. Decide where to start:
 - Work in a project (see why working with projects is preferred).
 - a. In the navigation pane, click **Projects**.
 - b. Select the project name.

- c. Click **Integrations** .
 - d. In the **Connections** section, click **Add** if no connections currently exist or **+** if connections already exist. The Create connection panel opens.
- Work outside a project.
 - a. In the navigation pane, click **Design**, then **Connections**.
 - b. Click **Create**. The Create connection panel opens.
2. Select the adapter to use for this connection. To find the adapter, scroll through the list, or enter a partial or full name in the **Search** field.
 3. Enter the information that describes this connection.

Element	Description
Name	Enter a meaningful name to help others find your connection when they begin to create their own integrations.
Identifier	Automatically displays the name in capital letters that you entered in the Name field. If you modify the identifier name, don't include blank spaces (for example, SALES OPPORTUNITY).
Role	<p>Select the role (direction) in which to use this connection.</p> <p>Note: <i>Only</i> the roles supported by the adapter you selected are displayed for selection. Some adapters support all role combinations (trigger, invoke, or trigger and invoke). Other adapters support fewer role combinations.</p> <p>When you select a role, only the connection properties and security policies appropriate to that role are displayed on the Connections page. If you select an adapter that supports both invoke and trigger, but select only one of those roles, you'll get an error when you try to drag the adapter into the section you didn't select.</p> <p>For example, assume you configure a connection for the Oracle Service Cloud (RightNow) Adapter as only an invoke. Dragging the adapter to a trigger section in the integration produces an error.</p>
Keywords	Enter optional keywords (tags). You can search on the connection keywords on the Connections page.
Description	Enter an optional description of the connection.

Element	Description
Share with other projects	<p>Note: This field only appears if you are creating a connection in a project.</p> <p>Select to make this connection publicly available in other projects. Connection sharing eliminates the need to create and maintain separate connections in different projects.</p> <p>When you configure an adapter connection in a different project, the Use a shared connection field is displayed at the top of the Connections page. If the connection you are configuring matches the same type and role as the publicly available connection, you can select that connection to reference (inherit) its resources.</p> <p>See Add and Share a Connection Across a Project.</p>

4. Click **Create**.
Your connection is created. You're now ready to configure the connection properties, security policies, and (for some connections) access type.
5. Follow the steps to configure a connection.
The connection property and connection security values are specific to each adapter. Your connection may also require configuration with an access type such as a private endpoint or an agent group.
6. Test the connection.

Configuring Connection Properties

Enter connection information so your application can process requests.

1. Go to the **Properties** section.
The Connection Properties dialog is displayed.
2. Enter the host name or IP address of the database server.
3. Enter the database server port number.
4. Enter the system or site ID.
5. Enter the database service name.

Configuring Connection Security

Configure security for your database connection by selecting the security policy and setting login credentials.

Note

When a wallet is rotated and you download a new wallet or when credentials are updated in the connection, you must first deactivate the integrations using that connection. Update the connection with the new wallet or credentials and reactivate the integrations for these changes to take effect.

1. Go to the **Security** section.

2. If you select **Username Password Token**:
 - a. Enter the database username to connect to the Oracle Database.
 - b. Enter the database password.
3. If you select **Oracle Wallet**:

Note

The Oracle Database Adapter can connect through the connectivity agent when using the wallet. It can be used as a trigger connection only if the connectivity agent is used in the connection. However, all operations that you select on the Basic Info page such as **Run a SQL Statement**, **Invoke a Stored Procedure**, and **Perform an Operation On a table** are supported when configuring the adapter to use direct connectivity (without the connectivity agent).

- a. In the **Wallet** field, select the check box, then click **Upload** to upload the wallet file.
- b. Enter the wallet password, then re-enter it a second time to confirm.
- c. Enter the database username and password to connect to the Oracle Database.
- d. Enter the database password a second time to confirm.

Configure the Endpoint Access Type

Configure access to your endpoint. Depending on the capabilities of the adapter you are configuring, options may appear to configure access to the public internet, to a private endpoint, or to an on-premises service hosted behind a fire wall.

Select the Endpoint Access Type

1. Go to the **Access type** section.
2. Select the option for accessing your endpoint.

Option	This Option Appears If Your Adapter Supports ...
Connectivity agent	<p>Connections to on-premises endpoints through the connectivity agent.</p> <ol style="list-style-type: none"> a. Click Associate agent group. The Associate agent group panel appears. b. Select the agent group, and click Use. <p>To configure an agent group, you must download and install the on-premises connectivity agent. See Download and Run the Connectivity Agent Installer and About Creating Hybrid Integrations Using Oracle Integration in <i>Using Integrations in Oracle Integration 3</i>.</p>

Test the Connection

Test your connection to ensure that it's configured successfully.

1. In the page title bar, click **Test**. What happens next depends on whether your adapter connection uses a Web Services Description Language (WSDL) file. Only some adapter connections use WSDLs.

If Your Connection...	Then...
Doesn't use a WSDL	The test starts automatically and validates the inputs you provided for the connection.
Uses a WSDL	A dialog prompts you to select the type of connection testing to perform: <ul style="list-style-type: none">• Validate and Test: Performs a full validation of the WSDL, including processing of the imported schemas and WSDLs. Complete validation can take several minutes depending on the number of imported schemas and WSDLs. No requests are sent to the operations exposed in the WSDL.• Test: Connects to the WSDL URL and performs a syntax check on the WSDL. No requests are sent to the operations exposed in the WSDL.

2. Wait for a message about the results of the connection test.
 - If the test was successful, then the connection is configured properly.
 - If the test failed, then edit the configuration details you entered. Check for typos and verify URLs and credentials. Continue to test until the connection is successful.
3. When complete, click **Save**.

3

Add the Oracle Database Adapter Connection to an Integration

When you drag the Oracle Database Adapter into an integration, the Adapter Endpoint Configuration Wizard appears. This wizard guides you through configuration of Oracle Database Adapter endpoint properties.

The following sections describe the wizard pages that guide you through configuration of the Oracle Database Adapter as a trigger or an invoke in an integration.

Topics:

- [Basic Information Page](#)
- [Trigger Polling Page](#)
- [Invoke Stored Procedure Page](#)
- [Invoke SQL Statement Page](#)
- [Table Operation Page](#)
- [Operations on Table Page](#)
- [Summary Page](#)

See [Oracle Database Adapter Capabilities](#).

Note

The Oracle Database Adapter does not support the regeneration of WSDL artifacts. See [Regenerating a WSDL File for Integrations \(in *Using Integrations in Oracle Integration 3*\)](#).

Basic Information Page

Specify a name, description, and operation type on the Basic Info page of each trigger and invoke connection in your integration.

Element	Description
What do you want to call your endpoint?	Identifies the connection with a meaningful name that defines the purpose of connection. For example, <code>CreateEmployeeInDB</code> for a database connection that adds new employee data. The name can include English alphabetic characters, numbers, underscores, and dashes. The name cannot include: <ul style="list-style-type: none">• Blank spaces (for example, <code>My DB Connection</code>)• Special characters (for example, <code>#;83& or righ(t)now4</code>)• Multibyte characters

Element	Description
What operation do you want to perform?	<ul style="list-style-type: none"> • Invoke a Stored Procedure — Select to run a stored procedure on the database. • Run a SQL Statement — Select to run a SQL query on the database. • Perform an Operation On a Table — Select to perform one of the following operations on a table. You can update or insert multiple records in a single request. <ul style="list-style-type: none"> – Insert – Update – Insert or Update (Merge) – Select <p>Notes</p> <ul style="list-style-type: none"> • When operations in a SQL statement such as Update, Concat, and Merge accept values for the inbound invocation of an integration, they do not work. For example, the following query does not work: <pre>select concat(empname, 'ss') from DB_AQ where empno=#empno</pre> <pre>select empno from DB_AQ where empname=concat(#empname, 'YY')</pre> <p>As a workaround, handle these scenarios during payload mapping. For example, perform a concatenation during mapping of the payload. The final output can then be passed as input to the SQL query.</p> <ul style="list-style-type: none"> • IN/BETWEEN operators are not supported with bind parameters. Use greater than (>) and less than (<) operators instead.

Trigger Polling Page

Select the root database table for the service query.

Topics

- [Polling Page](#)
- [Manage Tables Page](#)
- [Relations Page](#)
- [Polling Strategy and Options Page](#)

Polling Page

The following table describes the key information on the Polling page.

Element	Description
Import Tables	Imports tables and the root database table for the service query. A maximum of five tables can be imported.

Element	Description
Remove Tables	Removes the selected table from the service query tables list.
Review and Manage relationships reachable from the root database table.	Appears after importing tables. Select Edit to open the Relations page where you can view, create, and remove relationships between tables.
Review and verify the attributes created from the imported tables and relationships.	Appears after importing tables. Select Edit to open the Attributes Filtering page where you can review, verify, select or deselect the attributes in the object model created from the imported tables and the defined relationships.
Polling Strategy and Options	Appears after importing tables. Select Edit to open the Polling Strategy and Options page where you can define the polling strategy and specify polling options.

Manage Tables Page

The following table describes the key information on the Manage Tables page. The Manage Tables page appears when you select **Import Tables** on the Polling page.

Element	Description
Schema	Select the schema for the tables and views you are importing. Special characters (for example, #) are not supported in schema names. See Special Characters are Not Supported in Schema Names .
Table Type	The type of the table to which the schema or view is applied. The list allows these selections: <ul style="list-style-type: none"> All — selects all available tables and views. Materialized View — selects materialized views. Materialized View Log — selects materialized view logs. Synonym — selects the alias for the schema object. Table — selects tables. View — selects views.
Table Name	Specify the table name. Table names are case sensitive.
Search	Click to search for the specified table.
Available Tables	Lists the tables that meet the selection criteria.
Selected Tables	Lists your table selection.
Primary Keys	Appears when you select tables without a primary key defined. Selects the virtual primary key for the table. Note: Having the primary key at the database level is the best practice.

Relations Page

The following table describes the key information on the Relations page. The Relations page appears when you select **Edit** for the Review and Manage relationships reachable from the root database table option on the Polling page.

Element	Description
Create New	Opens the Create Relation page with these options: <ul style="list-style-type: none"> • Parent Table — selects the parent table for the relationship between tables. • Child Table — selects the child table for the relationship between tables. • Relationship — defines the relationship between the parent and child tables. • Attribute Name — Applies attributes to the table relationship. • Mapping — Displays the mapping for the table relationship.
Detach	Opens the Relationships list in a new window.

Polling Strategy and Options Page

The following table describes the key information on the Polling Strategy and Options page. The Polling Strategy and Options page appears when you select **Edit** for Polling Strategy and Options on the Polling page.

Element	Description
Logical Delete Field	Selects a field in the root database table. To allow the selection, polling must be enabled in the Status column.
Read Value	Identifies the value that is used to indicate a row has been read. For example, PROCESSED. Surrounding quotes are not required.
Unread Value	Indicates the rows to process. Only rows with Logical Delete Field and column values that match the Unread Value are read.
Rejected Value	Set to REJECTED . If the incoming message is greater than the threshold size, that particular record is updated to REJECTED instead of READ . If the outbound operation returns a response greater than the size allowed, the response message is ignored and a fault response is sent to the calling client. For details about supported sizes, see Service Limits in <i>Provisioning and Administering Oracle Integration 3</i> .
Polling Frequency (Sec)	Specifies the polling frequency (in seconds) for new records or events.

Invoke Stored Procedure Page

Enter the invoke stored procedure values. The Invoke a Stored Procedure page appears when you select **Invoke a Stored Procedure** as the operation to perform on the Basic Info page.

You can specify the following values on the Invoke a Stored Procedure page.

- Select the database schema that includes the data you want to query (for example, you want to query details about an employee based on their employee ID).
- Select a stored procedure or package from the list that is displayed after you select the database schema.

Note

- Stored procedures return binary large objects (for example, BLOB database data types) as base64Binary types in XML. Depending upon the use cases, these can be decoded during transformation using inbuilt functions such as decodeBase64 or can be passed as-is for downstream processing.
- Adapter input/output parameters are defined based on the stored procedure IN/OUT parameters. The IN parameter corresponds to the request and the OUT parameter is translated as the response. Procedures without parameters are not listed in the Adapter Endpoint Configuration Wizard for database versions 18c and above. You can pass a dummy parameter or create a wrapper procedure with a dummy parameter to list it in the wizard.

Element	Description
Select Schema	Select a database schema from the list. This action refreshes the page to display fields for selecting a package or procedure to invoke. Special characters (for example, #) are not supported in schema names. See Special Characters are Not Supported in Schema Names .
Select Package	Select the database package. This action refreshes the page to display the procedures available for the package. When importing a predefined integration package containing PLS or SQL stored procedures, the wrapper package is not recreated in the target database. To add the wrapper package, confirm JPublisher is installed on the target database and define the original stored procedure. After confirming JPublisher is installed and the stored procedure is defined, open the PL/SQL Wrapper utility and execute the add scripts command to add the scripts included in the exported inventory archives (IAR) file.
Select Procedure	Displays the in (inbound), out (outbound), and in/out (inbound/outbound) parameters for the selected package.
Arguments	Display the in, out, and in/out parameters that are passed with this procedure.

Invoke SQL Statement Page

Enter the SQL statement values. The Run a SQL Statement page appears when **Run a SQL Statement** is selected as the operation to perform on the Basic Info page. You can specify the following values on the Run a SQL Statement page.

Note

- Do not use schema/database names in SQL queries. Configure the details in the connection. For example:

```
Update HR.employee set HR.employee.first_name = 'Name' where
HR.employee.employee_id='1'
```

can be changed to a simple query, such as:

```
Update employee set first_name = 'Name' where employee_id='1'
```

where `HR` is used in the connection details. This restricts a user with specific privileges to a particular schema/database.

- When configuring the adapter as an invoke connection, ensure that proper spaces are provided between key words for a pure SQL statement. For example, the following statement fails during integration activation because there is no blank space between `VALUES` and `(#`.

```
INSERT INTO table_name VALUES(#EMPNO, #EMPNAME)
```

Add a blank space between `VALUES` and `(#`, and the statement is successfully processed.

```
INSERT INTO table_name VALUES (#EMPNO, #EMPNAME)
```

- When configuring the adapter as an invoke connection, define all bind parameters in the same order and define the parameters that takes absolute values at the end.

```
INSERT INTO table_name (EMPNO, EMPNAME, EMPUUID, EMPPHONE,
EMPHIREDATE) VALUES (#EMPNO,
#EMPNAME, Sys_guid(), NULL, SYSDATE)
```

Element	Description
SQL Query	Identifies the SQL query.
Validate SQL Query	Validates the SQL query syntax.
Status	Displays the SQL query syntax validation status. When syntax validation is successful, the message <code>Success!</code> appears.

Table Operation Page

You can update or insert multiple records in a single request.

Note

When you change the structure of a table (for example, you add or delete a column), you must re-import the table by doing a re-edit in the Adapter Endpoint Configuration Wizard. Go to the Import Tables page and re-import the same table, then click **OK > Next > Done** to complete the wizard. Only then are the table changes reflected in the integration.

Topics:

- [Import Tables Page](#)
- [Relationships Page](#)
- [Create Relationship Page](#)
- [Attribute Filtering Page](#)
- [Advanced Options Page](#)
- [Operations on Table Page](#)

Import Tables Page

Filter and select the tables to import based on the selected schema. These tables are used to generate a SQL statement based on the operation selected.

You can import the following number of tables:

- A maximum of three tables for insert, update, and insert or update actions
- A maximum of five tables for the select - operation on table feature
- A maximum of five tables for the polling feature

Element	Description
Schema	Select the schema to use. The page is refreshed to display the tables available for selection.
Name Filter	Filter the display of tables.
Available	Select the tables on which to insert or update records.
Selected	Displays the selected tables.

Relationships Page

Review the relationships between the selected tables and optionally create, remove, or rename relationships. These relationships are used in the insert or update SQL statements.

Element	Description
Relationships Table	Displays the relationships defined on the root database table and any related tables (one-to-one or one-to-many).
Create	Click to create new relationships.
Remove	Click to remove a selected relationship.
Rename	Click to rename a selected relationship.

Create Relationship Page

Specify the parent and child relationships to use in the SQL statement.

Element	Description
Parent Table	Select the parent table.
Child Table	Select the child table.
Mapping Type	Select the mapping type (one-to-many, one-to-one, or one-to-one with the foreign key on the child table). For example, if you selected Employees as the parent table and Departments as the child table, the following options are displayed: <ul style="list-style-type: none"> Employees has a 1:1 Relationship with Departments Employees has a 1:1 Relationship with Departments (Foreign Key on Child table) Employees has a 1:M Relationship with Departments
Parent and Child Table	Associate the foreign key fields to the primary key fields.
Relationship Name	Optionally name the relationship (a default name is generated).

Attribute Filtering Page

Filter out the attributes to exclude.

Element	Description
Attributes Tree	Deselect any attributes to exclude from the database query. You cannot exclude primary key attributes.

Advanced Options Page

Provide additional advanced options such as sequencing. This is only valid for the insert and merge operations.

Element	Description
Table	Displays the selected table.

Element	Description
Sequence	<p>Specify that the primary key is assigned from a sequence on any insert. Click Search and select a sequence from the list.</p> <p>Only the sequences of the user who owns the adapter on the Connections page are listed.</p> <p>The adapter generates sequence numbers in a batch of 50. Configure sequences in increments of 50.</p> <p>The first sequence value is not the <code>START WITH</code> definition in a database sequence after another sequence is used. For example, you use the Insert option of the Perform an Operation on a Table operation and the database sequence for primary key generation. Note that the generated IDs then start with a value that is 50 less than the sequence start value. This is the expected behavior. You can create a sequence by adjusting the start value by 50 or running <code>select seq.nextval from dual</code> once to consume the first 50 after creation.</p>

Operations on Table Page

Select the database tables. To use the bulk extract feature, you must choose the **SELECT** operation from the **Perform an Operation On a Table** list on the Basic Info page.

Operations on Table Page

Element	Description
Schema	Select the database schema that includes the tables to process.
Table Name	Enter a filter with which to search the schema (for example, <code>%TAB</code> to search for tables with <code>TAB</code> in the name).
Table Type	<p>Specify the table type filter to get a subset of the appropriate database objects, then click Search.</p> <ul style="list-style-type: none"> • ALL • MATERIALIZED VIEW • MATERIALIZED VIEW LOG • SYNONYM • TABLE • VIEW
Filter By	Enter the initial letters to filter the display of table names.
Table Names	<p>Select the tables to import.</p> <p>Note: It is recommended that you to import the tables together for the adapter to automatically recognize the relationship. If you import the tables separately, you must explicitly create the table relationship.</p>
Import Tables	Click to import the tables. The page is refreshed for you to select the parent database table.
Select the parent database table	Select the parent (root) table from the list. If using multiple related tables, this is the top-level parent table in the relationship. After making your selection, the page is refreshed for you to view and edit the table relationships.
Add Remove Tables	Click to add more tables or remove tables no longer in use.

Element	Description
Review and manage parent database table relationships	Click Edit to view and edit the table relationships. The relationships automatically identified by the adapter are displayed. See Review and manage parent database table relationships Option .
Review and filter columns from selected database tables	Click Edit to view and edit the table attributes. You can deselect any attributes to exclude from the database queries. Primary key attributes cannot be excluded. See Review and filter columns from selected database tables Option .
Review and edit SQL query	Click Edit to view and edit the default SQL query. See Review and edit SQL query Option . Note: This field is available for a <code>Select</code> operation on the table.

Review and manage parent database table relationships Option

Table 3-1 - Review and manage parent database table relationships Option

Element	Description
Create New Relations	Click to create a new relationship. View the existing parent and child table relations automatically created by the adapter.

Review and filter columns from selected database tables Option

Table 3-2 - Review and filter columns from selected database tables Option

Element	Description
Attributes Tree	View and deselect attributes automatically created by the adapter.

Review and edit SQL query Option

Note

This is only applicable for a `Select` operation on a table.

Table 3-3 - Review and edit SQL query Option

Element	Description
SQL Edit	Click to manually edit the query in the SQL Query field. Use this field to add any necessary arguments or parameters.
Maximum Number of Records to be fetched	Select the number of records to fetch with this SQL query.

Summary Page

You can review the specified adapter configuration values on the Summary page.

Element	Description
Summary	<p>Displays a summary of the configuration values you defined on previous pages of the wizard.</p> <p>The information that is displayed can vary by adapter. For some adapters, the selected business objects and operation name are displayed. For adapters for which a generated XSD file is provided, click the XSD link to view a read-only version of the file.</p> <p>To return to a previous page to update any values, click the appropriate tab in the left panel or click Go back.</p> <p>To cancel your configuration details, click Cancel.</p>

4

Implement Common Patterns Using the Oracle Database Adapter

You can use the Oracle Database Adapter to implement the following common patterns.

Topics:

- [Migrate an On-Premises Oracle Database Instance to an Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse Database Instance](#)
- [Define Fault Mapping in Integrations](#)
- [Define a Select Operation on Database Tables](#)

Migrate an On-Premises Oracle Database Instance to an Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse Database Instance

Perform the following steps if you want to migrate from an on-premises Oracle Database instance to an Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse database instance.

1. Migrate all the required database objects, stored procedures, wrapper procedures, and tables to the destination Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse database instance.

Note

When migrating integrations that include stored procedures with PL/SQL types, you must migrate the wrappers created by the integration along with the database objects before reactivating the integrations. If there are any modifications to the stored procedures performed after the migration, you must re-edit the Adapter Endpoint Configuration Wizard and reselect the stored procedure for the changes to be enabled. This re-edit does not create any wrappers and uses the actual stored procedures instead.

2. Change the Oracle Database Adapter connection details to point to an Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse database instance.
 - a. Go to the Connection page for the Oracle Database Adapter.
 - b. Go to the **Properties** section.
 - c. Specify the new host name.
 - d. Specify the new service name and click **OK**.
 - e. Go to the **Security** section.
 - f. Select **Oracle Wallet** from the **Security Policy** list.

- g. In the **Wallet** field, click the **Upload** icon to upload the wallet file.
- h. Specify the wallet password and reconfirm it.
- i. Specify the database service username.
- j. Specify the database service password, reconfirm it, and click **OK**.
- k. Configure an agent group.

Note

When migrating an on-premises Oracle Database instance to Oracle Autonomous Transaction Processing or Oracle Autonomous Data Warehouse, it is mandatory to use the connectivity agent in the connection.

3. Test the connection.
4. Once the test is successful, click **Save** to save the connection details.
5. Reactivate the integrations.

Define Fault Mapping in Integrations

You can define fault mappings in integrations. This mapping transforms an Oracle Database Adapter fault when used as a target into the source format defined in its WSDL. You add the Oracle Database Adapter to a scope action in an integration and select this fault in the **Fault Handler** part of the scope action.

A `serviceInvocationError` fault mapping is defined in the WSDL

In the mapper, the elements of `serviceInvocationError` provide details about the runtime fault:

- `type`: The type of fault.
- `title`: The title of the fault.
- `detail`: Information about the fault cause.
- `errorCode`: Information about the fault code.
- `remedialAction`: How to fix the fault.

This fault structure is populated during runtime when any exception occurs in an outbound invocation (for example, a primary key violation).

If using the adapter in a map data integration, only `reason`, `detail`, and `errorCode` are available in the mapper.

Assume an exception (for example, `NumberFormatException`) occurs in an invoke (outbound) adapter. Exceptions are mapped in fault mappings and returned to the source format as defined in its WSDL contract. In this use case, a stored procedure is used that accepts only an integer type. If you invoke the adapter by passing a noninteger value, Oracle Integration reports the fault back to you.

To define fault mapping:

1. Create connections for the SOAP Adapter and the Oracle Database Adapter.
2. Create an application integration.
3. Drag the SOAP Adapter into the integration canvas as a trigger.


The Adapter Endpoint Configuration wizard is displayed.

4. Configure the SOAP Adapter (for this example, named **s1**).
5. From the **Actions** palette, drag a **Scope** action below the SOAP Adapter.
6. From the **Invokes** palette, drag the Oracle Database Adapter inside the scope.

The Adapter Endpoint Configuration wizard is displayed.

7. Select an operation to invoke any stored procedure that accepts only an integer as the input parameter (for this example, the adapter is named **db1**).
8. Define mappings for the Oracle Database Adapter.
9. In the integration canvas, click **Reposition** and move the **s1** map inside the scope.
10. Define mappings for **s1**.
11. Click the **Fault Handler** part and select **Oracle Database : serviceInvocationError db1**.
12. From the **Actions** palette, drag a **Fault Return** action inside the **Fault Handler** part.
13. Define fault mappings.

The root element for the fault is `serviceInvocationError`. The fault includes other elements that carry the fault details: `type`, `title`, `detail`, `errorCode`, and `remedialAction`. The `detail` element carries information about the fault cause. The `remedialAction` element suggests the action to fix the fault.

14. From the  menu, select **Tracking** and define the tracking field.
15. Activate and invoke the integration by passing a string value (that is, a noninteger value) from the SOAP UI.

```
<typ:getOrganization>
  <typ:partyId>test</typ:partyId>
</typ:getOrganization>
```

The fault response returns information similar to the following:

```
<nstrgmpr:code>XSD object conversion error</nstrgmpr:code>
  <nstrgmpr:message>An error occurred while parsing XML representing a
  Java object.</nstrgmpr:message>
  <nstrgmpr:severity>Unable to convert the XSD element DATA_IN whose SQL
  type is INTEGER and JDBC type is INTEGER. Cause:
  java.lang.NumberFormatException: For input string: "test"</
  nstrgmpr:severity>
  <nstrgmpr:detail>
  <nstrgmpr:code>serviceInvocationError</nstrgmpr:code>
  <nstrgmpr:message>Check to ensure that the XML data describing the object
  matches the definition of the element in the XSD.</nstrgmpr:message>
  <nstrgmpr:detail>
  <nstrgmpr:code/>
  <nstrgmpr:message/>
  <nstrgmpr:severity/>
  <nstrgmpr:detail/>
  </nstrgmpr:detail>
  <nstrgmpr:detail xsi:type="nstrgmpr:ServiceErrorMessage" xmlns:xsi="http://
  www.w3.org/2001/XMLSchema-instance"/>
</nstrgmpr:detail>
```

```
</nstrgmpr:ServiceErrorMessage>  
</detail>
```

Define a Select Operation on Database Tables

You can define a `SELECT` operation to perform against database tables. This section provides a high level overview of creating an integration in which an Oracle Database Adapter is configured as an invoke connection to retrieve table records from the Oracle Database.

To define a `SELECT` operation on database tables:

1. Configure SOAP Adapter and Oracle Database Adapter connections.
2. Select **Application** in the Create integration panel.
3. Add and configure the SOAP Adapter as a trigger connection in the integration.
The SOAP Adapter is configured to accept an input and return the response received from the invoke connection.
4. Add the Oracle Database Adapter as an invoke connection in the integration.
This invokes the Adapter Endpoint Configuration Wizard.
5. On the Basic Info page, select **Perform an Operation On a Table** as the type of operation to perform and **Select** as the operation to perform on the table.
6. On the Operate On Table page, specify the schema and tables to import, and click **Import Tables**. For this example, the following values are specified.
 - **Schema:** HR
 - **Table Type:** TABLE
 - **Table Name:** %TAB
 - **Selected Tables:** **EMPLOYEE_TAB** and **DEPARTMENT_TAB**. The tables are imported together for the Oracle Database Adapter to recognize the relation between the tables.

Basic Info Invoke a Stor... Run a SQL St... **Operation On...** Summary

Operation On Table

Search tables to import

Schema *
HR

Table Name
%TAB

Table Type
TABLE

Search

Filter By
Name

Available

- DBAAS_LOG_TAB
- DBAAS_VIEW_TAB

Selected

- DEPARTMENT_TAB
- EMPLOYEE_TAB

Import Tables

The page is refreshed for you to select the parent (root) database table.

7. Select the parent table (for this example, **DEPARTMENT_TAB** is selected).

This page enables you to:

- View the automatically created table relationships and create new ones.
- View and deselect attributes.
- View and edit the automatically created SQL query.

Operation On Table

Select the parent database table

You must select the parent database table. If you are using multiple related tables, then this is the highest-level table (or top-level parent table) in the relationship tree. You can either add more tables or remove the ones that are no longer used.

--- select one ---

DEPARTMENT_TAB
EMPLOYEE_TAB

[Add](#) | [Remove Tables](#)

Review and manage parent database table relationships
[Edit](#)

You can review and manage all the relationships that are reachable from parent table. Relationship created via Adapter wizard are used by Adapter internally and doesn't have any impact on the database.

Review and filter columns from selected database tables
[Edit](#)

Use the Columns Filtering section to review and verify the columns in the object model created from the selected tables and the defined relationships. Deselect columns that you want to exclude from the database query.

Review and edit SQL Query
[Edit](#)

Use the SQL Query section to specify the selection criteria. You can add additional criteria's using Graphical Expression Builder or can define custom SQL select criteria using SQL Edit.

8. View your selections on the Summary page. Links to the tables you selected to import and SQL query you specified are provided.
9. Click **Done** to exit the Adapter Endpoint Configuration Wizard.
10. Complete the integration by performing mapping and tracking tasks.
11. Activate the integration.
12. Copy the link to invoke the integration from under the **How to Run** link.
13. Invoke the integration from a tool such as the SOAP UI.
14. Review the values returned by the Oracle Database Adapter.

5

Troubleshoot the Oracle Database Adapter

Review the following topics to learn about troubleshooting issues with the Oracle Database Adapter.

Topics:

- [Set Null to Collections](#)
- [Resolve Error ORA-04068: existing state of packages has been discarded](#)
- [Unable to Execute Stored Procedures with a PL/SQL Table When the Table Uses a Different Schema](#)
- [Wrappers Require Regeneration After Objects Change](#)
- [Special Characters are Not Supported in Schema Names](#)
- [Resolve Message Time Out Errors](#)
- [Recover from a CLOUD-0005: Unable to Establish Connection Error](#)

Additional integration troubleshooting information is provided. See Troubleshoot Oracle Integration in *Using Integrations in Oracle Integration 3* and the [Oracle Integration Troubleshooting page](#) on the Oracle Help Center.

Set Null to Collections

You may sometimes want to pass null to the adapter while mapping collections. If you do not map those collections, an `ORA-06550 pl/sql statement ignored error` can occur. To avoid this error, map the collections using the mapping component attribute `name='xsi:nil'`. This action ensures that a null collection is propagated to the adapter.

Resolve Error ORA-04068: existing state of packages has been discarded

If you receive a `java.sql.SQLException: ORA-04068: existing state of packages has been discarded` error, then perform the following tasks.

1. Ensure that the stored procedure is stateless.
2. Avoid using global variables.

Unable to Execute Stored Procedures with a PL/SQL Table When the Table Uses a Different Schema

You receive the following error when you attempt to use a stored procedure that contains a PL/SQL record, PL/SQL table, or boolean data type and the stored procedure is not defined in the schema used to create the connection. This is deliberately restricted because PL/SQL

record, PL/SQL table, or boolean data types require wrappers to be generated that may fail when you do not have the required permissions on the selected schema.

Please select procedure from the same schema based on the username that was used to create connection. This procedure contains PL/SQL RECORD, PL/SQL TABLE, or BOOLEAN data type and hence wrapper generation can fail due to privilege problems.

As a workaround, move the stored procedure to the schema used to create the connection. If you cannot change the schema, then define a wrapper stored procedure in the schema that does not rely on PL/SQL record, PL/SQL table, or boolean data types. Instead, you can use SQL object types.

Wrappers Require Regeneration After Objects Change

The adapter automatically generates the wrapper packages and objects for stored procedures used in an integration when PL/SQL boolean, table, and record types are involved. If the underlying objects (that is, the IN/OUT parameters) are changed, the wrappers must be regenerated after you delete the existing wrapper's packages and objects. During design time or activation, the wrappers are regenerated automatically with the latest object definitions available in the database.

Special Characters are Not Supported in Schema Names

If you use schema names with special characters such as #, integration activation fails. For stored procedures, the schema derives the names of the types in the XSD. If the type name contains #, the XSD has problems with the name. Use a schema name that does not contain any special characters.

Resolve Message Time Out Errors

The following errors can occur during both design time (in both the inbound and outbound directions) and runtime.

- Message not received within X seconds of wait interval

There can be multiple reasons for a time out occurring, such as connectivity issues between Oracle Integration and the connectivity agent or the connectivity agent being disabled. Ensure that the connectivity agent is up and running if you see this error. Check the status of the agent under **Dashboards > Agents** in Oracle Integration.

Note

When using the Oracle Database Adapter to connect to an Oracle E-Business Suite Database instance, you may notice this error occurring continuously. It is recommended that you use the Oracle E-Business Suite Adapter instead of the Oracle Database Adapter to access the Oracle E-Business Suite Database instance.

- `SQLState: 08006 errorCode: 17002 message: IO Error: Connection timed out`

This error can occur when database sessions are terminated by a network firewall or some other reason. The adapter automatically recovers during this state and new connections are created. However, a few requests using old connections may time out. Ensure that the firewall is not terminating idle connections.

- Timeouts can also occur due to design problems. Avoid certain antipatterns. For example, do not explicitly update the same table as an invoke operation when the same table is getting polled on the trigger side.

Recover from a CLOUD-0005: Unable to Establish Connection Error

If you receive the following error:

```
CLOUD-0005: Unable to establish connection.  
Please check connection parameters · IO Error: Invalid connection string  
format, a  
valid format is: "host:port:sid" and the Service Name contains HYPHEN "-"
```

Perform the following steps:

1. Check if the service name can be modified to remove the hyphen (-).
2. If you cannot remove the hyphen, prefix the host name in the database connection with // (for example, //host.test.com).